*Digital India*
Power To Empower

सत्यमेव जयते

150 YEARS OF CELEBRATING THE MAHATMA

**Ministry of Electronics & Information Technology**
Government of India

**ANNUAL REPORT 2018-19**

मैं नहीं हम
i to WE

# Self4Society
Bringing synergy for societal change

मैं नहीं हम

One **Aadhaar**
Many Benefits

Eco-Bin

"I see technology as a means to empower and as a tool that bridges the distance between hope and opportunity"

- Narendra Modi
Prime Minister

"The future is very promising because of the growing digital economy of India, large size of the market, demographic dividend and passion for technology"

- Ravi Shankar Prasad
Union Minister for Electronics &
Information Technology and Law & Justice

"The Digital India has potential to rapidly transform the lives of people on the margins and touch the lives of the weakest, farthest and the poorest citizen of India as also change the way our nation will live and work."

- S S Ahluwalia
Minister of State for Electronics &
Infromation Technology

सत्यमेव जयते

**Ministry of Electronics & Information Technology  (MeitY)**
**Government of India**

# ANNUAL REPORT
# 2018-19

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# Executive Summary

The Digital India programme of the Government of India is an umbrella programme that is designed to transform India into a knowledge-based economy and a digitally empowered society by ensuring digital services, digital access, bridging the digital divide, digital inclusion and digital empowerment. Such an objective is sought to be achieved with the power of technology that is affordable, developmental and inclusive.

Digital India architecture has transformed governance processes for delivery of services. Digital India weaves together a large number of ideas and thoughts into a single comprehensive vision to ensure that benefits of development reach each and every citizen of the country in equal measure along with the need for faster and timely service delivery. This vision is centred on Digital Identity, Digital Infrastructure, Digital Literacy & Skilling, Digital Delivery of Services, Digital Payment, Digital Entrepreneurship and Industry and Cyber security.

One of the key vision areas of the Digital India Programme is ensuring Digital Infrastructure as a core utility to every citizen. Recognising that robust digital infrastructure from the foundation of Digital India various specific initiatives has been undertaken towards the development of Digital Infrastructure in the country such as Jan Dhan-Aadhaar-Mobile(JAM) trinity, Bharat Net, NKN, MeghRaj, Common Service Centres, etc.

Through Aadhaar, the Government has provided digital identity to 123 crore residents of the country with 99 % coverage of adult population. The combination of Jandhan bank Accounts, mobile phones and digital identity through Aadhaar i.e. JAM trinity is helping the poor in receiving the benefits directly into their bank account. A total of Rs. 6.21 lakh crore have been disbursed through Aadhaar based DBT to beneficiaries of 438 Government schemes which, have led to saving of over Rs. 1.1 lakh crore in the last 4 years by removing fictitious claimants.

National Optical Fibre Network (NOFN) under Bharat Net envisaged as an information super-highway through the creation of a robust middle-mile infrastructure for reaching broadband connectivity to Gram Panchayats to assure digital access. Over 3 lakh km optical fibre cable has been laid connecting 1.21 lakh Gram Panchayats.

National Knowledge Network (NKN) has established a strong and a robust Indian network that will be capable of providing secure and reliable, highspeed connectivity. National Knowledge Network (NKN) is inter-connecting system, which connects all knowledge and research institutions in the country through a high bandwidth network. NKN aims to interconnect more than 1,500 education and

research institutes till 15 February 2019, 1,690 education and research institutes have been connected under NKN.

In order to utilise and harness the benefits of Cloud Computing, the Government has embarked upon an ambitious initiative - GI Cloud, which has been named as MeghRaj. The focus of this initiative is to accelerate delivery of e-services in the country, while optimising ICT spending of the Government. This will ensure optimum utilisation of the infrastructure and will make the development and deployment of e-Governance applications. 960 applications are running on 14,000 virtual servers.

With the objective of enhancing the ease of living of citizens, Digital delivery of services providing access to Government services at the doorstep of the citizens, especially in the remote areas, in an affordable manner. Common Services Centres (CSCs) are bringing e-Services to the doorsteps of people in the rural areas in an affordable manner. There are around 3.12 lakh CSCs across the country providing over 350 services ranges across sectors like education, health, agriculture etc. and have generated employment to 12 lakh persons including 55,000 women. National Scholarship Portal has 1.4 crore students registered and scholarships worth Rs 5,295 crore disbursed in the last three years. Jeevan Pramaan has improved the ease of verification of pensioners using Aadhaar. 2.48 Crore Digital Life Certificates have been submitted since 2014. DigiLocker provides access to over 349 crore certificates in digital format on a single platform. To make governance easily accessible to people, UMANG (Unified Mobile Application For New Age Governance) is the platform created by the Government that enables access of 339 Government services to the citizens through their mobile phones, thus expanding the digital outreach of the citizens. There has been a stupendous growth in Electronic Transactions (e-Transactions) in various e-Governance services. Over 8,919 crore e-Transactions have been recorded since its inception, till December, 2018.

Under Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA), the Government is implementing the world's largest digital literacy programme under which 1.96 crore people in rural backward areas have already been imparted training to become digitally literate and a total of 6 crore will be trained, thus, bridging the digital divide and helping people access benefits of the digital world.

Increased use of Digital Payment in the country has brought about transparency and accountability. With the aim of promoting Digital payments and to establish a robust, secure and inclusive National Digital Payment ecosystem BHIM app was launched in 2016. Over the years, digital payment transactions have grown multifold. BHIM/UPI has grown multi-fold in the span of two years. UPI consumers made over 67 crore transactions with a value of over Rs. 1 lakh crore in the month of January, 2019 alonbe. Currently, there are 134 banks offering UPI services to their customers.

The Government of India has been steering the BPO movement to smaller towns to create employment opportunities by promotion of IT/ITeS industry and secure a balanced regional growth by promoting local entrepreneurs, employment to women and differently-abled persons. It has the potential to generate around 1.5 lakh employment opportunities. 53,300 seats are allocated to 184 companies, resulting in setting up of 268 units distributed across 110 locations of 26 States & 2 UTs. BPOs have started operation at several locations, including, Bhaderwah, Budgam, Jammu, Sopore and Srinagar in Jammu and Kashmir, Guwahati, Kohima, Imphal in North-Eastern region, Baddi and Shimla in Himachal Pradesh, Patna and Muzzaffarpur in Bihar, Jaleshwar in Odisha.

The Government is promoting Electronics Manufacturing to accelerate the movement towards Make in India and Make for the world. Towards making India a manufacturing hub for electronics and mobile devices, 268 unique mobile and mobile component manufacturing units have been set up providing direct and indirect employment opportunities to 6.7 lakh citizens.

The National Policy on Software Products 2019 will accelerate India's emergence as a Software Product Nation. To leverage Artificial Intelligence and related emerging technologies in the interest of citizens and businesses, a National Programme on 'Artificial Intelligence' has been envisaged by my Government, to be catalysed by the establishment of National Centre on Artificial Intelligence as a hub along with Centres of Excellence.

With an aim to provide structural and fundamental support with right mix of awareness, training, hand-holding, lab and incubation support, Govt of India recently announced setting-up of Centre of Excellences in specific domains such as IoT and Electronics Products, Fintech, IoT in Agriculture, Virtual & Augmented Reality, Blockchain, Medical Tech, Automative Electronics, Gaming and Animation etc.spread across the country.

The advent of technologies and its fast adoption has generated huge and personalised data that can be used to alleviate societal problems relating to areas such as health, food security, transport and urban planning. In order to ensure growth of the digital economy while keeping personal data of citizens secure and protected, my Government is working to bring about a Data Protection Framework in India.

In the era of digital world, creation of an inclusive, safe and secure cyberspace is essential. With the massive potential unleashed by the Digital India Programme India is well positioned as a global hub for providing cyber security solutions, developing cyber security R & D plan and providing a large workforce of cyber security experts. To create an inclusive, safe  and secure cyber space for sustainable development, the Cyber Swachhta Kendra(Botnet Clearing and

malware analysis centre) has been set up to provide alerts to users for preventing loses of financial and others data.

Having built a strong foundation of digital infrastructure and vastly expanded digital access and outreach, India is poised for robust growth of digital technologies in all sectors of the economy that will lead to creation of up to $1 trillion of economic value from the digital economy in 2025.

The Annual Report 2018-19 of MeitY is prepared with the objective to disseminate and propagate the success of Digital India Programme and other initiatives of MeitY among citizens. It highlights the provess of Aadhaar enabling Direct Benefit Transfer, JAM trinity, etc., digital platforms engaging citizens and delivering services online, and digital industry with enhanced entrepreneurial and employment opportunities build over expertise of MeitY and its organizations. It covers various initiatives implemented by MeitY, ranging from policy to implementation, empowering society digitally, bridging digital divide and ensuring digital inclusion during the period of 1st January, 2018 to 31st March, 2019. The report showcases India's position in the digital revolution as a country, generating future pathways, powered by technology that is affordable, developmental and sustainable.

# Chapter 1

# Overview
## Vision, Mission, Objectives, Structure and Functions of MeitY



## 1.1 Introduction

Ministry of Electronics and Information Technology (MeitY) is responsible for formulation, implementation and review of national policies in the field of Information Technology, Electronics and Internet (all matters other than licensing of Internet Service Provider).

## 1.2 Vision

e-Development of India as the engine for transition into a developed nation and an empowered society.

## 1.3 Mission

To promote e-Governance for empowering citizens, promoting the inclusive and sustainable growth of the Electronics, IT and ITeS industries, enhancing India's role in Internet Governance, adopting a multipronged approach that includes development of human resources, promoting R&D and innovation, enhancing efficiency through digital services and ensuring a secure cyber space.

## 1.4 Objectives

1. **e-Government:** Providing e-infrastructure for delivery of e-services

2. **e-Industry:** Promotion of electronics hardware manufacturing and IT-ITeS industry

3. **e-Innovation/R&D:** Implementation of R&D Framework - Enabling creation of Innovation/ R&D Infrastructure in emerging areas of ICT&E/ Establishment of mechanism for R&D translation

4. **e-Learning:** Providing support for development of e-Skills and Knowledge network

5. **e-Security:** Securing India's cyber space

6. **e-Inclusion:** Promoting the use of ICT for more inclusive growth

7. **Internet Governance:** Enhancing India's role in Global Platforms of Internet Governance.

## 1.5 Functions of Ministry of Electronics and Information Technology (Electroniki Aur Soochana Praudyogiki Mantralaya)[1]

1. Policy matters relating to information technology; Electronics; and Internet (all matters other than licensing of Internet Service Provider).

2. Promotion of internet, IT and IT enabled services.

   2 A. Promotion of Digital Transactions including Digital Payments.[2]

3. Assistance to other departments in the promotion of E-Governance, E- Commerce, E- Medicine, E-Infrastructure, etc.

4. Promotion of Information Technology education and Information Technology-based education.

5. Matters relating to Cyber Laws, administration of the Information Technology Act, 2000 (21 of 2000) and other IT related laws.

6. Matters relating to promotion and manufacturing of Semiconductor Devices in the country excluding all matters relating to Semiconductor Complex Limited (SCL), Mohali.[3]

7. Interaction in IT related matters with international agencies and bodies e.g. Internet for Business Limited (IFB), Institute for Education in Information Society (IBI) and International Code Council – online (ICC).

8. Initiative on bridging the Digital Divide: Matters relating to Digital India Corporation (DIC)[4].

9. Promotion of Standardisation, Testing and Quality in IT and standardisation of procedure for IT application and Tasks.

10. Electronics Export and Computer Software Promotion Council (ESC).

11. National Informatics Centre (NIC).

12. Initiatives for development of Hardware/ Software industry including knowledge– based enterprises, measures for promoting IT exports and competitiveness of the industry.

13. All matters relating to personnel under the control of the Ministry[5].

14. Unique Identification Authority of India (UIDAI)[6].
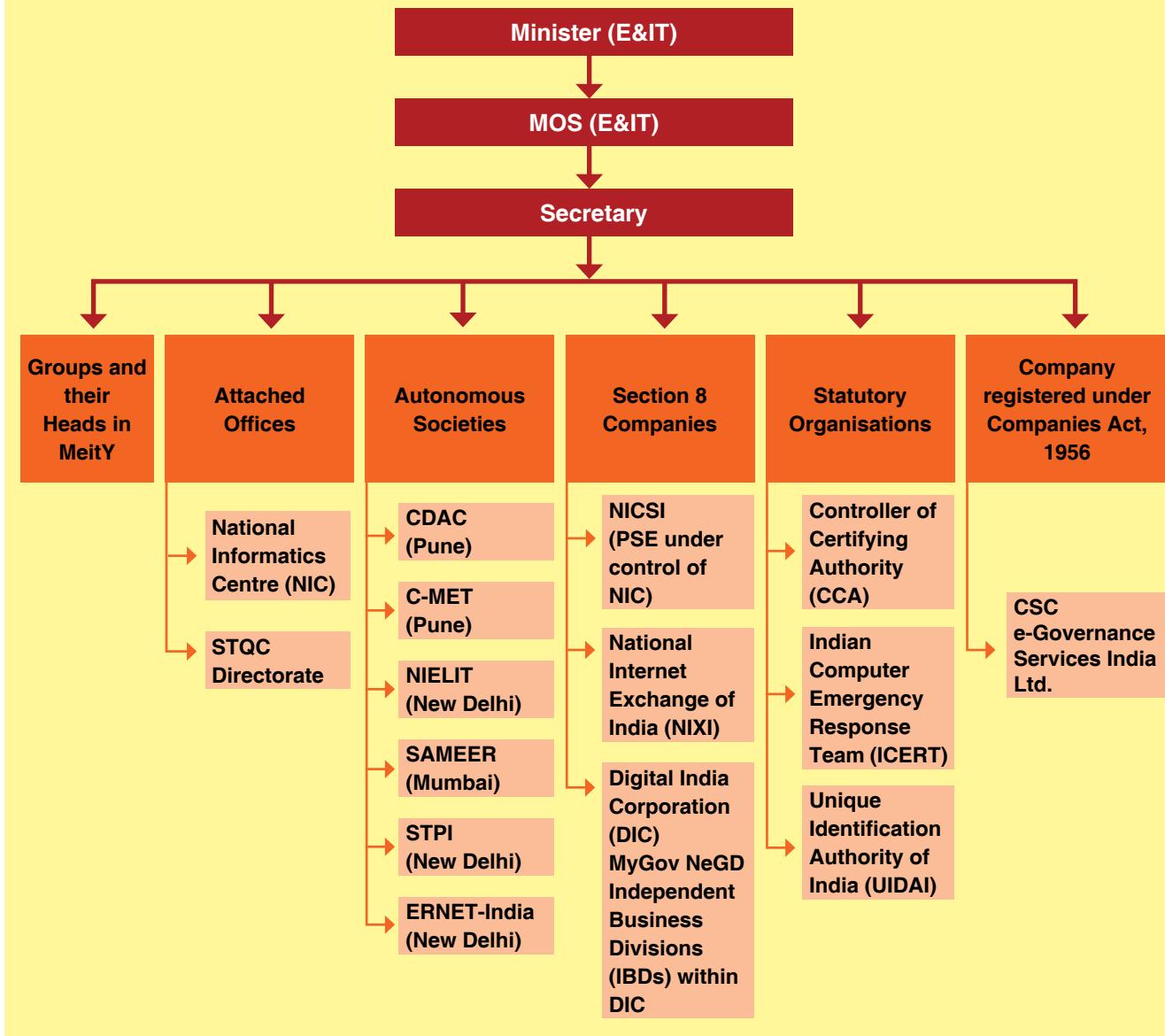
## 1.6 Organisation Structure:

The Secretariat of the Ministry of Electronics and Information Technology (MeitY) is headed by Secretary, who is assisted by AS and FA, and Group Coordinators and Heads of Organisations under the administrative charge of MeitY. The organisation chart is as follows:-

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1. Inserted vide Amendment series no.327 dated 16.07.2016. Earlier (as Department) modified vide Amendment series no.300 dated 26.02.2012
2. Inserted vide Amendment series no. 332 dated 13.02.2017.
3. Inserted vide Amendment series no.279 dated 01.03.2005 and further modified vide no.322 dated 17.03.2016.

4. Modified vide Amendment series no. 345 dated 17.10.2018.
5. Modified vide Amendment series no.281 dated 01.09.2005, Further modified vide amendment series no.327 dated 16.07.2016.
6. Inserted vide Amendment series no.318 dated 12.09.2015 (Earlier inserted under Planning Commission vide Amendment Series no.296 dated 22.02.2010, and in NITI Aayog vide series no.312)
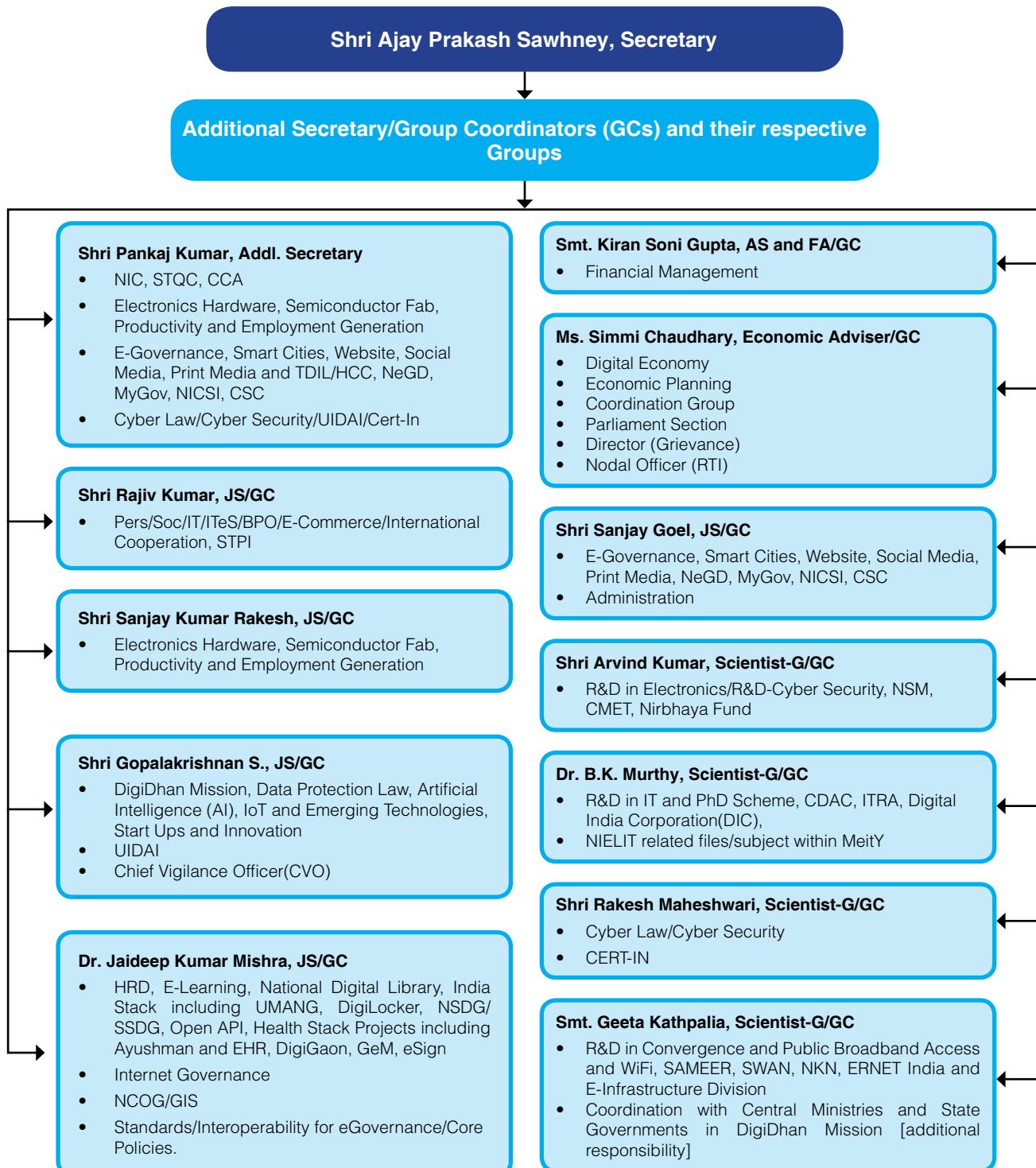
**MINISTRY OF ELECTRONICS AND INFORMATION TECHNOLOGY (MeitY) ORGANISATION(S) STRUCTURE**

```
                        Minister (E&IT)
                              │
                          MOS (E&IT)
                              │
                          Secretary
                              │
   ┌──────────┬──────────┬──────────┬──────────┬──────────┐
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| Groups and their Heads in MeitY | Attached Offices | Autonomous Societies | Section 8 Companies | Statutory Organisations | Company registered under Companies Act, 1956 |
|---|---|---|---|---|---|

**Attached Offices:**
- National Informatics Centre (NIC)
- STQC Directorate

**Autonomous Societies:**
- CDAC (Pune)
- C-MET (Pune)
- NIELIT (New Delhi)
- SAMEER (Mumbai)
- STPI (New Delhi)
- ERNET-India (New Delhi)

**Section 8 Companies:**
- NICSI (PSE under control of NIC)
- National Internet Exchange of India (NIXI)
- Digital India Corporation (DIC) MyGov NeGD Independent Business Divisions (IBDs) within DIC

**Statutory Organisations:**
- Controller of Certifying Authority (CCA)
- Indian Computer Emergency Response Team (ICERT)
- Unique Identification Authority of India (UIDAI)

**Company registered under Companies Act, 1956:**
- CSC e-Governance Services India Ltd.

In order to operationalise the objectives of MeitY, schemes are formulated and implemented, either directly or through its Responsibility Centres (Organisations/Institutions) under its jurisdiction. To make the technology robust and state-of-the-art, collaborations with the academia and the private/public sector is also sought. MeitY has two Attached Offices (viz., NIC, STQC), six Autonomous Societies (viz., CDAC, CMET, NIELIT, SAMEER, STPI and ERNET India), three Section 8 companies [viz., NICSI, NIXI and Digital India Corporation (DIC)], three Statutory Organisations (viz., CCA, ICERT and UIDAI) and one Company registered under Companies Act. 1956 (viz., CSC e-Governance Services India Ltd.) under its charge to carry out the business allocated to the Ministry.

**Shri Ajay Prakash Sawhney, Secretary**

**Additional Secretary/Group Coordinators (GCs) and their respective Groups**

**Shri Pankaj Kumar, Addl. Secretary**
- NIC, STQC, CCA
- Electronics Hardware, Semiconductor Fab, Productivity and Employment Generation
- E-Governance, Smart Cities, Website, Social Media, Print Media and TDIL/HCC, NeGD, MyGov, NICSI, CSC
- Cyber Law/Cyber Security/UIDAI/Cert-In

**Shri Rajiv Kumar, JS/GC**
- Pers/Soc/IT/ITeS/BPO/E-Commerce/International Cooperation, STPI

**Shri Sanjay Kumar Rakesh, JS/GC**
- Electronics Hardware, Semiconductor Fab, Productivity and Employment Generation

**Shri Gopalakrishnan S., JS/GC**
- DigiDhan Mission, Data Protection Law, Artificial Intelligence (AI), IoT and Emerging Technologies, Start Ups and Innovation
- UIDAI
- Chief Vigilance Officer(CVO)

**Dr. Jaideep Kumar Mishra, JS/GC**
- HRD, E-Learning, National Digital Library, India Stack including UMANG, DigiLocker, NSDG/SSDG, Open API, Health Stack Projects including Ayushman and EHR, DigiGaon, GeM, eSign
- Internet Governance
- NCOG/GIS
- Standards/Interoperability for eGovernance/Core Policies.

**Smt. Kiran Soni Gupta, AS and FA/GC**
- Financial Management

**Ms. Simmi Chaudhary, Economic Adviser/GC**
- Digital Economy
- Economic Planning
- Coordination Group
- Parliament Section
- Director (Grievance)
- Nodal Officer (RTI)

**Shri Sanjay Goel, JS/GC**
- E-Governance, Smart Cities, Website, Social Media, Print Media, NeGD, MyGov, NICSI, CSC
- Administration

**Shri Arvind Kumar, Scientist-G/GC**
- R&D in Electronics/R&D-Cyber Security, NSM, CMET, Nirbhaya Fund

**Dr. B.K. Murthy, Scientist-G/GC**
- R&D in IT and PhD Scheme, CDAC, ITRA, Digital India Corporation(DIC),
- NIELIT related files/subject within MeitY

**Shri Rakesh Maheshwari, Scientist-G/GC**
- Cyber Law/Cyber Security
- CERT-IN

**Smt. Geeta Kathpalia, Scientist-G/GC**
- R&D in Convergence and Public Broadband Access and WiFi, SAMEER, SWAN, NKN, ERNET India and E-Infrastructure Division
- Coordination with Central Ministries and State Governments in DigiDhan Mission [additional responsibility]

## 1.7 Client's/Citizens' Charter (CCC):

Details on CCC are available on MeitY's website, url: www.MeitY.gov.in/clients-citizens-charter (as a part of About MeitY).

# Chapter 2

# Digital India: Power to Empower



Digital India is an umbrella programme to prepare India for a knowledge based transformation. It weaves together a large number of ideas and thoughts into a single comprehensive vision so that each of them is seen as part of a larger goal. The focus of Digital India programme is on being transformative to realize - IT (Indian Talent) + IT (Information Technology) = IT (India Tomorrow) and making technology central to enable change. This programme pulls together many existing schemes. These schemes have been restructured and re-focused and are being implemented in a synchronized manner.

**Vision of Digital India**

The Digital India programme is centred on three key vision areas:

1. Digital Infrastructure as a Utility to Every Citizen
2. Governance and Services on Demand
3. Digital Empowerment of Citizens

**Vision Area 1: Digital Infrastructure as a Utility to Every Citizen includes:**

- Availability of high speed internet as a core utility for delivery of services to citizens
- Providing cradle to grave digital identity that is unique, lifelong, online and authenticable to every citizen
- Mobile phone and bank account enabling citizen participation in digital and financial space
- Easy access to a Common Services Centre
- Shareable private space on a public cloud
- Safe and secure cyber-space.

**Vision Area 2: Governance and Services on Demand includes:**

- Seamlessly integrated services across departments or jurisdictions
- Services availability in real time from online and

mobile platforms

- All citizen entitlements to be available on the cloud
- Digitally transformed services for improving ease of doing business
- Making financial transactions electronic and cashless
- Leveraging GIS for decision support systems and development

### Vision Area 3: Digital Empowerment of Citizens includes:

- Universal digital literacy
- Universally accessible digital resources
- All documents/certificates to be available on cloud
- Availability of digital resources/services in Indian languages
- Collaborative digital platforms for participative governance
- Portability of all entitlements through cloud

### Pillars of Digital India

This transformational programme has been designed to build holistic capabilities across infrastructure, manufacturing, processes, skill sets and delivery platforms which, in turn, will lead to the creation of a self-reliant, knowledge economy. The focus is on improving direct services to citizens, as well as making the country ready for ease of doing business. Accordingly, the initiatives under this programme aim to build and sustain all associated layers required for digital empowerment of the people and building a digital economy.

To ensure focus on each of these layers, following nine pillars of growth areas have been identified under the Digital India Programme:

1. Broadband Highways
2. Universal Access to Mobile Connectivity
3. Public Internet Access Programme
4. e-Governance–Reforming Government through Technology

5. e-Kranti - Electronic Delivery of Services
6. Information for All
7. Electronics Manufacturing – Target net zero imports
8. IT for Jobs
9. Early Harvest Programmes.

### Implementation Approach

Digital India is an umbrella programme that covers multiple Government Ministries and Departments. It weaves together a large number of ideas and thoughts into a single comprehensive vision so that each of them can be implemented as part of a larger goal. Each individual element stands on its own, but is also part of a larger vision. Digital India is implemented by the entire Government and is co-ordinated by Ministry of Electronics and Information Technology.

All the initiatives, including establishing and expanding core ICT infrastructure to delivery of services under this programme, have a definitive completion time target and are being monitored accordingly. A majority of the initiatives have been implemented and are delivering the services to citizens. Many of the quick-wins (being tracked under the umbrella of "Early Harvest Programmes") and citizen communication initiatives (being tracked under "Information for All") have been implemented in 2015.

The Digital India Programme aims at pulling together many existing schemes. The schemes have been restructured and re-focused and are being implemented in a synchronized manner. The common branding of programmes as Digital India highlights their transformative impact. While implementing this programme, the Government of India is making wider consultation with Citizens, Industry and Academia to discuss various issues to arrive at innovative solutions for achieving the desired outcome of Digital India. MeitY has already implemented a digital platform, namely, "MyGov"(www.mygov.nic.in), to facilitate collaborative and participative governance.

## Programme Management and Monitoring

Programme management structure of Digital India has been established for monitoring the implementation of the Digital India Programme. Key components of the management structure consist of a Monitoring Committee on Digital India headed by the Prime Minister, Digital India Advisory Group chaired by the Minister of Electronics and IT, an Apex Committee chaired by the Cabinet Secretary and the Expenditure Finance Committee(EFC)/Committee on Non Plan Expenditure (CNE).

## 2.1 Digital Infrastructure as a Core Utility to Every Citizen

### 2.1.1 Digital Identity: Aadhaar, an efficient and targetted service delivery platform

Unique Identification Authority of India (UIDAI) has been mandated to empower every resident of India with a Unique Identification Number and provide a digital platform for authentication in an easy, electronic and cost-effective way.

The Aadhaar System is built on a sound strategy and a strong technology backbone and has now evolved into a vital digital identity infrastructure.

Key features of Aadhaar include :

- 12-digit random unique number obtained through the process of de-duplication involving biometrics
- Only a number and not a card
- Number does not contain any intelligence
- Scalable technology architecture
- Open source technologies
- One Aadhaar for One Resident

Aadhaar, being a unique digital ID provides a powerful platform for authenticating a resident anytime and anywhere, which is in line with the vision of the UIDAI. The purpose of authentication is to enable residents to prove their identity and for service providers to confirm that the residents are 'who they say they are' in order to supply services and give access to benefits.

### 2.1.1.1 e-Pramaan

MeitY has conceptualized and is implementing the e-Pramaan framework (notified in the Gazette of India in December, 2012) for e-Authentication for public services. The objective is to electronically deliver the Government services to its intended recipients in a secure manner, as well as to build citizens' trust in online environment, which is always prone to identity thefts and other associated risks. MeitY has made e-Pramaan available for public usage with the help of C-DAC, Mumbai.

e-Pramaan is a centralized, standard based strong multi-factored authentication system which provides four factors for user authentication: Password (text, image), One Time Password (SMS, email, mobile app), Digital Certificate (Indian CAs), and Biometric (Finger Print, IRIS). The major features of e-Pramaan are:

1) Single Sign On (SAML 2.0 based)
2) Support in Java, Dot Net and PHP
3) Seamless upgradation to new technology
4) Two-way authentication
5) Flexible authentication chaining
6) Role based authorization
7) Secured communication channel

Various workshops were organised to create awareness about e-Pramaan. At present, 105 services are integrated and using e-Pramaan for authentication.

Another major component of e-Pramaan is the Aadhaar Ecosystem. C-DAC Mumbai is ASA/KSA – AUA/KUA of UIDAI to provide Aadhaar services. As on 31st March 2019, 231 departments are using its services with more than 8.63 crore transactions.

### Achievements

- All the four levels (Login-Password, OTP, Digital Certificate, and Fingerprint Biometric using Aadhaar Services) of authentication are available in production set-up on Government of India cloud at NIC, Shastri Park, Delhi.

- Image Password introduced as factor of authentication, which is a new feature added.

- Provided a solution compatible with all the browsers without applets.

- A new improved version of e-Pramaan with better performance launched.

- A mobile app developed for e-Pramaan.

- Complete compliance with UIDAI latest requirements.

- Five region wise workshops organised to spread awareness about e-Pramaan.

- 158+ Services registered

- Over 8.63 crore transactions

## 2.1.1.2 Online e-Sign (e-Hastakshar)

One of the initiatives taken under Digital India Programme is to provide non-repudiable authentication of applicant's identity through a facility called 'e-Sign'. This facility is an online digital signature service. e-Sign was formally launched by Hon'ble Prime Minister on July 1, 2015. e-Sign is an online electronic signature service, which can be integrated with service delivery applications via an Application Programming Interface (API) to facilitate an e-Sign user to digitally sign a document. Using authentication of the Aadhaar holder through Aadhaar e-KYC service, online electronic signature service is facilitated.

e-Sign service facilitates instant signing of documents online by citizens in a legally acceptable form. The services are being leveraged by various applications, such as, Digital Locker, Financial Sector, various Government agencies for internal office uses, Legal Document Signing etc. using OTP based authentication services of UIDAI.

Notification of Electronic Signature or Electronic Authentication Technique and Procedure Rules, 2015, in which the technique known as 'e-authentication technique using Aadhaar e-KYC services' for the e-Sign Online Service was introduced, which allows everyone to have the ability to digitally sign electronic documents. Five agencies, namely, eMudhra, C-DAC, nCode, NSDL and Capricorn are empanelled to offer e-Sign Services.

### Achievements

C-DAC's e-Sign Service was launched by Shri Ravi Shankar Prasad, Hon'ble Minister for Electronics and IT, Government of India on 3rd September 2016. This service enables an Aadhaar holder, with registered mobile number with Aadhaar, to electronically sign a form/document anytime and anywhere using a device.

During the year 2018-19, C-DAC carried out integration with various Government and private agencies for leveraging e-Sign service at production level and more than 45 lakh signatures.

## 2.1.2 State Wide Area Network (SWAN)

The Government has approved the Scheme for establishing State Wide Area Networks (SWANs) across the country, in March, 2005 to connect all State/UT Headquarters (SHQ) up to the Block level via District/sub-Divisional Headquarters (DHQ), in a vertical hierarchical structure with a minimum bandwidth capacity of 2 Mbps per link. Each of the State/UT can enhance the bandwidth up to 34 Mbps between SHQ and DHQ and upto 8 Mbps between DHQ and BHQ depending upon the utilization.

Presently, SWANs have been made operational in 34 States/UTs, except States of J&K and Arunachal Pradesh. However, procedural formalities are under way by the concerned State/UT Governments for selection of system integrator and implementation of the scheme in these 2 States/UTs. The Arunachal Pradesh has selected the system integrator (SI) for implementation of ArSWAN in the State. The project is under implementation. The States/UTs are utilizing the core infrastructure of SWAN for providing the closed user connectivity to various Government offices in the State & UTs. These offices access their applications through SWAN in a secured environment hosted at State Data Centres (SDCs).

The States have been utilizing the core

infrastructure of SWAN for connectivity and dedicated close user application access connectivity. SWAN has been integrated with NKN in 29 States/UTs at SHQ level and 495 at the district level to provide the high bandwidth.

Increasing digitization amongst States has led to higher utilization of bandwidth. Presently, 30 States/UTs are utilizing more than 72% of bandwidth of the existing link capacity. To monitor the performance of SWANs, the Department has mandated positioning of Third Party Auditors (TPAs) in the States/UTs. As on date, 29 States have empanelled the TPAs for monitoring the performance of the SWANs in the respective States/UTs. Remaining States/UTs are in the process of empanelment of TPA.

### 2.1.3 State Data Centre (SDC)

State Data Centre (SDC) is one of the three core infrastructure components under the NeGP. Under the SDC scheme, Data Centres to be established in all the States/UTs to consolidate services, applications and infrastructure in order to provide efficient electronic delivery of Government to Government (G2G), Government to Citizen (G2C) and Government to Business (G2B) services. These services can be rendered by the States through common service delivery platforms seamlessly supported by core connectivity infrastructure, such as, SWAN and CSCs as the front-end delivery outlets at the village level. Some of the key functionalities that can be provided through SDC are central repository for the State, secure data storage, online delivery of services, citizen information/services portal, State Intranet Portal, disaster recovery, remote management and service integration, etc. SDCs also provide better operation and management control with minimized overall cost of data management, IT resource management, deployment and other costs for States/UTs.

As on 31st March, 2019, 28 SDCs have been declared operational in Tamil Nadu, Puducherry, West Bengal, Andhra Pradesh, Meghalaya, Goa, Karnataka, Manipur, Odisha, Sikkim, Haryana, Kerala, Maharashtra, Gujarat,

Tripura, Rajasthan, Nagaland, Uttar Pradesh, Andaman and Nicobar Islands, Madhya Pradesh, Lakshadweep, Chhattisgarh, Jammu and Kashmir, Mizoram, Bihar, Himachal Pradesh, Jharkhand and Punjab.

Out of the 4 pending SDCs (yet to be operational) 2 SDCs, Uttarakhand and Assam have already selected Data Centre Operator (DCO) and have started installation.

Since the SDCs are expected to host critical Government applications/services including important citizen data, protection of the same is of prime importance. In this regard, the SDC scheme has provisioned for a Disaster Recovery (DR) mechanism through storage based replication as part of the SDC enhancement. Till now, 22 States are DR enabled.

MeitY is providing continuous support and guidance to the States/UTs in order to ensure smooth implementation of the project across the country. Policy guidelines, roles and responsibilities of different agencies/stakeholders, including various issues/concerns to be addressed while planning, implementation operations and maintenance of the Data Centres have been formulated. Guidelines are updated from time to time and are communicated to the States/UTs, leading to creation of consistent and state of art infrastructure.

**Achievements**

- In FY 2018-19, Uttarakhand and Assam have selected DCO and are going to be operational.

- 6 State Data Centres (Manipur, Jammu & Kashmir, Chhattisgarh, Andaman and Nicobar, Nagaland and Lakshadweep) completed 5 years of operation during the year 2018-19.

### 2.1.4 GI Cloud (MeghRaj)

In order to realize the Digital India vision, and to utilize and harness the benefits of Cloud Computing, the Government of India has embarked upon an ambitious initiative – "GI Cloud", which has been named as 'MeghRaj'. MeghRaj initiative is intended to deliver ICT services over cloud to all the departments/Ministries at

the Centre and States/UTs. The vision of this initiative is to accelerate delivery of e-Services in the country, while optimizing ICT spending of the Government. As per the MeghRaj policy, **"Government departments at the Centre and States to first evaluate the option of using the GI Cloud for implementation of all new projects funded by the Government. Existing applications, services and projects be evaluated to assess whether they should migrate to the GI Cloud"**.

Some of the major benefits of GI Cloud are listed below:

- Driving cost efficiencies with increased utilization of IT Infrastructure resources through cloud.

- Enable conversion of CAPEX to OPEX paving the way for consumption based billing and faster procurement of IT Infrastructure services.

- Rapid development, deployment and re-use of ICT applications.

- On demand scalability of infrastructure to meet the long term capacity requirements and elasticity to cater to the peak load requirements. The major components of MeghRaj include:

  - Setting up of State and National Clouds

  - Setting up of an e-Gov Appstore

  - Empanelment of Cloud Service Providers

  - Empanelment of Cloud Auditors

  - Setting up of Cloud Management Office (Policies, Guidelines, templates, security norms, certification, etc.)

  - Awareness workshops, training programmes and migration support for cloud adoption by Departments

  - MeghRaj (GI-Cloud) service Directory

  - Setting up of Clouds by other Government entities

**Achievements**

The first National Cloud implemented by NIC is already being used by more than 960 applications of Government Departments. NIC Cloud can be accessed using the following link:https://cloud.gov.in/

- Initiatives under Digital India Program hosted on National Cloud include

  o Digital India Portal

  o Digital Locker

  o Digitize India

  o Make-in-India

  o Skill Development

  o Smart Cities

  o Online Registration System (e-Hospital)

  o Aadhaar based Biometric Attendance of Government employees

  o Jeevan Pramaan - service for pensioners

  o MyGov - largest citizen engagement platform of the Government

The e-Gov Appstore under GI Cloud can be accessed using the link http://apps.gov.in/.

MeitY has empanelled 13 Cloud Service Providers for a variety of Cloud deployment models (Public Cloud, Virtual Private Cloud, and Government Community Cloud) and Cloud Service offerings (IaaS, PaaS & SaaS). The empanelled CSPs are Microsoft Corporation (India) Private Limited, IBM India Private Limited, Tata Communications Limited, Bharat Sanchar Nigam Limited (BSNL), ESDS Software Solutions Private Limited, Net Magic IT Services Private Limited, Sify Technologies Limited, CtrlS Data Centres Limited, Cyfuture India Private Limited, Web Werks India Private Limited, AMAZON Internet Services Pvt. Limited, NXTRA Data Limited and Reliance Corporate IT Park Ltd. The current status of the audit and the contact details of the empanelled CSPs can be accessed using the link http://MeitY.gov.in/content/gi-cloud-meghraj.

## 2.1.5 e-Sangam: National Service Delivery Gateway (NSDG)

It is a middleware infrastructure, being implemented by C-DAC Mumbai, acting as a standard based routing and message switch, which provides seamless interoperability and exchange of data across heterogeneous applications of geographically dispersed departments. e-Sangam also includes the National Services Directory (NSD). The primary function of the NSD is to provide a service registry, which acts as a service resolution point for all the services in the Gateway constellation. It facilitates the following:

- Interoperability between various e-Governance applications

- Secure messaging between governmental applications

- Shared Services Hub for Departmental Application Payment Gateway Services, Mobile Gateway Services, Authentication services

The Gateway has two major entities:

- **Service Providers (SP):** The back-end Government departments or any other third-party agencies offering e-services to citizens and businesses, and to other Government departments, are collectively referred to as Service Providers (SP). Third-party Service Providers may offer specialized services, such as, authentication, payment gateway services, or joined-up services.

- **Service Access Providers (SAP):** A Service Access Provider is an entity, which facilitates Government service access by Service Seekers, by providing a front-end infrastructure. Linked to the Service Access Providers will be the Delivery Channels, which would be the access mechanism for the citizens and businesses to avail the e-governance services.

**Achievements**

- 500+ Services registered in the production

environment of NSDG

- Functionality enhancement of NSDG Product completed in staging environment, security and performance testing completed.

- Average monthly transaction for the year 2018: 14,43,487.

## 2.1.6 National Knowledge Network (NKN)

In March, 2010, the Government of India approved the establishment of NKN with an outlay of ₹5,990 crore over a period of 10 years. National Informatics Centre (NIC) is the implementing agency.

2. The objective of the National Knowledge Network (NKN) is to interconnect all institutions of higher learning and research with a high speed data communication network to facilitate knowledge sharing and collaborative research.

3. Since its establishment over 9 years, the NKN has developed progressively to ensure that Indian researchers excel and also lead international and global collaboration. NKN is the largest network of its kind in the world and is currently perceived as a leading research and education network (REN) globally. NKN is the only network globally, that carries research & evaluation, Internet and e-Governance traffic as three independent verticals under one umbrella.

4. NKN with its goal to inter-connect all knowledge institutions across the nation over through seamless high speed data communication network, connected over 1,675 institutes comprising all the major Universities, Institutions of Higher Learning and Research including different Government Services/Departments.

5. NKN facilitates Digital India, as it is the backbone for all e-Governance initiatives in the country. In addition to educational Institutes, NKN connects all SDCs (State Data Centre), NDCs (National Data Centre), Ministries and Departments across the Government, namely, S&T, DRDO, Earth Sciences,

Space, ICAR, MHRD, amongst others.

6. The salient features of the NKN are:

a) Establishing an ultra high-speed national information network for the country.

b) Connecting all major knowledge institutions (Universities and Research Institutions) for knowledge creation, collation and dissemination.

c) Connecting Indian knowledge institutions to International knowledge community for knowledge sharing.

d) Enabling sectoral virtual networks in various application areas (Agriculture, Health, Education, E-governance and Grid Computing).

e) Setting up a platform for development of new processes and technologies based on high bandwidth and low latency networks.

f) Enabling a test-bed for network and securing technology development for the country.

g) Link to Global Networks to collaborate with the research communities across the globe.

7. As part of the directive given by Hon'ble Prime Minister of India in 2014, NKN is also delivering on its commitment for connecting with South Asian Countries i.e. Afghanistan, Bhutan, Nepal, Bangladesh and Sri Lanka. Sri Lanka has already been connected in January 2018 and the link was inaugurated by Shri Ravi Shankar Prasad, Hon'ble Minister of Electronics and Information Technology. Bhutan and Bangladesh has also been connected to NKN. Hon'ble Prime Minister of India inaugurated Bangladesh link on 11th March, 2019.

NKN also plans to extend its connectivity to Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) nations, as per the directive given by Hon'ble Prime Minister of India.

8. **Current Status (as on 31st March, 2019)**

• 1,697 links to institutions have been commissioned and made operational. This includes 388 links to institutions under National Mission on Education through Information and Communications Technology (NMEICT), which have been migrated to NKN.

• 33 NKN links have been upgraded to 10G based on their usage.

• 505 district Links are operational under NKN to interconnect various Districts across the country.

• 66 Virtual Classrooms have been set up.

• 92 nos. of Core Links have been commissioned and made operational.

• NKN connectivity has been extended to SWAN in 33 States/UTs and SDC in 30 States/UTs.

• 19 NKN locations i.e. Point of Presence (PoPs) are now ISO 27001 certified.

• NKN Services, such as, Bandwidth Testing Service, OSIR (Open Source IP Registrar), DNS (Domain Name Server) and NKN One have been launched and more than hundred institutes are on-board and BitAmbulator is updated with Drag and Drop, along with various other interactive features.

• NKN offering DDOS (Distributed Denial of Service) managed security services for the customers, who are connected to NKN backbone to protect their services from DDOS attacks.

• Stratum NTP Server installed at 7 Super core PoPs.

• Concurrently with strengthening its national footprint, NKN focuses on improving international connectivity, providing Indian researchers and students with access to the

global research and education community. NKN has peered with Research and Education Networks (RENs), such as, Asi@connect in Asia Pacific, GEANT in Europe, Internet2 in USA, LEARN in Sri Lanka and NORDUnet for Nordiac countries i.e. Denmark, Iceland, Norway, Sweden and Finland. Apart from this NKN has peering with content providers, such as, Google, Akamai, Microsoft and Facebook.

- NKN has commissioned its international PoPs at Amsterdam, Singapore and Geneva.

**The specific achievements of the beneficiaries/ stakeholders are as follows:**

1. **High Speed SCPC VSAT Connectivity**: NKN has established a High Capacity SCPC VSAT Connectivity at Kavarati, Lakshadweep and Port Blair, Andaman and Nicobar Islands.

2. **NKN usage in weather forecasting**: Using NKN, ISRO - MoES group collaborated with other international counterparts, such as, NOAA, EUMETSAT etc., which immensely helped in accurate weather forecasting and analysis. NKN supported in establishing "EUMETSAT Terrestrial Broadcasting Reception", for receiving EUMETSAT data on real time basis. NKN has helped in setting a secure network for receiving the database from NOAA-NESDIS (USA).

3. **NKN Support to Mission Mars:** ISRO Institutes, such as, IIRS and their Data Centre ISSDC are effectively using NKN for their science mission initiatives, including India's interplanetary mission "Mars orbiter Mission" and "ASTROSAT".

4. **E-PRAGATI using NKN Platform**: Hon'ble Prime Minister of India, Shri Narendra Modi launched an ambitious multi-purpose and multi-modal platform, PRAGATI (Pro-Active Governance and Timely Implementation), in March 2015, that rides on NKN platform.

5. **Video Conference:** Hon'ble Prime Minister of India, Shri Narendra Modi addressed (through VC) students of Smart India Hackathon 2017 simultaneously across 26 locations in India, which was held on 1st April, 2017.

Hon'ble Home Minister, Hon'ble Finance Minister and Hon'ble External Affairs Minister addressed various National and International events (through VC) by using NKN platform.

### 2.1.7 National Information Infrastructure (NII)

A pilot proposal for a period of one year on National Information Infrastructure (NII) for one district each in 7 States, namely, Nagaland, Karnataka, Kerala, Gujarat, Uttarakhand, UTs of Chandigarh and Puducherry has been implemented successfully covering 36 blocks, 1,560 Gram Panchayats (GPs) and more than 4,000 Government offices. The pilot has integrated various ICT infrastructure, namely, SDC, SWAN, NKN, NICNET, SSDG and also NOFN/BharatNet.

The learnings from the implementation of pilot including gaps and challenges encountered in integration, delivery of e-gov and other social sector services in rural areas will be taken into account for incorporation during planning and roll out of National Information Infrastructure across the country.

**Vikaspedia project**

Ministry of Electronics and IT (MeitY) has implemented Vikaspedia project for providing e-knowledge and using ICT-based applications for empowerment of poor (rural and urban).

It seeks to maximise utility of ongoing Government programmes through provision of universally accessible digital information resources in Indian languages, created and shared collaboratively by various development stakeholders.

1. **Multilingual, multi-sectoral collaborative knowledge sharing platform**

   Developed as part of the initiative, is the multi-lingual, multi-sectoral online knowledge platform -

www.vikaspedia.in/www.vikaspedia.gov.in .

**The Salient features of www.vikaspedia.gov.in are as follow:**

- **Multilingual** - hosts information in all **22 scheduled languages of India, besides English**.

- **Sectors covered** - Agriculture, Health, Education, Social Welfare, Energy, e-Governance.

- **Hosts multiple content forms** – text, audio, video, etc shared by various agencies/individuals.

- **Offers Collaborative Content sharing** - content edit and add provisions to authenticated

users.

- **Promotes user interaction**– through discussion fora, polls, page rating and commenting, interaction with social networking sites, screen reader access, etc.

- **Provides information based ICT services**– MOTHER, Ask an Expert, VLE corner, etc

- **Information Dissemination through multiple modes to reach the last mile** – personalised voice alerts, SMS, community radio, mobile apps, audio/video, IEC materials etc.

2. **The utility of Vikaspedia is as follows**

- Vikaspedia currently hosts 9.5 lakh pages of content shared by institutions (300+) and



Inauguration of NKN extension to LEARN, Sri Lanka in Jan 2018
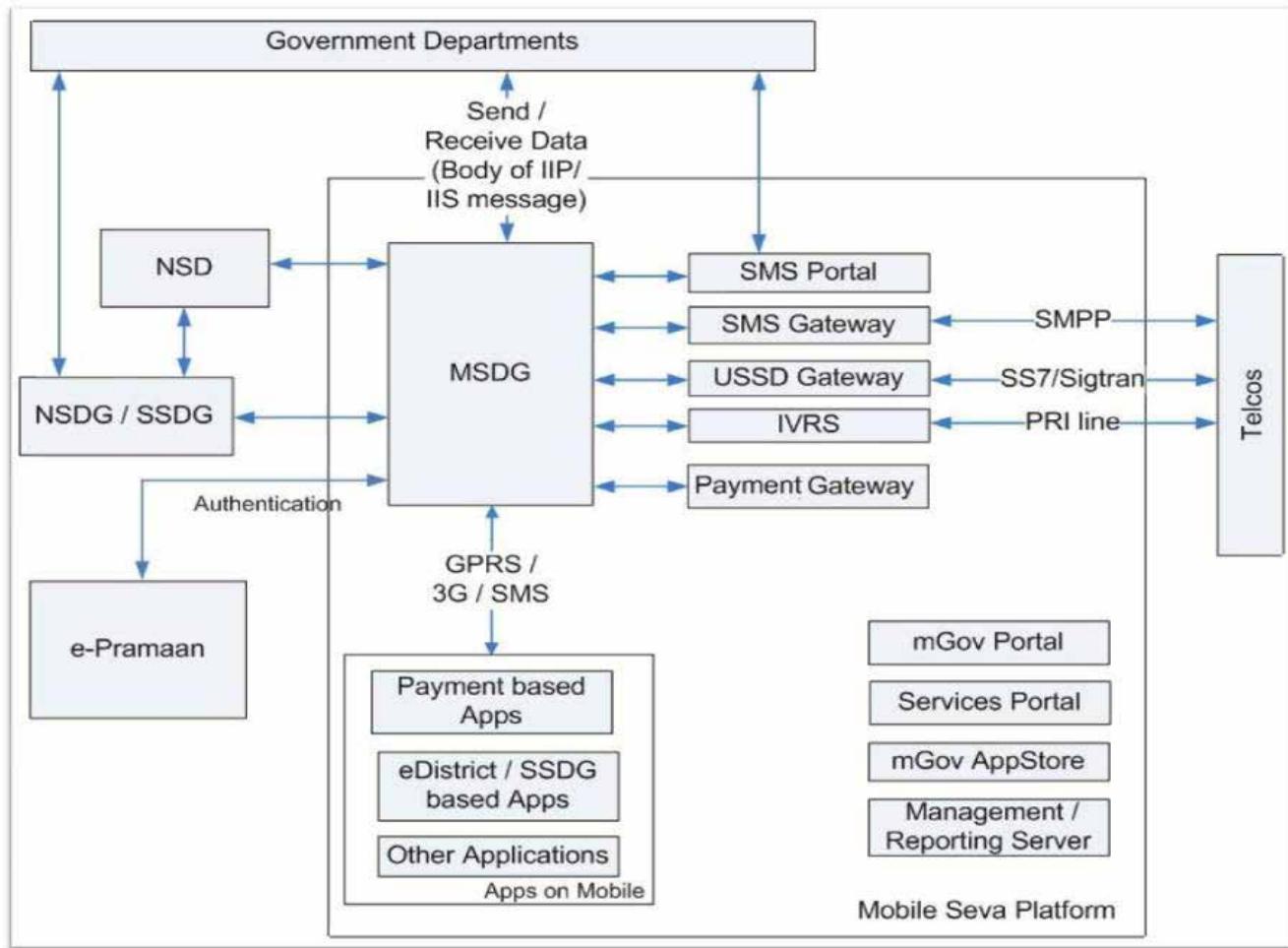
registered members (75,000+). It attracts 11.34 crore hits per month. Exclusive information for marginalised sections like women, SC/ST/BC/Minorities are being covered.

- Focussed capacity building of grassroot service providers on digital information access and sharing in regional languages have been taken up through 2260 events at State, district, community levels covering 25 States and 3 UTs. About 2.94 lakh have been trained so far.

- About 3 crore target audience have been reached to promote ongoing Government programmes through various ICT modes.

- Online utility surveys among the users of Vikaspedia portal indicate that Vikaspedia is a preferred source of information among the rural youth who access information on policies, schemes and entrepreneurship. Vikaspedia portal and its products have received several awards including the World Summit on the Information Society Forum (WSIS) 2014 Award.

### 2.1.8 Mobile Seva Platform

MeitY has initiated a massive countrywide initiative on mobile governance, being implemented by C-DAC Mumbai, to provide Government services to the people through mobile phones/devices. As a part of



Flow Diagram of Mobile Seva Platform

this initiative, the Framework for Mobile Governance was notified in February 2012. Mobile Seva has been developed by MeitY as the core infrastructure for all Government departments and agencies in the country for enabling the availability of public services through mobile devices.

Mobile Seva enables the integration of the mobile platform with the common e-Governance infrastructure consisting of SDCs, SWANs and SSDG/NSDG. It enables a Government department to integrate both web and mobile based services seamlessly and enhances the access to electronic services tremendously due to the very high penetration of mobile phones, especially in rural areas.

It provides all possible mobile based channels for delivering services, such as, SMS, USSD, IVRS and mobile applications (m-Apps). Availability of Government-wide shared infrastructure and services enable rapid development and reduced costs for the departments in rolling out electronic services.

**Achievements**

- Around 4,196 Government departments and agencies integrated with the Mobile Seva platform.

- Over 2,705 crore of push SMS were delivered till 31st March 2019.

- 714 services are available to citizens and businesses over Pull SMS.

- 983 live m-apps have been developed and hosted on Mobile Seva Appstore for different platforms. Till 31st March, 2019, over 5.03 crore downloads of different apps have been done.

- Over 1.17 crore transactions in IVRS Services and over 18.5 lakh transactions in USSD Service have been completed till 31st March, 2019.

- Mobile Seva project of C-DAC, Mumbai has been selected as one among 41 Gems of Digital India 2017 (Analyst's Choice) for excellence in eGovernance.

- Mobile Seva Project is a winner for showing Excellence in Designing the Future of eGovernment at Global mobileGov World Summit May, 2017.

### 2.1.9 Geographical Information System (GIS)

The Geographic Information System (GIS) based decision support system (DSS) platform was established under the National Centre of Geo-Informatics (NGoG) which was approved on 31st December, 2015 with outlay of ₹98.28 crore.

2. Some of the key features of NCoG based applications include:

i. Basemap available at 1:5,000 scale

ii. Compatibility of multi-purpose geo-datasets

iii. Allows user to plot assets/features on their own

iv. Self-sustainable

v. Cost effective

vi. Based on Open-Source (no software procured)

3. The platform is a single source GIS platform for sharing, collaboration, location based analytics and decision support system, catering to Central and State Government departments across the country. The GIS platform has provision to integrate with MIS data of Ministries/Departments.

4. The following GIS applications have been developed/under implementation:

i. Government Land Bank Information System (Ministry of Housing and Urban Affairs (MoH&UA): Map all Central Government land parcels, including that of Central Public Sector Enterprises (CPSEs).

ii. Rural Electrification System (Ministry of Power): Identify and map electrification status of villages under Grameen Vidyutikaran App (GARV).

iii. Mining Surveillance System (Ministry of Mines):

Curb illegal mining through automatic remote sensing detection.

iv. Industrial Information System (DIPP): GIS based master plan for industrial areas, zones, parks etc.

v. Geographic Indications Web Portal – A web portal to promote and undertake GIS mapping of Geographic Indications under the Department of Industrial Policy and Promotion.

vi. Saltpan Information System (DIPP): Central departments may view details of saltpan area/ land at cadastre level across India with details, such as, survey numbers, litigations etc. The departments can then apply to DIPP for buying the land parcels concerned.

vii. Coal Mining Surveillance System (Ministry of Coal) – System for surveillance and monitoring of any illegal coal mining activity taking place in the coalfield region.

viii. Textile Mills Information System : Plot all mills of National Textile Corporation Limited (NTCL) to facilitate identification of illegal encroachment.

ix. e-District services with CSC locations (MeitY): Pilot CSC locations and e-District services available across India.

x. Digital India outreach (MeitY): To represent live status of Digital India outreach vans.

xi. GIS for North-Eastern States (Ministry of Development of North Eastern Region): asset mapping of North East region.

xii. Road Information System (Ministry of Road, Transport & Highways): Geo-mapping present status of lanes, impedances of national highways, state highways etc.

xiii. Delhi Police GIS system and Mobile App for

Dark Spot Area (Ministry of Home Affairs): Web/mobile based application to represent operational status of light poles and dark areas in Delhi.

xiv. Mapping of water resources under Accelerated Irrigation Benefits Programme and Repair, Renovation and Restoration of Water Bodies Ministry of Water Resources, River Development & Ganga Rejuvenation (MoWR,RD&GR).

xv. GIS system for NHAI (NHAI): Plot national highways alongwith advanced analytics for basic details, construction progress matrix, land status, clearance status, commercial operations, focus projects.

xvi. AMRUT/Smart Cities, Ministry of Housing and Urban Affairs (MoH&UA) – To provide a facility to map assets/amenities and facilitate developmental planning under AMRUT scheme.

xvii. Soil Information System - Integration of Soil Health Card with NBSS&LUP soil survey data (Ministry of Agriculture) to represent soil information on GIS platform including crop recommendations.

xviii. Mapping of mortgaged land assets of companies (Ministry of Corporate Affairs) – GIS based application to represent

xix. Logistics Information System (Ministry of Commerce and Industry)

xx. Training Institute Mapping - Department of Personnel & Training (DoPT)

xxi. Electronic Manufacturing Units Mapping - MeitY

xxii. Central Board of Secondary Education (CBSE) applications

a. GIS based location capture for new school applicants

b. Plot existing school affiliated with CBSE

c. Mobile app for students to find shortest route to their exam centres

d. Capture location of the schools who are to apply as proposed exam centres

e. Distance analysis of exam centres vs school location (with buffer of 5/10/15 Km)

xxiii. Decision Support System for AICTE, Ministry of Humna Resource Development (MHRD): Technical colleges may share their locational details alongwith videos for AICTE approval (Pilot).

xxiv. Panchayats Extension to Scheduled Areas – PESA, Ministry of Panchayati Raj (MoPR): Visualization of PESA districts on GIS map

xxv. National Asset Directory, Ministry of Panchayati Raj (MoPR) – Mapping of assets at panchayat level (Pilot)

xxvi. Capacity building of Town and Country Planning Organisation (TCPO) under Ministry of Housing and Urban Affairs (MoH&UA) in GIS domain.

xxvii. GIS bases applications for States, such as, Telangana, Haryana, Kerala, Uttarakhand, Uttar Pradesh, Andaman and Nicobar Islands and Tripura.

xxviii. GIS based system to monitor progress under 115 Aspirational Districts (NITI Aayog): Under this project, portals concerned for the GIS portals for 65 districts have been made operational.

5. NCoG is also working on the following new projects:

i. Social Benefits Management System – A web portal for loan management, disbursement and recovery. GIS support for monitoring of loan recovery – Design and Development phase

ii. Industrial Performance Monitoring System– A web portal for Ministry of Statistics and Programme Implementation and 11 other Ministries to use this portal to report data of their industrial sector – Design phase

iii. A dashboard to manage Technology and Innovation Support Centre to capture R&D Activities is also being created for Department of Industrial Policy and Promotion.

iv. Delhi Police – Design, development, amalgamate and maintenance of 'Delhi Police… One Touch Away' – a citizen centric app with 26 services provided by Delhi Police through the previous apps or Web applications

v. Ayushman Bharat, Ministry of Health and Family Welfare (MoH&FW): Infrastructure and disease level mapping of health facilities, including primary, secondary and tertiary care and identification of gaps therein to plan for new health and wellness centres establishment.

vi. Implementation of National Mission on Cultural Mapping (Ministry of Culture).

## 2.1.10 High Speed Broadband Connectivity

Provisioning of internet connectivity in rural areas is under the purview of Department of Telecommunications (DoT), under Ministry of Communications. High speed broadband connectivity would be made available upto all 2.5 lakh Gram Panchayats in the country under NOFN/BharatNet programme being implemented by Department of Telecommunications. With the availability of high speed broadband connectivity upto Gram Panchayats, it would be easier for the Central and State Governments to deliver various G2B, G2G

and G2C services to the citizens across the county. So far, 3,01,154 kms of optical fiber has been laid connecting 1,21,652 Gram Panchayats and 1,16,411 Gram Panchayats are service ready.

Besides, availability of robust connectivity in turn would make it feasible to plan and deliver other social sector services, like, e-Health, e-Education, e-Agriculture, skill development and also financial inclusion. It is envisaged that it would be possible in the near future under the Digital India Programme to have inter and intra state socio economic development in the country.

## 2.1.11: Public Internet Access Programme (including Wi-Fi in Universities)

### Wi-Fi in 5 Universities

- Setting up Wi-Fi in Universities is one of the Early Harvest Programmes under Digital India. MeitY has taken up the task of providing model Wi-Fi enabled campus networks at five universities,, namely, University of Allahabad, University of Pune, Osmania University, Hyderabad, Utkal University, Bhubaneswar and North Eastern Hill University (NEHU), Shillong. The model is replicable and can be replicated at other higher learning institutions/ universities/hospitals across India. This would enable on campus students, faculty, teachers, visitors, guests to access the internet through Wi-Fi enabled devices retrieve and post information any time, from any place within the campus. The total outlay of the project is ₹35.51 crore.

- ERNET India is deploying Wi-Fi in these five universities. It is a high speed wireless access to Internet/Intranet resources on any-time any-where basis across the campus. Students/staff are being benefitted largely from it. They are accessing e-Books, journals from UGC-Infonet, e-journals, video lectures, online study material, digital repository, research and projects and collaborations and jobs and sharing their information

and knowledge among users. It has improved performance and efficiency of the users. It has enhanced user's participation where users from all parts of the world are collaborating and sharing information/data for research and development and education. It has provided freedom of work on the move, study/work continuity, easy access to the information, increase in productivity and reduction in day to day cost. The project has been extended till 22nd July 2019.

**Setting-up VSAT connectivity for Internet/Intranet in the North-Eastern part of the country**

- The objective of the project is to establish C-band VSAT connectivity at 60 institutes (research institutes/colleges and Government Organisations) in remote areas of North Eastern Region of the country to provide Internet access. As part of the project, only those institutes that do not have any form of connectivity shall be connected. The project is implemented by ERNET India. The total outlay of the project is ₹19.98 crore.

- This connectivity will play an important role in the development and progress of the schools and institutes; in schools both teachers and students will use connectivity to access course material, prepare themselves for exams, preparing lectures, general knowledge and current affairs, competitions, employments, etc. This will narrow the gap between remote areas and other parts of the country. This will help in removing the barriers to information dissemination and access to knowledge, which will promote equitable and sustainable development of these remote areas.

- VSAT has been installed and is operational at 60 sites. The links were made operational from March 2017, and operations and maintenance of the link is to be done for 3 years to provide connectivity for internet/intranet access. Therefore, the project has been extended till 22nd February 2020.

## 2.1.12 Safe and Secure Cyberspace

**National Cyber Coordination Centre (NCCC) :** Continuously evolving cyber threat landscape and its impact on well being of information technology, national economy, and cyber security necessitates the need for near-real time situational awareness and rapid response to cyber security incidents. Realizing the need, the Government has taken steps to set up the National Cyber Coordination Centre (NCCC) to generate macroscopic views of the cyber security breaches and cyber security threats in the country. The centre will scan the cyberspace in the country at meta data level and will generate near real time situational awareness. NCCC is a multi-stakeholder body and is being implemented by Indian Computer Emergency Response Team (CERT-In). The centre will work with various Organisations and entities in the country to counter and mitigate cyber attacks and cyber incidents on a near real time basis. The phase-1 of NCCC has been operationalised in July, 2017. Planning for the final version of the project is in progress.

**Cyber Swachhta Kendra (Botnet Cleaning and Malware Analysis Centre):** The Cyber Swachhta Kendra is operated by the Indian Computer Emergency Response Team (CERT-In) as part of the Government of India's Digital India initiative under the Ministry of Electronics and Information Technology (MeitY). The Cyber Swachhta Kendra (CSK) was launched on 21 February 2017.

Cyber Swachhta Kendra is a citizen centric service provided by CERT-In, which extends the Hon'ble Prime Minister's vision of Swachh Bharat to the Cyber Space. Its goal is to create a secure cyber space by detecting botnet infections in India and to notify, enable cleaning and securing systems of end users so as to prevent further infections. By providing free tools and security best practices for citizens, the Cyber Swachhta Kendra helps users to securely carry out digital payments, secure their personal computers, broadband routers, mobile phones, etc., thereby enhancing citizens trust in ICT while ensuring a cleaner and safer Digital India. At present, CSK is covering 90% of the subscriber base

for notifications on botnet/malware infection systems.

Currently, 191 Organisations from multiple sectors like Telecom (ISPs), Finance and Insurance, Transport, Power and Government are collaborating and being benefited by using CSK services.

During the year 2018-19, 340 types of botnet/malware were tracked and reported to collaborating ISPs/Organisations. Malware/Botnet infections include Bots affecting desktop systems, IoT bots, Ransomware, cryptocurrency miners, information stealing Trojans, banking trojans etc.

Further, systems with vulnerable services are tracked and reported to Organisations alongwith remedial measures.

Free Bot Removal Tool (FBRT) is regularly updated with signatures/detections for recent botnet/malware observed to enable cleaning of infected systems A total of 7.95 lakh Free Bot Removal Tool (FBRT) have been downloaded till September 2018.

"Cyber Swachhta Kendra" was awarded as one of the 51 "Gems of Digital India 2018" in June 2018.

### 2.2 Governance and Services on Demand

- Seamlessly integrated services across departments or jurisdictions
- Services availability in real time from online and mobile platforms
- All citizen entitlements to be available on the cloud
- Digitally transformed services for improving ease of doing business
- Making financial transactions electronic and cashless
- Leveraging GIS for decision support systems and development

### 2.2.1 e-District

**National Roll-out of e-District MMP:** e-District is

a Mission Mode Project (MMP) that aims at electronic delivery of identified high volume citizen centric services at the district or sub-district level. Ministry of Electronics and Information Technology (MeitY), Government of India (GoI) is the nodal Ministry for e-District MMP. This MMP is being implemented by State Governments/UT Administrations through their designated agencies. The MMP envisages leveraging and utilizing the four pillars of e-infrastructure, namely, State Data Centre (SDC), State Wide Area Network (SWAN), State Service Delivery Gateway (SSDG) and Common Services Centre (CSC).

The objectives of the e-District project are to ensure end-to-end workflow, to ensure delivery of e-Services by undertaking Business Process Re-engineering (BPR) of services and providing easy, anywhere and anytime access to Government services.

Intended Benefits/Outcomes: The project intends to achieve benefits/outcomes as mentioned below:

(a) Assured, reliable and efficient delivery of high-volume citizen services, electronically and with process reengineering at the district level in all the districts of the country.

(b) Service fulfillment for the citizens will be quicker.

(c) Citizens save time and money.

(d) Modernization of District Administration with training and capacity building at all levels.

(e) Transparency and Good Governance resulting in empowerment of citizens.

**Coverage and Services under e-District MMP:**

The e-District MMP currently covers all districts across all 36 States/UTs. Under the scheme, MeitY is funding the State Designated Agencies (SDAs) of each State/UT for implementation of the project over a period of 4 years. 10 categories (5 mandatory + 5 State/UT Specific) of identified high volume citizen centric public services at district and sub-district level will be taken up to be electronically delivered under this project.

**Services Launch Status:** As on 31st March, 2019 e-District services have been launched in 688 districts across 33 States/UTs. The status is indicated in the table below:

| National Roll-out Status of e-District MMP |
|---|
| 1. Andhra Pradesh (13/13) |
| 2. Arunachal Pradesh (23/23) |
| 3. Assam (33/33) |
| 4. Bihar (38/38) |
| 5. Chandigarh (1/1) |
| 6. Chhattisgarh (27/27) |
| 7. Dadra and Nagar Haveli(1/1) |
| 8. Daman and Diu (2/2) |
| 9. Delhi (11/11) |
| 10. Goa (2/2) |
| 11. Gujarat (33/33) |
| 12. Haryana (22/22) |
| 13. Himachal Pradesh (12/12) |
| 14. Jharkhand (24/24) |
| 15. Karnataka (30/30) |
| 16. Kerala (14/14) |
| 17. Madhya Pradesh (51/51) |
| 18. Maharashtra (35/36) |
| 19. Manipur (16/16) |
| 20. Meghalaya (11/11) |
| 21. Mizoram (8/8) |
| 22. Nagaland (11/11) |
| 23. Odisha (30/30) |
| 24. Puducherry (4/4) |
| 25. Punjab (22/22) |
| 26. Rajasthan(33/33) |
| 27. Sikkim(4/4) |
| 28. Tamil Nadu (32/32) |
| 29. Telangana (31/31) |
| 30. Tripura (8/8) |
| 31. Uttar Pradesh(75/75) |
| 32. Uttarakhand (13/13) |
| 33. West Bengal (18/23) |

**Achievements:**

• Empowered Committee has approved DPRs of all States/UTs (DPRs of Telangana and Andhra Pradesh are under revision).

- SPMU selected in 36 States/UTs.

- Formation of District e-Governance Socities (DeGS) completed in all 36 States/UT (100% covered in 30 States/UTs and partially completed in 5 States/UTs; due to newly created districts).

- Selection of e-District Managers (eDMs) completed in all 36 States/UTs (100% selected in 32 States/UTs, partially selected in 2 States/UTs, due to newly created districts and process initiated in 2 States/UTs, where the roll-out is in process).

- J&K nominated M/s CSC–SPV for the development of 10 identified e-services under e-District Service Portfolio. Further, Andaman & Nicobar Islands and Lakshadweep have opted for NIC's ServicePlus platform for final roll-out of project.

- Issuance of following Guidelines/Advisories have been completed:

  a. National Rollout Guidelines

  b. e-District Manager Hiring Guidelines

  c. Guidelines for Integrated Framework for the Delivery of e-services under National Roll-out of e-District MMP

  d. Implementation Guideline for providing flexibility to States/UTs for the implementation of National Roll-out.

  e. Guidelines for Horizontal Connectivity

  f. Draft Agreement Template for States/UT opting NIC as the Implementation Agency for e-District MMP

  g. Report on "Business Process Re-engineering of High-volume Government to Citizen Services".

  h. Advisory on Operational Expenses of e-District Manager

  i. Advisory on Implementing Ration Card services under e-District MMP

  j. Advisory on Implementing Birth and Death services under e-District MMP

  k. Guidelines for using Hand-held devices for e-District Services.

## 2.2.2 All Services through online and Mobile

**Unified Mobile Application for New-Age Governance (UMANG)**: UMANG has been developed as a single mobile platform to deliver major Government services. Hon'ble Prime Minister dedicated UMANG to the nation on 23rd November, 2017.

- UMANG's core platform is integrated with Aadhaar, DigiLocker, PayGov, Rapid Assessment System (RAS) etc.

- Citizens can access pan India Government services from the Central Government, State Governments, local bodies and their agencies.

- UMANG supports 12 Indian languages, in addition to English and has been hosted on cloud. UMANG aims to bring power to the finger tips of citizens.

- As on 31st March, 2019, UMANG has about 358 services from 81 applications of Central Government departments and Government departments of 18 States/UTs and more services are continuously being on-boarded.

- UMANG has won awards, namely, the 'Best m-Government Service Award' during the 6th edition of the World Government Summit at Dubai, UAE (February, 2018) and the IDC Digital Transformation Award 2018 under the category Omni-Experience Innovator (August, 2018) and Special Jury Choice Award in the category of "excellence in providing Citizen-Centric Delivery" during National e-Governance Awards 2018-19 in February 2019.

### 2.2.2.1 Programme on "Good Governance and Best Practices"

This scheme has been initiated to promote Information and Communication Technology (ICT) enabled good

governance in the country. Under this scheme, MeitY has finalised a framework to promote e-Governance in the country, wherein, the replication of successful e-Governance practices and applications would be taken up and departments would also be encouraged to come up with new applications in uncovered domains. Project proposals have been sought (from Central/States/UTs Government departments), which will be funded after due assessment, depending upon the merit of the project.

**Achievements:**

5 projects have been approved under the scheme and successfully implemented.

### 2.2.2.2 World Bank assisted "India: e-Delivery of Public Services" Project

Following approval of a Development Policy Loan amounting to USD 150 million from the World Bank for programme management and financial support for National e-Governance Plan (NeGP), MeitY has been utilizing this support as a focal point to convene all the associated departments of the Central and State Governments around a concrete reform agenda for e-governance in the country. MeitY is supporting critical policy and institutional actions of the Central/State/UT governments that entail e-delivery of services leading to a more robust implementation of NeGP, with significant social benefits for the population and positive impacts on the poor. As on 31st March, 2019, 39 projects have been approved. Funds for all 39 projects have been released to the implementing agencies in various States/UTs.
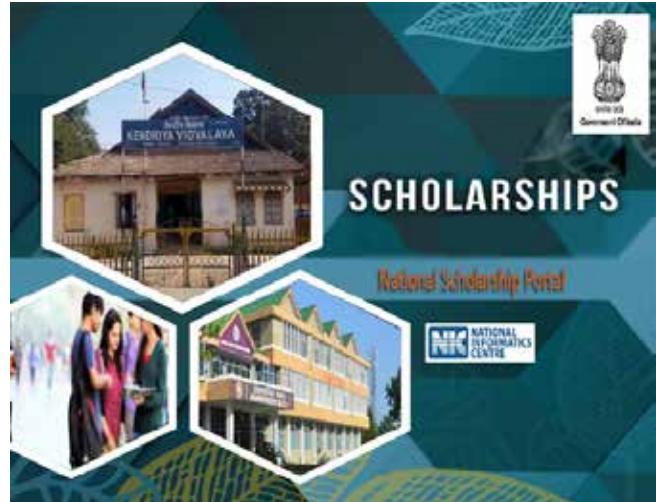
**Achievements:**

21 projects covering various domains, such as, health, education, legislature, prison, Election Commission, capacity building have been successfully implemented under the scheme and other projects are at different stages of implementation.

### 2.2.2.3. National Scholarships Portal

National Scholarships Portal is an initiative envisaged to be a single unified portal for online scholarship application submission, verification and final disbursement of scholarships amount directly into a student's bank account. This system brings transparency by avoiding duplication and ensures timely disbursement.



National Scholarship Portal

It aims at providing a **S**implified, **M**ission-oriented, **A**ccountable, **R**esponsive and **T**ransparent **('SMART')** System for faster and effective disposal of scholarships applications and delivery of funds directly into beneficiaries account without any leakages by providing common electronic portal for implementing various scholarships schemes launched by the Union Government, State Governments and Union Territories across the country.

**Objectives**

• Ensure timely disbursement of Scholarships to the students

• Provide a common portal for various Scholarships schemes of Central and State Governments

• Create a transparent database of scholars

• Avoid duplication in processing

• Harmonisation of different Scholarships schemes and norms

- Application of Direct Benefit Transfer

**Online registration** and **submission** of scholarship applications

Single **standardised application** form for all scholarships

**Easy sanctioning** process for authorities

View and track application status

**Auto disbursal** of scholarship to student's bank account with **Direct Benefit Transfer**
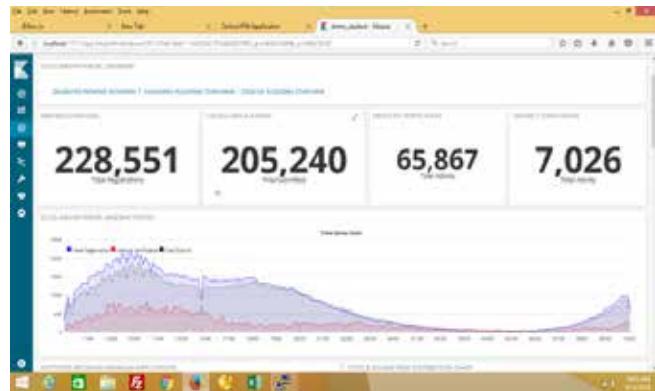
**Application renewal** facility for students and institutes

**Benefits**

- Simplified process for the students
  - o All scholarships information available under one umbrella
  - o Single integrated application for all scholarships
- Improved transparency
  - o System suggests the schemes for which a student is eligible
  - o Duplicates can be reduced to the maximum extent

- Helps in standardisation
  - o Master data for Institutions and courses at all India level
  - o Scholarships processing
- Serves as a decision support system (DSS) for Ministries and departments as up-to date information is available on demand.

**Comprehensive Dash board/MIS System and monitoring system**

- Facilitate monitoring at every stage of Scholarships distribution i.e. from student registration to delivery of funds
- NSP advance MIS system allows all stakeholders to generate their on-demand customized report.





Dashboard Real Time Monitoring Tool

**Intelligent rule Engine**



*Data as on 31.10.2018

- NSP is enriched with an intelligent rule-engine based Scheme Identification, that automatically populates schemes for which a student is eligible.

**Achievements (Academic Year 2018-19)**

In the Academic Year (AY) 2018-19, 10 Central Ministries/Departments and 9 States have on-boarded their 60 scholarship schemes. 1.55 crore applications have been received and 67.7 lakh students have received scholarships amount upto ₹2,104 crore. Disbursement under a few Central and State schemes is in process.

**Impact**

National Scholarship Portal is increasingly being adopted by various Ministries and educational institutes for offering scholarship schemes to eligible students. The portal is emerging as a primary channel to apply for scholarships among students. All major central sector schemes and centrally sponsored schemes are already on-boarded on NSP, while many States have also shown their keen interest to process their State owned scholarship scheme through NSP, so that they could also harness the benefit of the national level platform.

On the other hand, the ultimate beneficiary, i.e., the students are also finding it very easy to identify and apply for the most suitable scheme to them. The scholarship amount is directly reaching in their bank account in a timely manner.

### 2.2.2.4 Digital Locker and other initiatives

**Digital Locker**

Digital Locker is a key initiative under Digital India, the Government of India's flagship programme, aimed at transforming India into a digitally empowered society and knowledge economy. Targeted at the idea of paperless governance, Digital Locker is a platform for issuance and verification of documents and certificates in a digital way, thus eliminating the use of physical documents. Indian residents, who sign up for a DigiLocker account, get a dedicated cloud storage space.
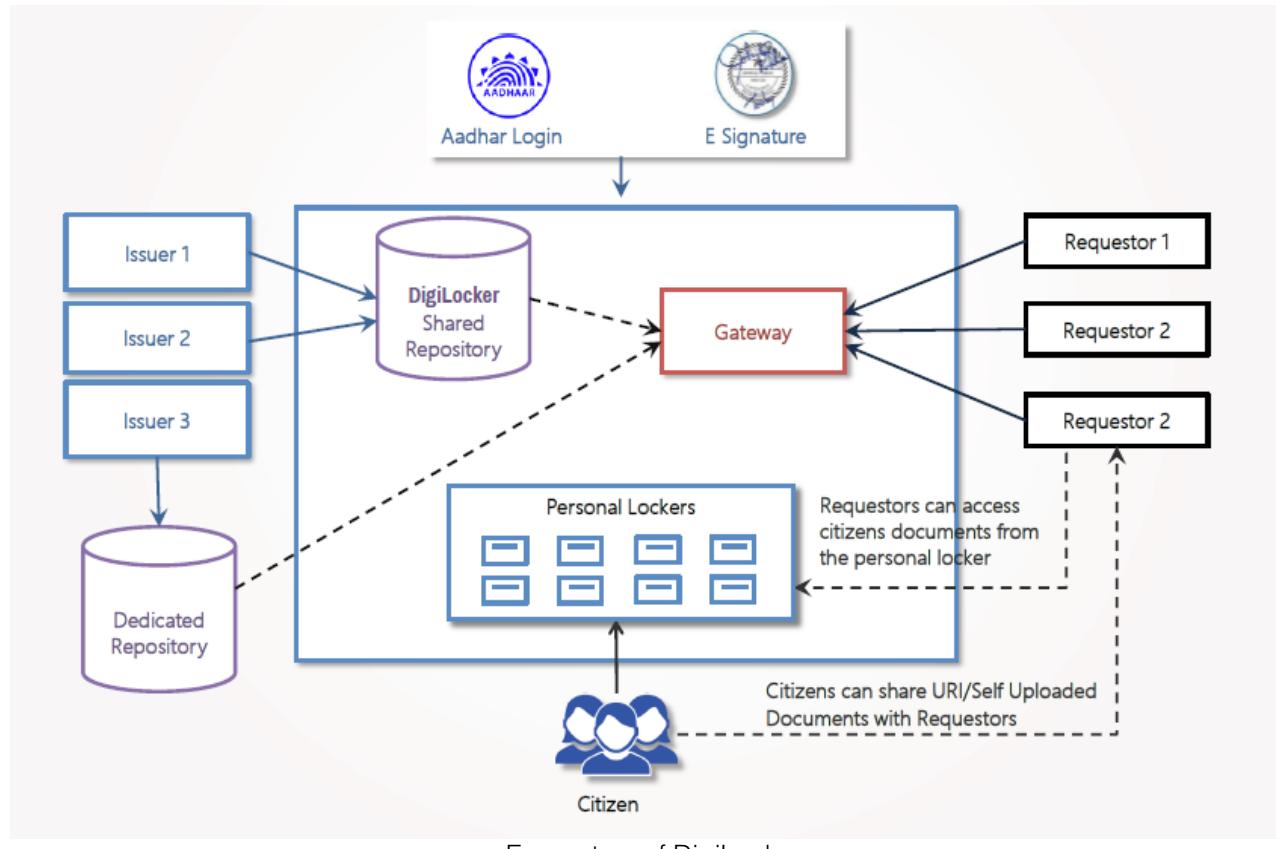
Organisations that are registered with Digital Locker can push electronic copies of documents and certificates (e.g. Driving License, School certificates) directly into citizens' lockers. Citizens can also upload scanned copies of their legacy documents in their accounts. These legacy documents can be electronically signed using the eSign facility.

The following are the key stakeholders in the Digital Locker system:

- **Issuer**: Entity issuing e-documents to individuals in a standard format and making them electronically available, e.g. UIDAI, CBSE, Ministry of Road Transport and Highways, etc.

- **Requester**: Entity requesting secure access to a particular e-document stored within a repository, e.g., University, Passport Office, Regional Transport Office, etc.

- **Resident**: An individual who uses the Digital Locker service based on Aadhaar number.

**Benefits of DigiLocker**

- **Access**: Citizens can access their digital

Ecosystem of DigiLocker
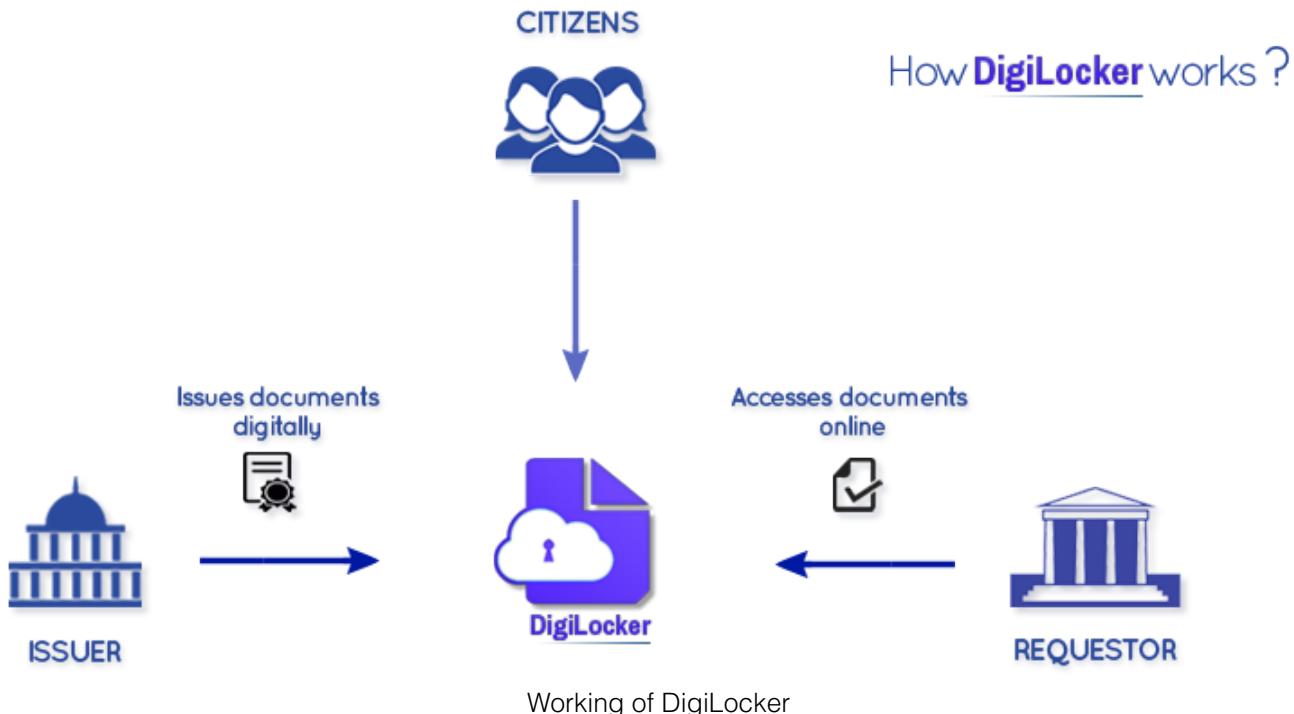
documents any time, any where and share them online.

- **Paperless**: It reduces the administrative overhead of Government departments by minimizing the use of paper.

- **Authenticity**: Digital Locker makes it easier to validate the authenticity of documents as they are issued directly by the registered issuer.

- **eSign**: Self-uploaded documents can be digitally signed using the eSign facility (which is similar to the process of self-attestation).

**Achievements:**

- DigiLocker now provides the access to over 350 crore authentic certificates from over 116 Organisations.

- As on 31st March, 2019 there are

  o More than 2.05 crore Registered Users

  o More than 2.54 crore Uploaded Documents

  o More than 6.58 lakh eSigned Documents

- CBSE, CISCE, about 15 State Education Boards, Skill Development Agencies and Technical Education Councils are providing digital certificates through DigiLocker.

- e-District services of various states, such as, Assam, Himachal Pradesh, Haryana, Chhattisgarh, Jharkhand, MP, Uttarakhand, UP, Nagaland, Odisha, Telangana, and Kerala along with that of Delhi and Chandigarh are integrated with DigiLocker.

- Ministry of Road Transport and Highways has been providing Driving Licenses and Vehicle Registrations through DigiLocker since last two years. As an

Working of DigiLocker

important step to complement this initiative, Ministry of Road Transport and Highways issued an advisory to the State Transport departments to clarify that the Digital Driving Licenses, Vehicle Registrations and other documents, such as, insurance certificates provided through DigiLocker are at par with the physical documents.

- The photo identification documents, such as, Driving License and Aadhaar presented through DigiLocker will also be accepted as a valid proof of identity while travelling on Indian Railways. Ministry of Railways issued a notification in June 2018 in this regard.

- Ministry of Civil Aviation has issued a circular stating that if the passenger shows the Aadhaar/ Driving License from the 'Issued Documents' section by logging into his/her DigiLocker account, the same shall be considered as valid photo identity documents at airports.

- UIDAI, LPG Vouchers, New India Assurance Co. Ltd., CBDT, PMGDISHA, Ministry of Skill

Development And Entrepreneurship, Odisha Land Record Documents among various others are integrated with DigiLocker.

### 2.2.2.5 Enabling Schools with Smart Virtual Class Room Facility

The objective of the project "Smart Virtual Classroom" was to set-up smart virtual class room facilities in 3,204 Government owned/controlled schools plus 50 DIET in seven pilot states of Himachal, Gujarat, Rajasthan, Tripura, Haryana, Andhra Pradesh and Tamil Nadu with the focus to improve the quality of education to students from remote/rural part of the country. Also a centralized control system was established in Delhi at ERNET's data centre which hosted the MCU, Streaming/Recording server and other associated component for multiparty audio/video interaction and also offline access of classroom sessions round the clock for learning/collaboration between all the stakeholders. The basic aim of the SVC project was to create technology enhanced classrooms that will foster opportunities for teaching and learning by integrating learning technology, such as, computers, electronic

white boards, projectors, specialized software, interactive audio-video systems, etc. Under the project, the operational usage training of SVC infrastructure is provided to the Schools and DIETs teachers where DIET is acting as a mentor. Specialized faculty is taking the lectures live to the other schools in that district as well as in the adjoining areas. Other details may please be seen at 9.4.8 of Chapter 9.

### 2.2.2.6 Open Government Data (OGD) platform

### for National Data Sharing and Accessibility Policy (NDSAP)

The Open Government Data (OGD) Platform India (https://data.gov.in) has been set-up by the National Informatics Centre (NIC) in compliance with the National Data Sharing and Accessibility Policy (NDSAP). The objective is to provide proactive access to Government owned shareable data along with its usage information in open/machine readable format, through a wide area

Open Government Data (OGD) Platform Dashboard

Hon'ble MEIT Shri Ravi Shankar Prasad felicitates the winners of #OpenGovDataHack

of network across the country, in a periodically updated manner, within the framework of various related policies, rules, and acts of the Government. Developed using Open Source Stack, the project is one of the initiatives under Pillar 6 (Information for All) of the Digital India initiative.

Similarly, Government Open Data License – India has been developed to give legal frame work to the data consumers wishing to use and build on top of public data. License also gives assurance of what they legally can and can't do with the data both commercially and non-commercially.

All users are provided a worldwide, royalty-free, non-exclusive license to use, adapt, publish (either in original, or in adapted and/or derivative forms), translate, display, add value, and create derivative works (including products and services), for all lawful commercial and non-commercial purposes.

Till 31st March, 2019, the OGD India was having 2,66,640 dataset resources, 4,633 catalogs contributed by 144

Ministry/Departments (84 Central and 60 States), 1,620 Visualizations created, 10,808 Application Programming Interfaces (APIs) created, 215 Chief Data Officers (106 Central and 109 States). OGD India has been viewed 21.22 million times and 6.63 million datasets have been downloaded.

OGD is promoted through newsletters, social media, workshops, challenges and participation in data-meets.

**Achievements:**

| Items | 1st April 2017 | 31st October 2018 | 31st March, 2019 |
|---|---|---|---|
| Dataset resources | 75,146 | 2,31,792 | 2,66,640 |
| Catalogs | 4,114 | 4,429 | 4,633 |
| Contributed by Departments | 105 | 141 | 144 |
| Visualizations created | 1,056 | 1,509 | 1,620 |

| Items | 1st April 2017 | 31st October 2018 | 31st March, 2019 |
|---|---|---|---|
| Application Programming Interfaces (APIs) created | 444 | 7,861 | 10,808 |
| Chief Data Officers | 111 | 204 | 215 |
| Viewed | 10.38 million | 19.34 million | 21.22 million |
| Downloaded | 4.22 million | 6.20 million | 6.63 million |

OGD also acts as a knowledge-sharing platform through online communities. It facilitates community participation for development of Apps, Information graphics, etc. by using the available datasets. Dedicated Community (http://community.data.gov.in) and event portals (https://event.data.gov.in) have also been developed to help in community engagement and event management.

OGD team regularly conducts events like Data Hackathon, Challenges, and Workshops etc. for promotion, data utilization and public engagement. OGD Platform, in association with Internet and Mobile Association of India (IAMAI) has organised Hackathon - "#OpenGovDataHack" for Students, Entrepreneurs, Innovators, Start-ups, Developers and Community to create unique and innovative service delivery Applications and Information-Graphics to foster innovation. The sectors selected for the Hackathon were Water and Sanitation, Transport, Education, Crime and Health.

#OpenGovDataHack was held in 7 cities across the country as well as online. The Esteemed Jury under the Chairmanship of Secretary, MeitY, evaluated the shortlisted Apps and selected One Winner, One 1st runner-up, Two 2nd runner-ups and eight consolation awards, which were given to the teams in the National Award Ceremony at Stein Auditorium, India Habitat Centre, and New Delhi on 01-Nov-2018.

## 2.2.2.7 Electronic Transaction Aggregation and Analysis Layer (eTaal)

A large number of e-Governance initiatives, including various Mission Mode Projects (MMPs) under e-Kranti, are being implemented in the country by the Central and State Governments and Organisations for ensuring efficient, affordable, transparent and convenient service delivery to citizens. Several of these initiatives have national importance and are included in the country's IT strategy. Some applications use internal performance measurement mechanisms defined through Service Levels and Key Performance Indicators (KPIs), but there is no standard metric to evaluate the impact of all initiatives. In view of the rapid growth in the number of services delivered through electronic means in India, Ministry of Electronics and Information Technology (MeitY) and National Informatics Centre (NIC), the nodal ICT Organisation, identified the number of end-to-end electronic transactions as the best indicator for measuring the real-time performance of e-Governance services in terms of service delivery to citizens.

MeitY and NIC have developed eTaal (URL: http://etaal.gov.in) as an electronic dashboard for providing a real time aggregated view of eServices being delivered across different States and levels of Government. eTaal provides an aggregated view of e-Transactions performed through e-Governance applications implemented including, but not limited to, the national level projects like Digital India initiatives and MMPs defined under the Pillar 5: e-Kranti – Electronic Delivery of Services of Digital India. eTaal automatically pulls the e-transaction count from the applications integrated with it using Web Services technology.

eTaal 2.0 has been launched recently. The portal has been expanded to provide deeper insights about the eServices through visually appealing Business Intelligence (BI) reports and data analytics dashboards that provides meaningful insights in near to real time basis. To provide a quick view of eServices being delivered across the country, an eService Directory has also been developed. User can search for any

eService delivered by a given State/Ministry, under a given service category and a sub category. Citizen can also get the URL of the service delivery portal from eService Directory.

State portal is also created for each State which can be accessed by the user from home page. Ministry portal is also under development stage which will provide ministry specific analysis for e-Transaction.

### Achievements

- 4,224.21 crore e-transactions have been recorded during 2018-19.

- 3,672 e-Services have been integrated including Central Ministries/Departments Mission Mode Projects (MMPs) and e-Services of 36 States/UTs.

- Several workshops have been conducted in the State of Andhra Pradesh, Telangana, Gujarat and Goa.

### 2.2.2.8 e-Hospital Project/Online Registration System (ORS)

As part of the Digital India initiative of Ministry of Electronics and Information Technology (MeitY), NIC has developed the e-Hospital, e-Blood_Bank and ORS applications. The ORS portal was inaugurated by the Hon'ble Prime Minister of India on 1st July 2015. ORS is the patient interface of e-Hospital for citizens to book online appointment for the hospitals. ORS is accessible over the Internet. ORS is a system to link hospitals across the country for online appointment and providing patient centric services like viewing lab reports, checking blood availability status etc.

The e-Hospital application is the Hospital Management Information System for internal workflows and processes of hospitals. ORS as well as e-Hospital applications are hosted at NIC's National Cloud MeghRaj. The availability on cloud has relieved hospitals from application and server management. The e-Hospital application is made available to Government hospitals on cloud through Software as a Service (SaaS) model. The e-Hospital system is a one-stop solution which helps in connecting patients, hospitals and doctors on a single digital platform. The e-Hospital application is developed based on the global healthcare standards like HL7, SNOMED-CT, ICD10 and LOINC, and Meta Data and Data Standards published by the Ministry of Health and Family Welfare (MoHFW).

**Brief objective of the e-Hospital project:** The objective of the e-Hospital project is to provide and extend application software related technical support and implementation of the cloud based e-Hospital, ORS and e-Blood Bank applications. Apart from this, the project objectives involve provisioning of single interface for patients across the country for delivery of patient centric services and providing technical support to the hospitals through a dedicated helpdesk/call centre.

**Current status of implementation:** The modules which are currently available on cloud are Patient Registration (OPD and Casualty), IPD (Admission, Discharge and Transfer), Billing, Lab Information System, Radiology Information System, Clinic, Dietary, Laundry, Store and Pharmacy, OT Management and e-Blood Bank.

- 322 hospitals have been on-boarded on e-Hospital, from which 261 hospitals are reporting till March 2019.

- live transactions, with 9.21 Cr. transactions since Sept 2015 and over 2.2 lakh transactions on daily basis till March 2019.

- 48 hospitals in Uttar Pradesh, 69 hospitals in Karnataka and 68 hospitals in Madhya Pradesh are using e-Hospital application.

- ORS has been adopted by 190 hospitals across the country till March 2019.

- Over 24.37 lakh appointments booked from ORS since July 2015 till March 2019, ORS is now available as a part of UMANG app

e-Hospital OPD

**Achievements made under the e-Hospital project:**

- The e-Hospital application has been implemented in major hospitals like AIIMS (Delhi, Bhopal, Bhubaneswar, Rishikesh and Raipur), RIMS Imphal, KGMU Lucknow etc.

- The states of Uttar Pradesh, Karnataka, Uttarakhand, Jharkhand, Manipur, Assam, Tripura and Madhya Pradesh have planned to roll out the e-Hospital application state-wide.

- Over 2.2 lakh transactions are being done from the e-Hospital application and approx. 2,500 appointments are being booked from ORS portal on daily basis.

### 2.2.2.9 Rapid Assessment System (RAS):

National e-Governance Division (NeGD) under MeitY has developed a Rapid Assessment System (RAS) for continuous feedback on e-services delivered by Government of India and State Governments. This system has multiple channels for receiving feedback and it is backed by analytics. These analytics will help RAS Integrated Departments/Ministries for continuous system improvement and better governance. It offers trigger based service integration with department's process workflow through APIs.

A citizen may provide feedback using RAS through various channels – Web Portal, Mobile App and SMS. RAS Portal allows department to quickly build

feedback forms as per their requirement, publish them and make these feedback forms available to end-users on Department defined triggers i.e. delivery of service etc. Departments have their own dashboard and have option to view reports. RAS offers Localized Feedback Forms, in 9 languages, i.e. Hindi, Gujarati, Bengali, Kannada, Malayalam, Marathi, Punjabi, Tamil and Telegu.

Physical Progress: As on 31st March, 2019, the RAS application has been integrated with 1,826 e-services of 323 departments in 28 States/UTs. 8.28 crore feedback requests have been sent. Major integrated e-Gov applications of States, include Caste certificate, Income certificate, Domicile certificate, Birth & Death certificates and Central Projects namely VAHAN, SAARTHI, DigiLocker, DAY-NULM, UMANG & Central Pension Accounting Office.



RAS Dashboard

## 2.2.2.10 Jeevan Pramaan

In a big relief to over a crore retired employee of Government and PSUs, with Jeevan Pramaan, a pensioner can now digitally provide proof of his existence to the authorities for continuity of pension very year instead of requiring to present himself physically or through a Life Certificate issued by specified authorities. This facility has been widely acclaimed by the pensioners. The Aadhaar enabled biometric digital certification does away with the requirement of a pensioner having to submit a physical Life Certificate in the month of November every year, in order to ensure continuity of pension being credited in the account.

Since its launch on 10 November 2014, over 254.29 lakh pensioners have submitted life certificates.

## 2.2.2.11 Aadhaar Enabled Biometric Attendance System (AEBAS)

Digital India's AEBAS Project has been established and rolled out during September, 2014 in Government of India and extended to all State Governments successfully from March 2015.

It is an enabling system to register an employee's attendance by presenting his/her biometric (Finger Print/Iris), which is authenticated online within seconds in real time with UIDAI records. The Cloud-based software is installed and operated from NIC National Data Centre. Front end system is the BAS tablets or the desktop devices. The connectivity of terminals/devices is established through Wi-Fi/GPRS/LAN with Internet, Broadband or SIM based GSM connectivity on tablets.

Till date, 8,452 Central and State Government Organisations are on-boarded with 32 lakh employees/Candidates registered. Real time attendance statistics are reflected in individual attendance dashboards. Around 120,000 devices are installed across the country in form of Tablets/Desktop devices/Iris Scan machines. Close to 32 lakh employees/candidates are now marking attendance all over India on this system.

Facility of advanced MIS reports is available with separate web-service feature.

AEBAS is made highly scalable and caters to various type of requirements with respect to Ministry scheme beneficiary verification and attendance, eg. Skill Development trainees, Culture Ministry "Gurus", Sports Authority coaches and athletes, and so on.



AEBAS Dashboard

AEBAS awareness workshops were conducted for representatives of Centre and States for Nodal Officers, Users and support engineers of Organisations across the country, face to face and through VC. Separate 24x7 Helpdesk team is rendering support to users. Various monitoring mechanisms have been enabled and are monitored online with SMS facilities on the health system of all AEBAS Servers and functions.

Timely updates and enhancements with necessary security features in accordance with UIDAI's security guidelines are being incorporated into the system for safety and smooth process.

## 2.2.2.12 PRAGATI (Pro-Active Governance And Timely Implementation)

As a part of Digital India programme, e-Governance Reforming Government through Technology, Hon'ble Prime Minister of India launched multi-purpose and multi-modal platform PRAGATI on 25th March, 2015.

This video conferencing facility brings the Secretaries to Government of India and the Chief Secretaries of the States on single platform on every fourth Wednesday of the month, through which Hon'ble Prime Minister is able to discuss the issues in major projects and programmes with the concerned Central and State officials directly with full information and latest visuals of the ground level situation. This enables faster implementation of Central level schemes/projects, state level projects and resolution of grievances between State and Central level departments.



Hon'ble Prime Minister's Pragati (PMO) Video Conferencing

This is Hon'ble Prime Minister's unique initiative of resolving bottlenecks in project implementation, cutting delays, reviewing the progress of flagship Government initiatives and keeping tabs on handling and resolution of public grievances.

Every project or issue taken up at PRAGATI meetings comes with a deadline, which Government agencies have to adhere to. About 150 sites participate in each PRAGATI VC session in interactive mode which is managed by NIC.

PRAGATI VC rolled out on March 25, 2015 has pushed 250 projects (Central/State) involving investment of

around ₹11.75 lakh crore till date. 47 Programmes/ Schemes of various Ministries/Department and 17 Sector Grievances have been reviewed (Ministries/ Department).

29 PRAGATI sessions have been chaired by Hon'ble Prime Minister till date.

### 2.2.2.13 Digitize India Platform (DIP)

Digitize India Platform (DIP) is an initiative of the Government of India under the Digital India Programme to provide digitization services for scanned document images or physical documents for any Organisation. The aim is to digitize and make usable all the existing content in different formats and media, languages, digitizes and create data extracts for document management, IT applications and records management. This platform was launched in August,

2015 under Digital India.

The main objective of this project to provide an end-to-end workflow-based IT framework for digitization of Government records to enhance service delivery to the citizen and to empower numerous self-identified volunteers, part-time workers, housewives, students and general public, who add small portions of their contribution through crowd sourcing mechanism to achieve the greater result.

DIP provides an innovative solution by combining machine intelligence and a cost-effective crowd sourcing model. It features a secure and automated plant form for processing and extracting relevant data from document images in a format that is usable for meta-data tagging, IT application processing and analysis.

Achievements:

| Items | FY:2015-16 | FY:2016-17 | FY:2017-18 | FY:2018-19 (as on 28.2.19) |
|---|---|---|---|---|
| Digital Contributors | 21,000 | 2.09 lakh | 5.09 lakh | 5.20 lakh |
| Document Digitized | 2.6 lakh | 8.86 lakh | 1.02 Cr. | 1.08 crore |
| Snippets Digitized | 24.3 lakh | 2.10 Cr. | 3.89 Cr. | 3.94 crore |

### 2.2.3 Financial Transactions Electronic and Cashless

Electronic payments and fund transfers have the advantage of targeted and direct delivery to the intended beneficiaries without the involvement of middlemen who may otherwise subvert the system.

Similarly, online mechanisms for payment of fees for certain public services offer a transparent, friendly and expeditious channel to citizens for payments. It is envisaged that all financial transactions above a certain threshold shall be made electronic and cashless. Further, there is also a move towards strengthening the implementation of Direct Benefits Transfer (DBT) by

leveraging the "JAM Trinity" (Jan Dhan, Aadhaar and Mobile).

As Aadhaar is unique and does not change over the lifecycle of an individual, the 12- digit Aadhaar is sufficient to transfer any payments to an individual. Today, in order to transfer money to a beneficiary, the Governments/ Institutions need to know the bank account, IFSC Code, and bank branch details etc. which is prone to change. However, Aadhaar offers the possibility of sending money by just using the 12-digit number for life without bothering about any changes in the bank account of the individuals. Thus, with this unique property of being valid for a lifetime, Aadhaar is very well perceived as a Financial Address in the banking sector.

## 2.2.3.1 Direct Benefit Transfer (DBT)

The Direct Benefits Transfer (DBT) programme envisages a switch from the present electronic transfer to bank accounts of the beneficiary to transfer of benefits directly to Aadhaar seeded bank accounts of the beneficiaries. The scheme is being headed by DBT Mission. Under the DBT Mission, DBT Cell is to be constituted in each Ministry. In the similar fashion,a DBT cell has been constituted in MeitY under the chairmanship of Joint Secretary(e-Gov). This DBT cell is responsible for on boarding of various welfare schemes/Services on DBT. It coordinates with respective Programme Divisions and IFD for DBT transition of the Schemes and helps in meeting the timelines for the implementation of DBT reform initiative.

Till date four Schemes/Services have been identified for DBT on boarding by MeitY, namely, NIELIT O, A, B and C Scholarship Scheme, Visvesvaraya PhD Scheme for Electronics and IT, Reimbursement of training fees under Scheduled Caste Sub Plan and Tribal sub Plan and Jeevan Pramaan.

## 2.2.4 Technical and Other Support

## 2.2.4.1 e-Gov App Store

The e-Gov AppStore (https://apps.gov.in), launched in May 2013, is a National level common repository of customizable and configurable applications, components and web services, that can be re-used by various Government agencies/departments at Centre and States, with the vision to accelerate delivery of e-services as envisaged under NeGP and optimizing the ICT spending of the Government. Core and Common applications that have high demand and are replicable across the Central and State levels, are the potential applications to be included in e-Gov AppStore and they can be hosted on the National Cloud. The project enables re-use of already developed applications without incurring further cost and effort in development of those applications. Therefore, the

Appstore facilitates the Government Departments with the following objectives:

- Speeding up the development and deployment of e-gov applications.

- Easy replication of successful applications across States.

- Avoid duplication of effort and cost in development of similar applications.

- Ensure availability of certified applications following common standards at one place.

**Achievements**

- Currently 57 applications, that include applications, web services and components, have been uploaded on e-Gov AppStore. Out of these 57 applications, 19 applications have been funded under the project.

- Selection criteria has been finalised for shortlisting applications for productization/re- engineering.

- Guidelines on Application Development Re-engineering have been prepared in consultation with various Government and Private agencies (CGG, CDAC, NIC and industry experts) and have been published, on MeitY's website.

- The Project Implementation Committee of App Store meets at regular intervals for evaluating the proposal submitted, funding of contributed applications for productization, implementation and monitoring.

- 20 applications have been funded so far for productization. The applications funded for productization this year are Collabland, e-Pariksha, CollabERP, CollabCAD,CollabED Sande-Sande. One more application on "Paddy Procurement" by Chhattisgarh has been approved by PIC for productization.

- State level awareness workshops have been organised in various states to educate the Application Owners on Cloud ready application development and deployment.

**Digital India Awards**

Digital India awards honour exemplary digital initiatives. The online nominations for digital India awards have been started and the awards ceremony was held in February, 2019.

**Promotion of Government initiatives/events**

- Micro site for Independence Day has been designed, developed and maintained at http://knowindia.gov.in/independenceday/independenceday.php.

- Spotlights covering important Government initiatives and events like National Digital Repository for Museums of India, POSHAN Abhiyaan - PM's Overarching Scheme for Holistic Nourishment, Unique Disability ID, Swadhar Greh Scheme, Rapid Reporting System - For Adolescent Girls, Rashtriya Madhyamik Shiksha Abhiyan, Ayushman Bharat - National Health Protection Mission, Digital Gender Atlas for Advancing Girls Education, Jigyasa, Swadesh Darshan

- Monthly newsletters were sent to registered user of India Portal to keep them updated with the latest happenings related to Nation.

**Social Media Presence**

Facebook page has been maintained at https://www.facebook.com/NationalPortal India.

Twitter handle has been maintained at https://twitter.com/indiagovin

## 2.2.4.2 Development of Common Minimum Framework (CMF) for Government Websites :

- Websites of 92 Ministries/Departments/Apex bodies have been made accessible as per the

following:

- o Websites of 66 Ministries/Departments/Apex bodies migrated to the Content Management Framework (CMF)

- o 26 Ministries/Departments/Apex bodies were guided and technically supported to make their websites accessible.

- Highlights of the recently launched websites under CMF are:

- o Hon'ble Prime Minister, Shri Narendra Modi inaugurated the website of National Human Rights Commission in October 2018.

- o Hon'ble Minister of State, Shri Arjun Ram Meghwal inaugurated the website of Ministry of Parliamentary Affairs in September 2018.

- 14 Government offices/entities were provided with the CMF Core Framework for developing accessible websites.

- Review and testing for websites' quality and performance was carried out.

- Provided comprehensive WQR to stakeholders of the Ministries/Departments/Apex bodies in order to achieve consistent compliance to W3C's Web Content Accessibility Guidelines (WCAG 2.0), The Rights of Persons with Disabilities Act 2016, Information Technology Act of India and Guidelines for Indian Government Websites (GIGW).

## 2.2.4.3 National Centre for e-Governance Standards and Technology (NeST)

Government of India (GoI) is implementing the Digital India programme as an umbrella programme to prepare India for knowledge based transformation into a digitally empowered Society and knowledge economy. Under the over-arching vision of Digital India, GoI aims to make all Government services digitally

accessible to citizens through multiple channels, such as, web, mobile and common service delivery outlets. To implement e-Governance projects successfully the solution shall have to be interoperable, secure, scalable, reusable, leading to efficiency, effectiveness, reduction in cost and risk, standardisation is only way to achieve this objective.

## Achievements

Following standards/guidelines have been approved by Apex Committee:

a. Indian Standard on enhanced in-script for Keyboard layout

b. Meta Data Standard for drinking water and sanitation

c. Guidelines for Adoption of Electronic Payments and Receipts

d. Guidelines on Mobile as Digital Identity

e. Interoperability Framework for e-Governance

f. MDDS Panchayati Raj

g. e-Government Service Maturity Model

h. Security Guidelines for use of Biometric Technology in eGov projects

i. Encryption Decryption Mechanism for open Bids in GeM

j. MDDS in Health Domain

k. Audit Framework for cloud service providers

l. IndEA Enterprise Architecture Framework

m. IndEA Adoption Guide on Method based Approach

n. Adoption of OWASP – MASVS 1.0

o. Digital Service Standard (DSS)

Following standards are under Apex Committee Approval:

- Project Management Framework for e-Governance Projects

- Guidelines on e-Governance Project Lifecycle

- Guidelines for Functional Requirements Specification

- Guidelines for Software Requirements Specification

63 Awareness Training Programmes have been organised on the e-Governance standards.

### 2.2.4.4 Capacity Building Scheme 2.0

Since 2015, e-Governance in India has witnessed radical changes. This transformation requires considerable enhancement of capacities in transforming existing systems. To address the changing and growing capacity building need, the CB Scheme Phase II was launched in January 2015. The key components of the CB-I scheme are continued to 31 March 2019 at total outlay of ₹423.87 crore and the scope has been enlarged to cover central line ministry in various training and knowledge initiatives. The CB-II emphasized addressing the emerging training needs and institutionalization of CB efforts to ensure sustenance and scaling up. CB-II also features technology enabled learning and knowledge management for any time any where learning and sharing.

**Major components:**

1. Recruitment, continued deployment and HR management of the 340 specialized resources in the SeMTs in all States and UTs to support Digital India programme.

2. Training and development initiatives, including, inter alia,

   - Development of competency frameworks, training guidelines, content, case studies etc for different groups of stakeholders

   - Developing a pool of certified trainers

   - Develop Online and Web Based Training and

Learning Management System

- Certification programmes for specialized/key roles

- Knowledge management and sharing through workshops, development of case studies, sharing best practices and creation of knowledge repositories etc.

### Achievements

The training programmes ranges from short duration sensitization and awareness sessions to the long duration in-depth training. Sizable content and various need based training modules have been developed and standardized. A pool of resources have been identified and trained under train the trainer programme to scale up capacity building efforts across the country.

**Highlights of Capacity Building Efforts**

- A broader outreach programme of MeitY "Cyber Surakshit Bharat" is launched in collaboration with leading IT Industry and related Govt Organisations to educate and enable the CISO's, and broader IT community within Government to address and mitigate the emerging challenges and create awareness among Government users. This include series of regional awareness workshops, intensive role based trainings for designated CISOs and the officers responsible to observe cyber security in their respective Govt Organisation, and developing toolkits.

- Special focus has been made on engagement with leading training and academic institutes within and beyond Government to maximise the reach for covering maximum officials at the same time seeding in e-Governance as part of curriculum in various cadre based state and central training institutes. Central and Administrative Training Institutes (ATIs-CTIs) are conducting specialized trainings, CIO and CISO role based trainings,

thematic workshops and developing master trainers in e-Gov along with facilitation from NeGD. Content and faculty support has been provided to ATI- Mysore, NIFM-Faridabad, IGNFA-Dehradun, MGSIPA-Punjab and DIT-Delhi, Uttarakhand, J&K and UP. During the year, MOUs were signed with IGNFA-Dehradun, CeG-Lucknow and MGSIPA-Punjab to take up specialized e-Gov and embedding e-Gov trainings.

- Learning Management System (LMS) and Knowledge Management Systems (KMS) launched and webinars being conducted on GST, GCCS 2017 and in e-Governance domain. Indian Railways, GSTN, International Solar Alliance, State Governments of Jharkhand, Kerala and Tamilnadu are being supported to leverage LMS platform of NeGD.

- The following training programmes/workshops have been conducted under CB schemes Phase II till 31st March, 2019 in FY 2018-19:

| Training Programme/ Workshops | No. of Programmes | No. of Participants |
|---|---|---|
| Thematic Workshop | 1 | 62 |
| Chief Information Officer (CIO) programme | 3 | 60 |
| Central Specialized Training Programmes | 4 | 133 |
| Chief Information Security Officer (CISO) | 10 | 380 |
| NeGD supported Digital India Sensitization Program with State Administrative/Central Training Institutes | 5 | 200 |

### 2.2.5 Common Services Centres

The Common Services Centres (CSCs) are internet enabled access points for delivery of various Digital Services (eServices) to the citizens. The CSCs enable citizens to avail the Government and other services closer to their locality in a transparent and timely manner. The primary objective of the CSC is to provide e-governance services within the reach of the citizen, by creating the physical service delivery ICT infrastructure. It helps in making a transparent service delivery mechanism and eliminating citizens' effort in visiting government offices.

CSCs are run by Village Level Entrepreneurs (VLEs), who are co-opted into the ecosystem from the community they serve. To ensure sustainability of the CSC, the entrepreneurship capabilities of the VLEs are nurtured from time to time through entrepreneurship development programmes and training workshops.

The CSCs aim to provide individual access to internet and access devices to citizens in rural India where the ICT intervention is very low, thereby, reducing / eliminating the digital divide. CSCs being well equipped ICT enabled centres, necessarily play a significant role in enabling universal access to plethora of e-Services for citizens and acting as cornerstone for the citizens' digital empowerment, hence creating a transparent governance ecosystem. Altogether, these CSCs are becoming a game changer by providing a common Information Technology (IT) platform for rural citizens.

Today, CSCs are more than service delivery points in rural India. They are positioned as change agents, promoting rural entrepreneurship and building rural capacities and livelihoods. They are enablers of community participation and collective action for engendering social change through a bottom-up approach with key focus on the rural citizens.

**CSC Scheme**

The CSC Scheme was initially launched in September, 2006 under National e-Governance Plan (NeGP), with an aim to cover all 6 lakh census villages by one lakh CSCs, as per 1:6 ratio equitably spread across rural India.

Based on the assessment of the CSC Scheme, the Government of India has launched CSC 2.0 Project in December, 2015, under the pillar-3 of Digital India Programme, to expand the outreach of the CSCs to all Gram Panchayats (GPs) across the country and made the CSCs the integral part of the Digital India Programme. It has aimed to set up at least one CSC in every GP across the Country within duration of 4 years (by November, 2019), thereby envisaging establishment of at least 2.5 lakh CSCs covering all Gram Panchayats of the country over a period of four years.

The CSC 2.0 is envisaged as transaction based and service delivery based model, delivering a large bouquet of e-services through a single delivery technological platform, which would increase the sustainability of the CSCs across the country.

**The Status of CSC Scheme**

During the Financial Year, 2018-19, the number of functional CSCs increased by 52,641 CSCs including 45,344 CSCs at GP level. Resultantly, the number of functional CSCs has increased to 3,45,246 at the close of March, 2019, including 2,28,547 CSCs at GP level.

**CSC – Service Delivery Platform**

The number of services offered by CSCs has increased steadily over the years and the CSCs are offering more and more G2C services (Central and State Government services), UIDAI Services, Election Commission Services, Digital literacy and other educational services, services under Financial Inclusion (Banking, DigiPay, Insurance and Pension), Healthcare services, Skill Development, and other B2C services (IRCTC,

Utility Bill Payment, E-Commerce, E-Recharge, etc) through Digital Seva Portal.

Currently, 28 central government services are offered to the citizens through the CSC network using the centralized Digital Seva Portal. State G2C services, ranging from 10 to 400 in various States, are also being delivered through the CSCs in collaboration with various State governments and their departments. By partnering with Government and private service providers, CSC SPV is enabling the CSCs to deliver a wide range of services and thus ensuring the viability and sustainability of the CSCs. The total number of services being delivered through the CSCs, including B2C services, is around 350.

### New Initiatives through CSCs

During the Financial Year, 2018-19, CSC E-Governance Services India Limited, under the guidance of the Ministry of Electronics & Information Technology, has undertaken a number of new initiatives and engaged the CSCs to implement various flagship programmes of the Government under Digital India Programme for digital empowerment and simplifying life of people through citizen centric service delivery efforts.

A few of the important new initiatives as well as other services that are implemented and provided through the CSCs are :

- Ayushman Bharat Yojana
- Pradhan Mantri Shram Yogi Mann-dhan Pension Yojana (PM-SYM)
- 7th National Economic Census
- Jeevan Pramaan
- Udyam Parichay / Udyam Jyoti
- HIMCARE - Himachal Health Care Scheme
- Tele-Centre Entrepreneurship Course
- Printing of Ration Card in Himachal Pradesh
- E-Courts Service
- Sarathi Services

### Other Programmes of National Importance

Apart from the above noted initiatives, during the Financial Year, 2018-19, CSC E-Governance Services India Limited implemented the following Programmes/ Projects of national importance –

- Pradhan Mantri Digital Saksharata Abhiyan (PMG DISHA)
- Wi-Fi Choupal
- Setting up of Sanitary Napkin Micro Manufacturing Units
- Digital Village

### Services through CSCs under CSC Ecosystem

A large bouquet of Services have been offered to the citizens through the CSCs under the following major categories of Services –

1. State Government Services
2. Central G2C Services
3. Aadhaar Services
4. Digital Literacy
5. Other Educational Services
6. Skill Development
7. Services under Financial Inclusion
8. Tours & Travels
9. Utility Bill Payment
10. Healthcare Services
11. Other B2C Services

### Transactions through the CSC Network

Under the above categories of services, during the Financial Year 2018-19, a total of 1,738.20 lakh transactions involving a total transaction value of Rs. 28,243.22 crore were made through the CSCs under CSC ecosystem.

The status of service-wise transactions done through the CSCs during the FY 2018-19 is shown in the Table below –

| SERVICE-WISE SUMMARY OF TRANSACTIONS  UNDER CSC ECOSYSTEM DURING FY 2018-19 | | | | | |
|---|---|---|---|---|---|
| | No. of TXNs | Value of TXNs | | No. of TXNs | Value of TXNs |
| SERVICES | 2018-19 | 2018-19 | SERVICES | 2018-19 | 2018-19 |
| A.   SERVICES ON DIGITAL SEVA PORTAL | | | | | |
| Ayushman Bharat | 154.1 | 45.76 | Sub-Total Carried Over | 649.64 | 3113.39 |
| E-District Services | 96.95 | 59.03 | Health Care Services | 0.83 | 1.95 |
| Electricity Bill Payment | 99.89 | 1198.47 | Tele-Law | 0.49 | 0.01 |
| PM Fasal Bima Yojana | 41.77 | 434.21 | Jeevan Pramaan | 1.07 | 0.04 |
| PAN Card Applications | 74.74 | 79.1 | IT Return Filing | 0.25 | 1.18 |
| E- Recharge | 40.83 | 42.31 | Skill Development | 0.07 | 0.78 |
| Insurance Renewal | 17.34 | 674.11 | Udyam Parichay Registration | 0.18 | 0.01 |
| Labour Services | 13.71 | 3.73 | FMCG Distribution | 0.04 | 3.16 |
| ISP Billing | 0.22 | 0.69 | LED Bulb Project | 0.01 | 2.01 |
| BBPS | 13.33 | 84.1 | Aadhaar Printing | 0.06 | 1.37 |
| EPIC Printing | 9.17 | 1.16 | e-Vahan & Sarthi | 0.1 | 1.55 |
| Other State G2C services | 5.15 | 35.42 | Employment Service | 0.02 | 0.02 |
| FSSAI | 7.3 | 19.82 | Agriculture Services | 0.01 | 0.13 |
| Insurance Product Sales | 4.7 | 77.31 | eCourts | 0.007 | 0.03 |
| IRCTC | 6.15 | 66.77 | Aadhaar Update | 0 | 0 |
| Passport Applications | 4.22 | 4.18 | Aadhaar Seeding | 0 | 0 |
| Tours and Travels | 3.47 | 113.24 | PM Awas Yojana | 0 | 0 |
| Educational Service | 3.29 | 15.32 | Electoral Registration | 0 | 0 |
| Swachh Bharat Abhiyan | 3.25 | 0.03 | Total - Portal TXNs | 652.777 | 3125.63 |
| eStamp | 3.87 | 47.55 | | | |
| PMSYM | 27.22 | 31.99 | B.   SERVICES THROUGH CSC SPV NETWORK – Other than Portal | | |
| Other Services | 14.42 | 11.32 | | | |
| FASTAG Service | 1.23 | 58.33 | Aadhaar Generation | 63.08 | 25.23 |
| Public Distribution System | 1.3 | 0.64 | Banking – BCAs | 604.45 | 21800.74 |
| Pension Services | 0.25 | 3.22 | Banking – AEPS | 350.97 | 3090.79 |
| Water Bill Payment | 1.02 | 5.38 | PMGDISHA  :  Certified | 66.94 | 200.83 |
| Civil Registration | 0.75 | 0.2 | Other Than Portal | 1085.43 | 25117.59 |
| Sub-Total | 649.64 | 3113.39 | Portal + Non-Portal | 1738.20 | 28243.22 |

**Note -1 * Vol of TXNs in lakh**

**Note -2 ** Value of TXNs in INR Crore**

## Generation of Employment through CSCs

CSCs have been promoting entrepreneurship in rural and semi-urban areas and creating employment avenues locally as majority of the CSCs employ around 4 persons from the community for running their activities. Besides, CSCs have also been setting up Micro Manufacturing Units for sanitary napkins, LED bulbs, paper plate making, etc., which additionally employ around 5-10 persons in a CSC. In a rough estimate, today, around 12 lakh people have been provided direct or indirect employment through their engagement with CSC across the country.

## 2.3 Digital India Initiatives by NIC

### 2.3.1 Aadhaar Authentication/AEAD

NIC has setup Aadhaar Authentication Services for E-governance Applications of NIC. The services are setup at Shastri Park, Pune and Hyderabad data centres. NIC has redundant leased line connectivity with UIDAI Data centre at Hebbal, Bangalore and Manesar. Using the Aadhaar Authentication services of NIC, many projects are being executed like Biometric Attendance System, PDS for Various states, Scholarship etc. Type of Aadhaar Authentication services offered for applications are Demographic Authentication, Biometric Authentication, OTP Authentication and eKYC based on Biometric, OTP. Average response time for authentication is around 1 second and 95% transactions are served within 1 second. NIC is one of the leading transaction requestor for Aadhaar services of UIDAI. NIC has also launched Aadhaar service based on the new framework of UIDAI i.e. Registered Device Concept. The Division is involved in helping the application developers to migrate to new RD service environment.

NIC has signed agreement with UIDAI to provide AUA/ASA platform for NIC's e-Governance projects. Presently over 150 State/Central Projects are on board.

| S.N. | Name of Project | Total (in crore) |
|---|---|---|
| 1 | Biometric Attendance System | 67.20 |
| 2 | ePDS Uttar Pradesh | 57.78 |
| 3 | Ration Card Management,Maharashtra | 53.95 |
| 4 | ePDS Maharashtra | 32.56 |
| 5 | ePDS Karnataka | 25.95 |
| 6 | Ayushman Bharat Jan aarogya Yojana (ABJAY),Beneficiary Identification System | 84.45 |
| 7 | Agriculture DBT Portal | 5.88 |
| 8 | Digital Locker | 5.14 |
| 9 | Attendance System in Andhra Pradesh (Vidyawaan) | 5.08 |
| 10 | ePDS Haryana | 5.0 |

| S.N. | Name of Project | Total (in crore) |
|---|---|---|
| 11 | Micro Small and Medium Enterprises(MSME) | 4.45 |
| 12 | Pradhan Mantri Awas Yojana (PMAY) | 4.11 |
| 13 | Swachh Bharat Mission, MoDWS | 3.40 |
| 14 | ePDS Andhra Pradesh | 2.82 |
| 15 | National Scholarship Portal | 2.50 |
| 16 | ePDS chhattisgarh | 2.46 |
| 17 | Jeevan Pramaan | 2.44 |
| 18 | PDS NIC CELL | 2.21 |
| 19 | Indian Army Recruitment | 2.04 |
| 20 | Pradhan Mantri Matru Vandana Yojana(PMMVY) | 1.86 |
| 21 | ELABHARTI,DBT Bihar | 1.62 |
| 22 | ePDS Tripura | 1.58 |
| 23 | Mobile App for New Age Governance (UMANG) | 1.43 |
| 24 | Vidyawaan-Intermediate Eduction,Andhra Pradesh | 1.41 |
| 25 | Aadhaar Authentication of LPG Consumers | 1.17 |
| 26 | National Rural Livelihoods Mission(NRLM) | 0.93 |
| 27 | Rural Housing DRD NIC | 0.75 |
| 28 | ePDS Goa | 0.74 |
| 29 | Deendayal Antyodaya Yojana (Ministry of HUPA) | 0.72 |
| 30 | ARMAAN,Ministry of Defence | 0.64 |

### 2.3.2 CollabCAD

Collaborative Digital Diagnosis System is an Image and DICOM viewer to visualise medical and dental images for diagnosis and treatment planning. Remote Health Centres can connect to expert radiologists and doctors in Centres of Excellence for diagnosis. CollabDDS also provides the experts a common platform to collaborate. It is a Desktop based solution available on both Windows and Linux. eCollabDDS is a web enabled tool for visualizing image/DICOM data.

**CORS:** CollabDDS Online Radiological Services provides a web interface among different health communities for resolution of radiological and dental problems. CORS would be accessible to local as well

as remotely situated doctors for seeking guidance from expert radiologists. Radiologists at the Centres of Excellence would provide the diagnosis. Using CORS, doctors can either upload cases for forwarding to experts or can conduct real time collaboration with the experts, thereby reducing the turnaround time.

- **Indicleft:** Indic left has been successfully deployed at ICMR data centre and is in use by all the three participating Centres, namely, AIIMS, New Delhi, KGMU, Lucknow and GSR, Hyderabad. Approximately 250 cases have been entered so far.



Demonstration of Indicleft through Video Conferencing

### 2.3.3 DARPAN (Dashboard for Analytical Review of Projects across Nation)

"DARPAN" is a comprehensive, generic and configurable platform and an integrated dashboard product for CMs, Chief Secretaries, Divisional Commissioners and DM/DCs. It is an online tool that can be used to monitor and analyze the implementation of critical and high priority projects of the State. It facilitates presentation of real time data on Key Performance Indicators (KPIs) of selected schemes/projects to the senior functionaries of the State Government as well as district administration which can be used for planning, evaluation and monitoring. Google Transliterate API has been used for on the fly conversion of application value into regional language.



CM Dashboard in Dirrerent States

- CM, CS and DM Dashboard have been launched in 28 States by their respective Hon'ble CMs, Chief Secretaries and District Magistrates/Collectors. National level projects like MGNREGA, Swachh Bharat Mission, Vahan, Sarathi, PMGSY are integrated with the dashboard.

### 2.3.4 eOffice

The eOffice product developed by NIC aims to usher in more efficient, effective and transparent inter-Government and intra-Government transactions and processes. The product is built as single reusable system by bringing together independent functions and systems under a single framework. The product is based on an Open Architecture Framework that allows flexibility for scaling and responding to the dynamic needs of the Government. The eOffice suite of applications comprises of File Management System (eFile), Knowledge Management System (KMS), Leave Management System (eLeave), Tour Management System (eTour), Personnel Information Management System (PIMS), Collaboration and Messaging Services (CAMS), Smart Performance Appraisal Report Recording Online Window (SPARROW), and Property Related Information System (PRISM).

- In order to cater to the needs/requirements of various Central and State level implementations like Government of Andhra Pradesh, Government of Kerala, following versions/updates have been provided for eOffice applications:

| Application Name | No. of Releases | Feature Set released | Latest Version |
|---|---|---|---|
| eFile | 7 | 53 | 5.5_11 |
| KMS | 2 | 12 | 6.1 |
| CAMS | 1 | 10 | 6.0 |
| EMD | 4 | 11 | 5.4.3.1 |
| eLeave | 1 | 12 | 5.8 |
| eTour | 1 | 12 | 5.7.1 |
| PIMS | 3 | 11 | 2.3.4 |
| SPARROW | 3 | 10 | 3.2 |

- Applet free Digital Signatures released.
- Work of eFile NG has been started which is based

on the latest technology, improved user interface, multilingual support (Unicode compliant) and improved performance.

- Migration activity from Old portal (Plone based) to New Portal (PHP based) has been carried out.
- Integration with eSign 2.1 according to latest guidelines by UIDAI.
- Expansion of hardware infrastructure in eOffice Cloud at National Data Centre, Shastri Park (NDC-SP).
- Revised eOffice Brochure published.
- Desktop based Digital Signing Tool (DST) released
- eOffice website revamped (https://eoffice.gov.in)

eOffice has been implemented in various Central Government Ministries/State Government Secretariats/Other Departments/PSUs. NIC eOffice Project Division has conducted 104 National Level eOffice training programmes for about 2,574 officials from around 110 participating Ministries and departments.

e-office applications have won following awards:

- BW Businessworld Digital India Summit Award for Department of Information Technology, Government of Tripura.
- Skoch Order of Merit, Mahabubnagar, Telangana.
- Silver Skoch Award for Department of Governance Reforms, Government of Punjab.
- Digital Excellence Award for Government of Punjab.
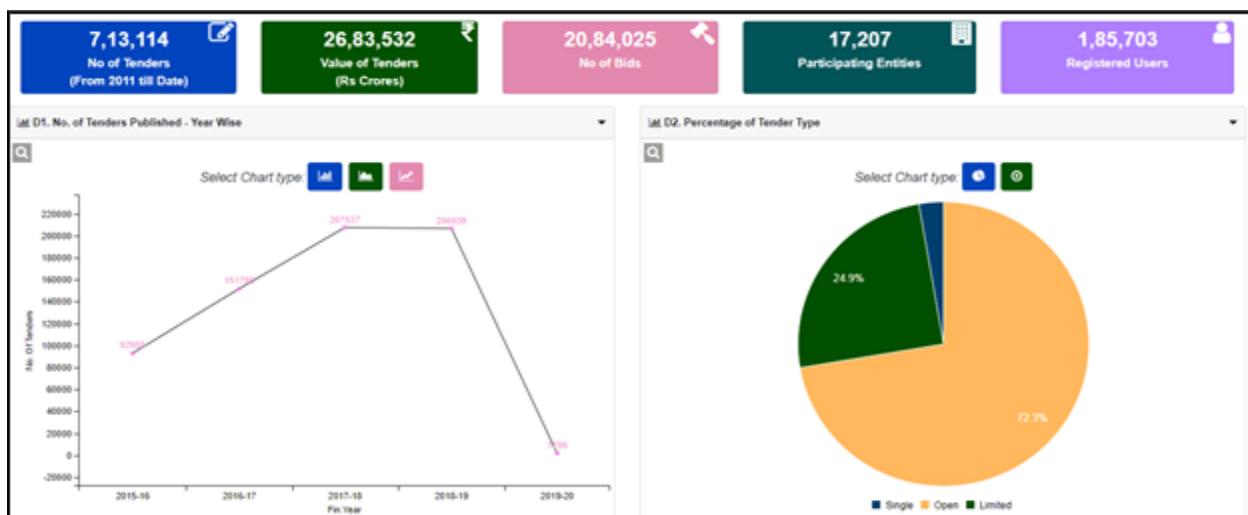


Hon'ble Minister Ministry of Electronics and IT and Law and Justice inaugurated e-Office in National Security Guard Office

### 2.3.5 eProcurement Project
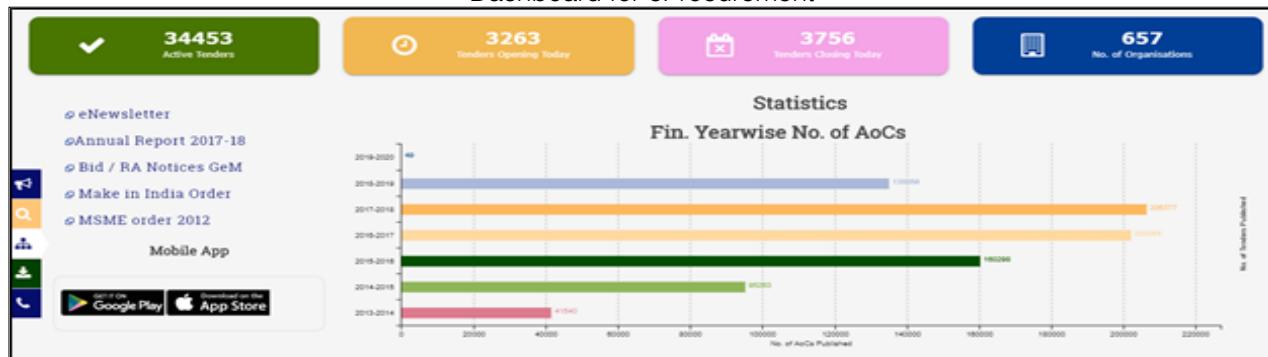
e-Procurement system, GePNIC has been developed to cater to the tendering requirements. This can easily be adopted for all kinds of procurement, such as, goods, services and works. Broad Product functionalities are registration of Government officials and bidders in different roles, tender creation (multiple packets) and publishing RFP/RFQ/EOI/Global tenders with multi Currency/open/single/limited/tender cum auction (eRA), corrigendum, decisions of pre-bid meeting, online bid submission/resubmission/withdrawal, item wise evaluation, configurable technical parameter sheet, auto tendering process with automatic technical evaluation, quality and cost based selection, online payment of tender fee/earnest money deposit and automatic refund, forward and reverse auction, complete transparency in public domain and SMS/mail alerts. Security features and transparency indicators are two factor authentication, bid encryption (technical and financial) at client end, encryption using PKI technology, digital signing of all documents, secured hosting, role based access, log shipping, NTP configured, 24 X 7 availability visibility of each other's offers for participating bidders after opening and periodic audits by STQC.

Electronic tender traffic per month is around 1, 00,000 (approx.) tenders per month. More features like Non-Disclosure Agreement, Pre and Post Integration with other SAP/ERP systems for seamless e-tendering, Grievance Module, two stage tendering, MSE and Startup validation have been developed.



Dashboard for eProcurement



eProcurement Central Web Portal

### 2.3.6 Immigration, Visa and Foreigners Registration and Tracking (IVFRT)

Visa issuance system has been implemented in 169 Indian Missions out of 178 Indian Missions abroad, biometrics system has been implemented in 154 Indian Missions, C-FRO, C-Form and S-Form services has been implemented in all 13 FRROs and 674 FROs across the country, e-Visa has been extended to 166 Countries at 24 Indian airports and at 5 Sea Ports. Since the launch of the scheme (November' 2014) 63.5 lakh e-Visas have been issued. e-FRRO Service has been introduced for all FRROs and over 600 FROs across the country.

### 2.3.7 India Portal

India Portal, a Mission Mode Project in the integrated services category under the NeGP, has been envisaged to be a unified portal that would provide 'single window access' to information and services to be electronically delivered from all Government departments, institutions and organizations. It has been a most popular source of information to a wide range of stakeholders - from citizens, to government, to business and to Indian diaspora. It is a gateway of Indian Government websites at centre, state and district levels and has a rich repository of forms, documents, schemes and web links. Other initiatives/activities under the aegis of India Portal are:

**Guidelines for Indian Government websites (http://web.guidelines.gov.in)**

The first version of Guidelines for Indian Government Websites (GIGW) was released in 2009 to make Indian Government websites usable, user centric and universally accessible. Consequently, with the change in technology and user needs, a new version of the guidelines was proposed and has come into effect from February 2019. The new version features inclusion of the latest standards in web technologies and accessibility, and a new section with guidelines pertaining to Mobile Apps.

**Digital India Awards (https://digitalindiaawards.gov.in)**

Digital India Awards under the ambit of India Portal have been instituted to acknowledge the exemplary initiatives in digital governance. The awards are biennial and the 5th edition of Digital India Awards was organized in 2018. This edition of the awards saw the inclusion of a new category Emerging Technologies to recognize brilliance in the use of new technologies such as Artificial Intelligence, Block Chain, Internet of Things, Machine Learning, Natural Language Processing, Voice User Interface, Big Data & Analytics. The 2018 edition witnessed an enthusiastic participation from across the nation with around 600 nominations received from government entities at centre, state, district and local levels. 35 awards were conferred in 10 categories by the hon'ble Minister of Electronics and Information Technology, Law and Justice, Shri Ravi Shankar Prasad, in a ceremony that was witnessed by participants from across the country. Compendium of winners was also released during the event.

**National Government Services Portal (https://services.india.gov.in)**

To facilitate availability of online services that are provided by various government entities under one platform, in a citizen centric manner under categories like health and wellness, education and learning, money and taxes, National Government Services Portal has been developed. The portal lists 7,465 services that can be searched by categories.

Promotion of Government initiatives/events

- Micro site for Independence Day has been designed, developed and maintained at http://knowindia.gov.in/independenceday/independenceday.php

- Spotlights covering important Government initiatives and events like Rashtriya Vayoshri Yojana, Pradhan Mantri Annadata Aay Sanrakshan Abhiyan (PM-AASHA), Bhasha Sangam - Celebrating the Linguistic Diversity of India, Digi

Yatra- A New Digital Experience for Air Travellers, Study in India: Towards Higher Education, National Digital Repository for Museums of India, POSHAN Abhiyaan - PM's Overarching Scheme for Holistic Nourishment, Unique Disability ID, Swadhar Greh Scheme, Rapid Reporting System - For Adolescent Girls, Rashtriya Madhyamik Shiksha Abhiyan, Ayushman Bharat - National Health Protection Mission

• Monthly newsletters were sent to subscribers of India Portal to keep them updated with the latest happenings related to the nation

### 2.3.8 National Data Centre

NIC is providing Data Centers Services from its National Data Centres at Delhi, Hyderabad, Pune and Bhubaneswar. The National Data Centre at Bhubaneswar was inaugurated by Hon'ble ME&IT in May, 2018. Openstack based cloud services have been started and hosting of state applications is now being taken up from this newly established NDC. National Data Centre at Delhi was upgraded with latest start-of-the-art networking, two petabyte enterprise class storage, backup & load balancing ICT Infrastructure and several projects of national importance were hosted/enhanced, such as E-Way Bill, ICJS, PFMS, Messaging, e-Courts, e-Transport and e-Office. NDC Pune network was also upgraded to high speed and several projects were moved to NIC Cloud including e-Pramaan, e-PDS, e-Certificates and MHA Projects. NDC Pune has also provided DR hosting for e-HRMS and GST.

### 2.3.9 Public Finance Management System (PFMS)

Eight new external systems were integrated with PFMS for DBT payment, namely, GEOREACH – DBT payments to road constructors for construction and maintenance of rural roads, NIKSHAY 2.0 - DBT payment for Tuberculosis Patients for Ministry of Health, HORTNET - Subsidy payment to farmers for fertilizer purchase for D/o Horticulture, Ministry of Agriculture, OMMAS – DBT payment to contractors executing road work for Pradhan Mantri Gramin Sadak Yojana for State Govt

PWD departments, DRDA, YAS-YOUTH - for payment to coaches and sports persons, PRIYASoft – for payment to the vendors by Panchayats as a part of EAT module of PFMS, DBT-Maha Online – for social welfare department, Maharastra for scholarship payments to students, BHOOMIRASHI – for payment to citizens of India for acquiring their land by Government of India.



Launch of Bhoomrashi Portal by Hon'ble Minister for Ministry of Road Transport and Highways

### 2.3.10 CPWD SEWA

CPWD SEWA has been made a complete maintenance operation and maintenance management tool for both residential (GPRA and Non-GPRA) and non-residential (GPOA and Non-GPOA) accommodation maintained by CPWD. CPWDSEWA, a web application acted as an interface between allottees of residential units and CPWD Service Centre. It provides 24x7 Call Centre with Toll free number, SMS services, feedback system etc., and the human interface at Service Centres for lodging complaints has been eliminated. Complaints and checking of status can be made through CPWD's Call Centre Toll Free Numbers 18002664499/1800114499, through Resident's Module in website http://cpwdsewa.gov.in or through CPWD Sewa Residents Mobile App (Windows Phone, Android and iOS).

On an average monthly 7,50,000 SMS are sent to different levels. CPWDSEWA service caters to 146,143 residential units, 42,220 non-residential units, 951 service centres, 839 CPWD management and 110 Call centres.

### 2.3.11 DBT Data Management

DBT MIS is a web based application developed for

Department of Social Justice and Empowerment for capturing beneficiary details. The MIS provided the users of Ministry and concerned associated offices to enter beneficiary details for DBT purpose. There are 3 options provided in the application for data entry i.e. - Online data entry (one by one beneficiary detail), Offline data entry (one by one beneficiary data entry in macro enabled excel file and then uploading of data) and Cumulative data entry for the month. If any stakeholder/associated Organisation have their own MIS, they can send the required DBT data through web services. MIS consists of 3-tier user hierarchy in data entry, using analytical dashboard feature developed by NIC Analytics division for showing graphs etc.

### 2.3.12 Deendayal Antyodaya Yojana

### 2.3.12.1 National Urban Livelihoods Mission (DAY-NULM)

The mission (https://nulm.gov.in) aims at providing shelters equipped with essential services to the urban homeless in a phased manner. In addition, the mission also addresses livelihood concerns of the urban street vendors by facilitating access to suitable spaces, institutional credit, social security and skills for accessing emerging market opportunities. It is one of the flagship programmes of MoHUA. The NIC-MoHUA developed the national level portal for Deendayal Antyodya Yojana National Urban Livelihoods Mission (DAY-NULM) and it is operational in more than 3,200 Urban Local bodies and statutory towns.

NULM MIS has been developed for six components viz. Employment through Skill Training and Placement (ESTP), Self-employment Programme (SEP), Social Mobilization and Institutional Development (SMID), Support for Urban Street Vendor (SUSV), Shelter for Urban Homeless (SUH), Capacity Building and Training (CBT).

### 2.3.13 Digital Government Research Centre (DGRC)

MeitY launched the "Digital Government Research Centre (DGRC)" established at STPI-PATNA,

PATLIPUTRA Campus in Patna on 02.03.2017. The prime objective of DGRC is to bring in innovation in IT platforms/products and services which can be used as best practices in Digital India initiative and the research outcome will serve as benchmark for e-governance applications. DGRC will also extend research as utility to researchers for facilitating plagiarism checks, providing indexed journals and subscriptions. Other major research projects initiated in collaboration with IIT Patna include Disaster Management using Crowd Source Data and Spatial Data Infrastructures (SDI) for Urban Governance Applications.

### 2.3.14 EFC/PIB cases monitoring System

This system facilitates inter-ministerial consultations on EFC/SFC proposals by enabling the ministries/ department to upload proposals and send to concerned ministries/departments for their comments. Ministry accordingly incorporates the suggested changes/comments in the initial project proposal and uploads final proposal for consideration of Department of Expenditure (DoE). Minutes of the meeting are also circulated through the system.

### 2.3.15 EAPDEA Portal

A portal is implemented for online communication between Multilateral Development Banks (World Bank, ADB etc) and Department of Economic Affairs (DEA) with respect to Externally Aided Projects. Various advantages of online proposal are complete external funded projects management system; communication between funding agencies, such as, World Bank and ADB through portal, online mission clearance submitted to DEA by external agencies, Online Approvals provided by DEA for these mission clearances, performance monitoring of loans readily available and feedback on vendors available for better project management.

### 2.3.16 PPR Portal

PPR portal is implemented for online submission of Preliminary Project Report (PPR) for which the financial assistance is required from Multilateral Development

Banks (World Bank, ADB etc). These PPRs can be forwarded to various line ministries, etc. for their comments. The portal facilitates interaction between ministries, DEA, Niti Aayog etc. for any clarifications and comments/suggestions iteratively.

Advantages include online submission and status tracking of PPR. Proposal initiator can send reminder to the concerned ministry through portal. Comments of line ministries can be received on portal itself and are available to all stakeholders of the project. Repository of PPRs and their final status with full stakeholder's communication is available.

### 2.3.17 eCourts

E Courts is Mission Mode Project of Government of India which uses technology to make judicial process more efficient and speedy. It is one of the national eGovernance projects being implemented in the High Courts and Subordinate Courts of the country. The project envisages providing efficient and time bound citizen centric service delivery, to develop, install and implement decision support system in Courts, to automate the process to provide transparency of information access to its stakeholders and to enhance judicial productivity both qualitatively and quantitatively, to make the justice delivery system affordable, accessible, cost effective and transparent. Case Information System, eCourts Portal (ecourts.gov. in), National Judicial Data Grid, Mobile App, Innovative Services, National Service and Tracking of Electronic Process (NSTEP), eFiling services and ePayment enables digital payments of all fines, penalties, judicial deposits and court fees in Courts

### 2.3.18 e-Way Bill

e-Way Bill Application, provides a self-service platform to tax payers and transporters to generate single e-Way Bill for movement of goods from one place to another, as per GST Rules. Following implementation of GST, need was felt to further improve the trade facilitation as well as strengthen the existing tax collection measures. In order to fulfill these objectives, the e-Way Bill system was rolled out all over India. The e-Way Bill under the

GST regime replaces the Way Bill which was required under the VAT regime for movement of goods.

28.89 lakh Tax Payers have been registered; 0.41 lakh Transporters enrolled; 4.9 crore average e-way bills generated per month; 8.66 lakh Average e-way bills verified by officers per month; 11.49 lakh average number of tax payers are using e-way bill per month.

This system enabled the Government to remove the static check posts in all the States. It has also facilitated the governments in collecting more tax revenue. Overall it has resulted in win-win situation for all the stakeholders.



Benfits of eWay Bill

### 2.3.19 Holiday Homes

Holiday Home application (holidayhomes.nic.in) is a web based G2E application for searching, booking and monitoring of Government Guest Houses and holiday homes across India. It is extensively used by the Government employee on tour/LTC/holidaying for booking of room in the Holiday Homes/Guest House. Recently is has been integrated with non-tax receipt portal (NTRP).

### 2.3.20 Indian Customs EDI Systems (ICES)

The migration of ICES Application of NIC to the latest Oracle 12C version was carried out. The eSanchit Application of Customs was integrated with ICES. The eSanchit allows a trader to submit all supporting documents for clearance of consignments

electronically with digital signatures. It goes a long way in achieving both the "Digital India" and the "Ease of Doing Business" motto of the Government. The integration of ICES with PFMS was also initiated. The benefits to the exporter would be directly transferred to their respective accounts with minimal human intervention. In terms of daily statistics, around INR 1500 crore of duty was collected, INR 100 crore of drawback payment was made and more than 50,000 documents were filed.

As part of the new regulations going to be implemented from 01 March, 2019, the entire manifest module would be undergoing a major change and would be a complete mini application in itself. The new manifest module covers reporting of all cargo in the ship. The Manifest will consist of General Declaration, Cargo Details/Bills of Lading and other declarations like, Crew list, Passenger list etc. Among the accolades received by NIC, prominent press coverage in national dailies, about the ICES Project being a major facilitator in special drive launched by the CBIC to make timely refund of GST amount to the traders.

### 2.3.21 Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)

MGNREGA is one of the largest employment guarantee schemes in the world. NREGASoft is an end to end work flow based e-Governance application designed and developed by NIC-DRD in collaboration with Ministry of Rural Development, GOI. It is performing around 10-12 lakh financial transactions related to Wage, Material and Admin payments. The software covers all the activities from MGNREGA MIS to Citizen centric App and training modules to end users. Since NREGASoft MIS captures all the activities under MGNREGA scheme, it processes around 1 crore transactions per day. MGNREGA scheme caters to 691 district, 6,919 Blocks and 2,62,586 Gram Panchayats. Till now 11.86 crore Aadhaar have been seeded for active workers; 3.12 crore MGNREGA assets geotagged; 2,729 crore person days generated and ₹ 5,16,000 crore expenditure were made through this portal.

### 2.3.22 MyGov:  A platform for citizen Engagement towards Good Governance

MyGov is a first-of-its-kind participatory governance initiative that has become an exemplary platform facilitating citizen engagement, where people can contribute their ideas towards core policy issues, give suggestions, feedbacks, and participate in the governance process at large through discussions, tasks, polls, talks. MyGov has engaged with multiple Ministries and Government bodies at Central and State level and has effectively bridged the void between government and citizens by empowering people to participate in government policy making processes.

MyGov has hosted more than 1,500 activities engaging citizens and soliciting their suggestions/inputs on governance matters of national interest with 81.41 Lakh registered users. It has an impressive social media presence with more than 3.75 Lakh followers on Facebook, 15.60 Lakh followers on Twitter, 1.82 Lakh followers on Instagram and more than 70,000 Subscribers on YouTube. MyGov has hosted some of the prominent activities, such as 'Mann Ki Baat,' radio address of Hon'ble Prime Minister, Expert group discussion for AIM (ATAL Innovation Mission), Self4Society (Main Nahi Hum - self4society.mygov.in), Innovate India (innovate.mygov.in), Swach Bharat Summer Internship with a participation of more than 3 Lakh Swachh Bharat interns (sbsi.mygov.in), Swachhta Hi Seva (swachhbharat.mygov.in) SETU (Self Employment and Talent Utilization) under NITI Aayog, Ideas for Union and Railway Budget, National Health Policy, New Education Policy, Policy on Internet of Things of India, National Youth Parliament Festival, Gandhi Quiz on the 150th Birth Anniversary of Mahatma Gandhi, FridaysAtMyGov, Padma Awards 2018 and 2019, Smart India Hackathon 2018, website on 4 years of Government (48months.mygov.in/), Performance dashboard and Check Your Eligibility Engine (transformingindia.mygov.in), MyGov State Instance websites for Arunachal Pradesh, Manipur,

Tripura, Chhattisgarh and Jharkhand & many such notable initiative of the Government in this financial year.

Self4Society is a unique volunteering platform and mobile app, launched on 24th October 2018 by Hon'ble Prime Minister, where IT specialists, corporates & general volunteers can participate & contribute volunteering hours under various national causes on the theme of "Main Nahi Hum". Currently, it has 179 enrolled organisations who have created 4907 initiatives wherein more than 72000 volunteers have contributed more than 1.56 lakh volunteering hours.



### 2.3.23 National Rurban Mission (NRuM)

National Rurban Mission (NRuM) is implementing a comprehensive web based IT system, with the help of NIC for effective management of implementation and operations of NRuM. It ensures organised development of the clusters through Integrated Cluster Action Plans (ICAPs) and Detailed Project Reports (DPR). The mission aims to create 300 such 'Rurban Clusters' over the next 3 years, across the country with about 100 Rurban clusters approved every year. This MIS system is going to be integrated with PFMS system, so that complete fund releases, expenditure, DBT etc. are processed from the MIS through PFMS. Till now, 229 Cluster Information is completed and MPR entry is in progress in 10 states.

### 2.3.24 National Social Assistance Programme (NSAP)

The National Social Assistance Programme (NSAP) which came into effect from 15th August, 1995 represents a significant step towards the fulfilment of the Directive Principles in Article 41 of the Constitution. NSAP at present comprises IGNOAPS, IGNWPS, IGNDPS, National Family Benefit Scheme (NFBS) and Annapurna. NSAP-PPS is a platform provided by Ministry of Rural Development, GoI to States for quick disbursal of pension in respective bank account of pensioners using PFMS, India Post. Pension processing is also done by states and payment files are generated and pushed to PFMS and credit response is updated by States in NSAP-PPS portal.



Assam State was awarded by Hon'ble Union Minister of Rural Development, Panchayati Raj and Mines under NSAP, with technical support from NIC

### 2.3.25 Pradhan Mantri Awaas Yojana

#### 2.3.25.1 Pradhan Mantri Awas Yojana (Urban) - PMAY(U)

NIC has developed a MIS portal for PMAY- Urban scheme and provides central assistance to Urban Local Bodies (ULBs) and other implementing agencies through State/UT Centres. An extensive Mission Progress Dashboard has been developed by NIC and made available with drilldown from all India summaries to State Summary to ULB Summary to Applicant level and also search facilities for applicants/citizens. Beneficiary details available in MIS are 28.34 lakh and number of geo tagged images are 27.80 lakh.

The Portal is integrated with SMS gateway and SMTP; integrated with CSC and with UMANG mobile App through web APIs; integrated with NRSC for providing the BLC beneficiaries and to get back the GEO tagged

information at different stage of construction from the bhuvan through web API; integrated with UIDAI for real time Aadhaar seeding, for Aadhaar e-sign and bio-metric authentication; Aadhaar 2.5; integrated with MoHUA dash board through Web API; integrated with DBT Bharat portal through Web API. Mobile app for geo tagging of AHP and ISSR projects has been developed and integrated with geo-urban portal through Web API and MIS is in the load balancing to cater the huge data.

### 2.3.25.2 Pradhan Mantri Awas Yojana Gramin - (PMAY-G)

PMAY-G aims at providing a pucca house, with basic amenities, to all houseless householder and those households living in kutcha and dilapidated house, by 2022. The immediate objective is to cover 1.00 crore household living in kutcha house/dilapidated house in three years from 2016-17 to 2018- 19. One of the most important features of PMAY-G is the selection of beneficiary, which selects beneficiary using housing deprivation parameters in the Socio Economic and Caste Census (SECC), 2011 data which is to be verified by the Gram Sabhas. Programme implementation and monitoring is carried out through an end to end e-Governance model using AwaasSoft and AwaasApp. The two IT applications help identify the slip ups in the achievement of targets during the course of implementation of the programme. The stakeholders are 26 States, 691 Districts, 7,361 Blocks and 2,74,749 Panchayats. Till now 1,09,47,668 houses have been registered; 99,02,586 houses geo tagged; 89,75,742 sanctioned with verified account with PFMS; 54,35,134 houses completed; 26,42,428 Aadhaar verified and 7,65,96,139 photo captured.

### 2.3.26 Swachh Bharat Mission

### 2.3.26.1 Swachh Bharat Mission (Urban) - SBM(U)

A Digital initiative taken by NIC-MoHUA on the recommendation of Ministry of Housing and Urban Affairs, is an online portal for submission, verification, approval and transfer of subsidy to beneficiaries in their bank account for Individual House Hold Latrine (IHHL) applications as well as capturing and monitoring of sanitation infrastructure of 4000+ ULB and 80000+ Wards across India. Various mobile apps have been made available at http://msbmurban.gov. in to all stakeholders (National Mission Directorate, State Mission Directorate, Urban Local Bodies, wards, beneficiaries) as well as to citizens for effective execution of Swachh Bharat Mission (Urban). Geo tagging of IHHL toilets, community toilets, public toilets made available through portal as well as mobile app. One of its kind online applications where all process from grassroot level up to PMO level is online. 1.04 crore applications were processed through this Online Swachhbharaturban.gov.in Portal.

### 2.3.26.2 Swachh Bharat Mission (Gramin) – SBM (G)

Swachh Bharat Mission - Gramin (SBMG) was launched on 2nd October, 2014 with the primary objective of making India Open Defecation Free (ODF) by 2nd October, 2019. Ministry of Drinking Water and Sanitation, Government of India is monitoring eligible beneficiaries (who still do not have toilet) as per base line survey conducted in FY 2012-13, whose data was entered in web enabled application during period 2013-15.

The IT tools being used in SBM-G are SBM-G web portal, MIS, mSBM, SwachhApp, Dashboard, Swachhata Darpan, Swachhata Hi Seva (SHS) 2018, Gobardhan, Solid and Liquid Resource Management (SLRM), Swachh Sangrah Portal, Swachhta Action Plan and E- office.

### 2.3.27 Vision and Voices of India going Digital (VIVID)-2018

The National Meet on Grassroot Informatics, VIVID-2018, aimed at showcasing the various initiatives of NIC in creating and enhancing the Digital Infrastructure in the country. Some of these are - setting up of ICT infrastructure, developing state of the art products to enable the Government and empower the citizens, initiatives at state and district level along the lines of Digital India initiatives along with the various

awareness campaigns on Digital Payment Systems encompassing DBT, PFMS, Cashless Payment, Aadhaar etc.

VIVID this year provided an extensive platform for knowledge sharing for empowering 240 NIC District officials from across the country to interact and leverage on each other's experience and best practices. During the three days event (8-10th February 2018), DIOs gave presentations on their portals, showcased their applications, their District initiatives and their immense contribution towards implementation of the Digital India initiative of the Government.

The national meet covered wide range of relevant topics in various sessions including Emerging Technologies (Internet of Things, Artificial Intelligence, Machine Learning and Big Data Analytics), Cyber Threats and Counter Measures (Changing Digitisation Paradigm and its impact on Security, Cyber Security Threats and Cyber Crimes), Critical Information Infrastructure protection (NIC-CERT), Enterprise Level Applications, and many more topics for NIC District officials.

The meet was attended by senior Government officials, States IT Secretaries along with the NIC officers from across the country to discuss on various important subjects related to the technology field. They shared their experience in the implementation of the eGovernance programme at their State/District. Nearly 400 NIC officers from all over India participated in this meet.



Launch of Centre of Excellence for Application Security during "VIVID" DIO Meet 2018

### 2.3.28 S3WaaS (https://s3waas.gov.in)

S3WaaS – Service is an ICT Platform that generates Secure, Scalable and Sugamya (Accessible) websites through SaaS implementation. Websites being the face of the Government entities should act as a means of providing equal opportunity even to differently-abled persons to contribute towards nation. S3WaaS has been built with an objective to empower the District Administrations across India to generate, configure, deploy and manage the district level websites for publishing district specific information and services in an accessible way, without much effort and technical know-how in a short span of time. S3WaaS leverages technology to generate websites which are highly customizable and seamlessly deployed on a scalable and completely software defined infrastructure.

- At present 509 websites have gone live

- 20 States/UTs have fully migrated on S3WaaS while 7 states have partially migrated

- Support for 15 regional languages
- S3WaaS awarded Gems of Digital India, 2018



Launch of S3WaaS during "VIVID" DIO Meet 2018

## 2.3.29 Soil Health Card (https://soilhealth.dac. gov.in)

Soil Health Card portal **(https://soilhealth.dac.gov. in)** facilitates generation of Soil Health Cards for the benefit of farmers in uniform and standardized format across the country. It supports 22 languages, alerts to farmers, automatic fertilizer recommendation calculations, bio-fertilizers, organic fertilizers and micronutrient suggestions, fertilizers recommendations for fruits and vegetable crops based on crop stage/ age. Major activities performed by NIC include designing of dashboard for soil health and monitoring of the scheme, generation of Soil Health Card Maps, mobile apps for sample registration and test results entry, fertilizers assessment, generation of nutrient status reports, migration of data from state portals to national portal, database optimization, linkages with land records for Andhra Pradesh, Karnataka, Uttar Pradesh, Haryana and Himachal Pradesh, linkages with CSCs, mFMS, CM/DM Dashboards and e-Disha, infrastructure enhancement. E-learning sessions are conducted regularly.

3.29 crore samples were registered on portal and 10.73 crore Soil Health Cards were printed and dispatched on portal in the first cycle. In addition to this, 2.70 crore samples have been registered and 9.33 crore Soil Health Cards have been printed and dispatched in the second cycle. 'Soil Health Card' Project has received 'Gems of Digital India Awards 2018' under 'Jury's Choice' on 13th June, 2018.

## 2.4 Digital Empowerment of Citizens

### 2.4.1 DigiDhan - Digital Payments

India is at the cusp of transformation towards Digital Economy, enabled by Digital Payments. In the last decade, there have been great advancements in the mobility, internet usage, banking sector, greater enrolments of Aadhaar, evolution of innovative payments platforms and advancements in banking sector accompanied by suitable regulatory guidelines by Reserve Bank of India (RBI) regarding digital

banking. Such developments have allowed the payments space to mature, forming the core while building a cohesive ecosystem with enabled services like m-Commerce/e-Commerce, fintech and sector specific integrated services etc.

**DigiDhan Mission**

In 2017-18 union budget speech, it was decided to set up a mission to achieve a target of 2500 crore digital transactions. Pursuant to this, DigiDhan mission was constituted and a Project Management Unit (PMU) set up. In 2017-18, 2071 crore digital transactions were achieved. In 2018-19, Mission has targeted to achieve 3,013 crore Digital Payments transactions.

- MeitY allocated Digital Transactions targets to 56 banks on the basis of achievements in FY 2017-18.

- MeitY allocated digital transaction targets to 40 ministries on the basis of citizen touch points for each Ministry/Department and its affiliated institutions. Digital transaction targets were distributed to States on the basis of GDP and Population.

- In order to increase the penetration of Digital Payments Acceptance infrastructure, Mission allocated target to 39 Banks for deployment of 20

lakh PoS in urban, rural and north east sector. DFS had allocated target to 35 banks to deploy 20 lakh BHIM Aadhaar PoS devices in last financial year and the same has been taken forwarded in current financial year.

- MeitY extended two incentive schemes of BHIM, namely, BHIM Referral for Individuals and BHIM Aadhaar Pay Scheme, till 31st March, 2019.

- DigiDhan mission has been tracking and monitoring the growth of digital transactions with Banks, Ministries and States.

- In order to enhance the awareness level on digital payments modes, its benefits and its enablement process, MeitY regularly participates in training workshops with various stakeholder agencies.

Digidhan mission is monitoring growth of digital payments adoption in banks, States and Smart Cities using digital payments dashboard (www.Digipay.gov.in). The Dashboard collates information from all the 56 banks, NPCI, RBI, DFS and Closed loop PPIs.

**Growth in Digital Payments**

Over the years there has been a significant growth in digital payments, as indicated in Figure 1.

In 2016-17, country saw 1004 crore digital transactions which reflected an increase of 74% YoY. In 2017-18,
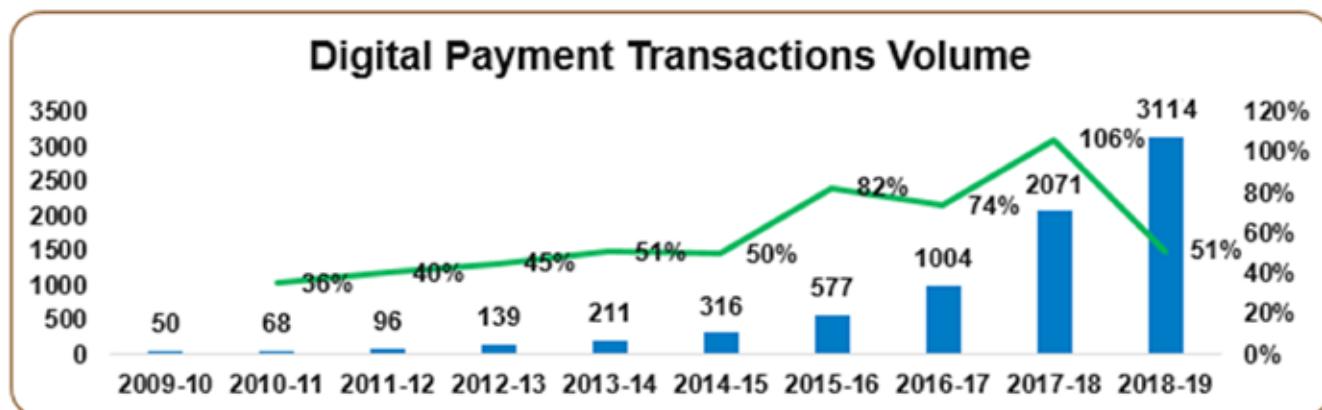


Figure 1: Growth of Digital Payments (Source: RBI, NPCI and Banks) (All numbers are in crore)
Note: Final data for FY 2018-19 is yet to be published by RBI.

2,071 crore digital transaction were recorded with 106% growth YoY, against the total target of 2,500 crore. In 2018-19 Mission has targeted to increase the digital transactions to 3,013 crore and till 31st March, 2019, 3,114 crore digital transactions were recorded which reflect an increase of 50% YoY. This increase can be attributed to development of innovative digital payments platforms such as Bharat Interface for Money (BHIM)-UPI, BHIM Aadhaar and BharatQR code. In Dec, 2016, NPCI launched BHIM app (based on BHIM-UPI platform), which has been downloaded by 3.6 crore users. A number of Payment Service Providers (PSPs) have launched BHIM-UPI based apps such as Google (Tez), PhonePe and PayTM. This has made BHIM- UPI cross a milestone of 258 lakh transactions per day and emerge as the most used digital payment platform after cards and wallets. Since demonetization, five modes of payments namely BHIM-UPI, Immediate Mobile Payments System (IMPS), Aadhaar enabled

Payments System (AePS), mWallets and Debit Cards) have significantly contributed to the growth of digital transactions.

The trinity of Jan Dhan, Aadhaar, Mobile (JAM) is serving as the foundation for schemes that benefit the citizens. Direct Benefit Transfer (DBT) has various initiatives under its umbrella, namely, PAHAL, MGNREGA, NSAP etc. wherein direct funds transfer is made to beneficiaries or through state/Government agencies/institutions to beneficiaries. The digitized mode of transactions is the underlying engine behind DBT and it is just one example of the transformative effect of digital payments.

**Growth of Digital Payment Acceptance Infrastructure**

The associated institutions — Banks and NPCI have also upped the ante on the payment acceptance infrastructure front, wherein the digital payment
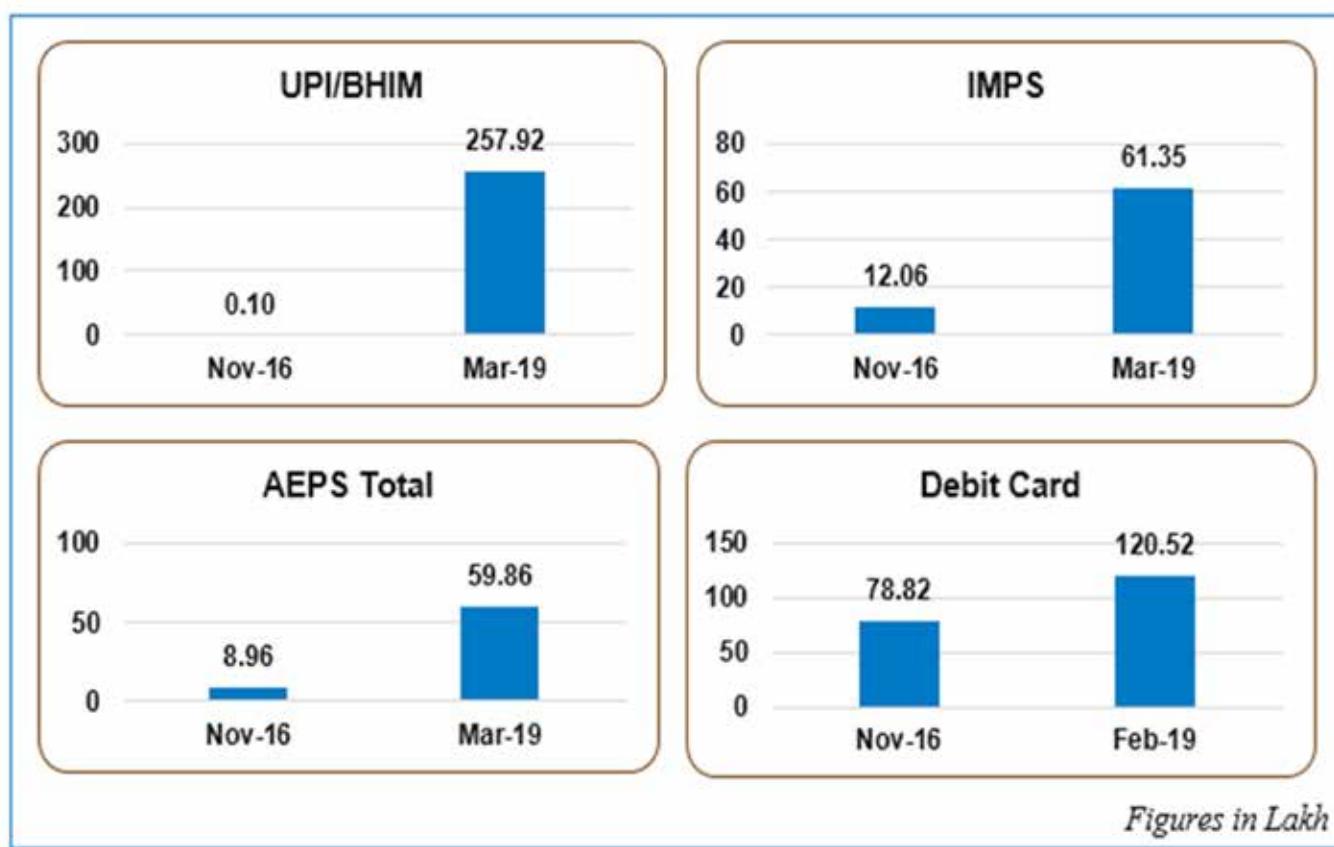


Figure 2: Daily average Growth of Digital Payment Transactions (Source: NPCI and RBI)

acceptance infrastructure has increased from 15.12 lakh PoS machines in Oct, 2016 to 39.40 lakh PoS machines in March, 2019 (as per RBI published report). Till September 2018, 152 lakh other merchant PoS devices were present in the market including Bank's wallets, BHIM (UPI), Bharat QR Code, BHIP app, Bank's own QR Code, BHIM Aadhaar Pay, USSD (*99#) (as per DFS). Similarly there has been growth in number of Pre-Paid Instruments (PPIs) in the market and regulatory regime is moving towards greater interoperability of PPIs.
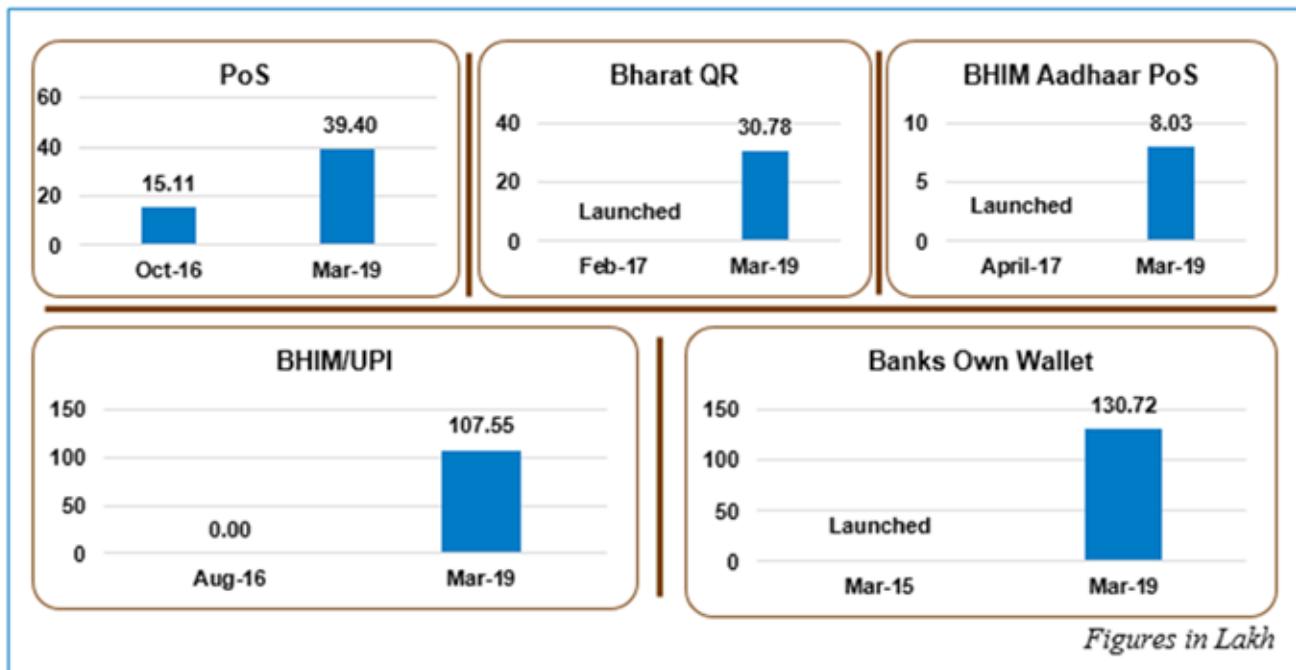


Figure 4: Growth of Digital Payments Acceptance Infrastructure (All numbers are in lakh)

The sustained efforts have led to the doubling up of the card acceptance infrastructure in the country.



Figure 5: Growth of Digital Payments Acceptance Infrastructure

**Universalization of Digital Payment Infrastructure**

In order to enable every citizen in the country who may belong to any economic strata, suitable technologies are adopted. People with smart phones applications have a host of options to make payments through apps that run on BHIM-UPI platform. People having feature phones can opt to make transactions using USSD. People who do not have any phone can use Aadhaar enabled Payment System (AePS) and BHIM Aadhaar Pay for banking transactions.

**Incentivization of Digital Payments and Dis-incentivize Cash transactions**

- Notification on subsidizing MDR charges on Debit Cards/BHIM UPI/AePS transactions of value less than or equal to 2,000/- has been issued on 27th December, 2017.

- Duration of the Scheme for two years from 01-01-2018 to 31-12-2019.

- All the Acquiring Banks are eligible for the Scheme.

- Banks are submitting quarterly claims to RBI and RBI is releasing payments to the respective banks.

- The fund released for Q1 (Jan–March 2018) is ₹123.43 crore for 35 banks.

- The funds released for Q2 (Apr –June 2018) is ₹136.08 crore for 34 banks.

## Strategy

On digital payment acceptance infrastructure side, Government of India has strategized to saturate the acceptance points with BharatQR code and BHIM Aadhaar, in addition to any other mode. In respect of payments that are repetitive in nature, such as, utility payments, the strategy is to onboard all the utilities on the Bharat Bill Payment System (BBPS). This will enable the option of accepting payments from any consumer through any mode from any bank. Ultimately any entity receiving payments, should be able to offer following options to the citizens:

A. Printing of Bharat QR code (preferably dynamic) on bills.

B. Enabling at least two of the following options in all physical payment receipt counters:

- Pull request through Mobile no./Virtual Payment address (VPA) wherein a request of bill amount is received on BHIM/UPI enabled App of the customer.

- Prominent display of printed static Bharat QR code at the billing counter to enable customer to scan and pay.

- Dynamic Bharat QR code on a display facing the customer.

Considering benefits of digital payments, any payment acceptance entity may consider to offer a visible discount on digital payment vis-a-vis cash.

## New Products and Services

**Digital Payments Dashboard** (www.digipay.gov.in) was launched by Hon'ble Minister of Electronics and IT on 13th February, 2018 during the conference of State IT Ministers and State IT Secretaries held on 12-13 February, 2018.

- **Digivarta :**

  DigiVaarta was launched in Delhi by Hon'ble Minister for Electronics and I.T. on 28th September, 2018, with the express intention of spreading awareness on DigiDhan, and also to spread popularity of BHIM's barcode-based merchant payment mode with merchants and traders at large. This launch has two components:

  A. An SMS application which operates from NIC's SMS Gateway on a special short-code service allotted for this purpose by DoT with the number "14444". Citizens will receive SMS messages which are pre-approved by experts and the response messages will be made available for further action, analysis and research. The Government proposes initially to pay for the citizen's response so as to promote citizens' engagement and make the awareness programme completely free for the citizen.

  B. A Mobile application version of DigiVaarta, which can be accessed and used by smart phone users. This app can perform many more functions beyond chat and offers audio-video tutorials etc.

## MeitY Campaigns

- **RuPay Card Campaign:** MeitY organised a camp for issue of on-spot RuPay debit card to MeitY employees.

- **Bharat QR Code Campaign**: MeitY along with SBI on-boarded 300 DMS booths on Bharat QR.

- **Smart City Campaign:**

  A special campaign was undertaken with the

100 smart cities and 9 Ministries/Departments to promote digital payments during the period from 1st July 2018 to 31st October 2018. Various State and Central Government agencies collecting payments from citizens in various Smart Cities were requested to report information related to actual collections and share of digital payments in such collections, on the Digidhan Dashboard. Ministry of Housing and Urban Affairs (MOHUA) has been coordinating and continuously encouraging Smart Cities to increase digital payments in their cities. MoHUA is also giving Smart Cities Payment Awards 2018 "100 days Challenge in 100 Smart Cities" to guide, motivate, recognize and reward the Smart Cities for promoting digital payments and carrying out innovative payment initiatives. Smart Cities have shown significant progress in uploading data on the dashboard and over the months there was an increasing trend clearly observed. Ministry of Railway (MoR) and Ministry of Petroleum and Natural Gas (MoPNG) have been regularly providing data. Smart Cities are also to provide details of infrastructure enabled to collect digital payment and as a mandate from RBI, MeitY has been encouraging Smart Cities to on-board water billers, Power Discom on BBPS. Various promotional activities and campaigns have been organised by Smart Cities to encourage digital payments in their respective cities. Department of Telecom along with NPCI has organised trainings to understand BBPS on-boarding and encourage modes of digital payments.

The following Ministries/Departments/Agencies are being monitored and are required to upload the progress made in promoting digital payments on the Dashboard:(i) Ministry of Housing and Urban Affairs (ii) Ministry of Civil Aviation (iii) Ministry of Petroleum and Natural Gas (iv) Department of Posts (v) Ministry of Railways (vi) Ministry of Power (vii) Ministry of Road Transport Highways (viii) Department of Telecom and (ix) Department of Financial Services.

**Promotion and Publicity of Digital Payment Transactions**

In order to create awareness of this programme amongst citizens of India and proliferate the intended benefits of digital transaction, a 360 degree communication and awareness campaign was undertaken through various channels, including Print, Television, Radio, Digital and on-ground activities.

- **Digital Payments promotion template for Banks:** MeitY has created a template for Banks on promotion of digital payments. The promotional plans from 27 Banks has been received and those plans have been assessed.

- **Digital Payments page on MeitY website:** The page containing matter related to the digital payments is being regularly updated on the details of incentives and promotion schemes to make the citizen well-informed.

- **Launch for incentive/promotion schemes:** MeitY has launched several incentive/promotion schemes, such as,

- **Incentive schemes for BHIM:**

To promote BHIM App, Government has launched the following incentive schemes to popularize the digital transactions:

- **Meeting with Ministries and Departments**: MeitY Digital Promotion team has conducted a number of meetings and workshops with various Ministries and Departments across Central and State level for promotion and creating awareness for digital payments.

- **Digital Jagriti** - Common Service Centres are conducting Digital Financial Inclusion Awareness and Access (Digital Jagriti) programmes for citizens on usage of digital payments modes and supporting merchant on-boarding for acceptance of digital payments.

- **DigiShala**- Free Doordarshan DTH educational channel available in Hindi, English and regional languages for creating awareness regarding various forms of electronic payment. DigiShala is available through GSAT15 (DD Direct DTH), 93.5 degree East, Receive frequency: 11590 MH.

- **PMGDISHA -** The programme aims at training beneficiaries on use of electronic payment system. 14.7 lakh persons have been enrolled out of which 14.28 lakh candidate have been imparted training (as of 15th Oct 2018)

**Ministries/Department and States/UTs related**
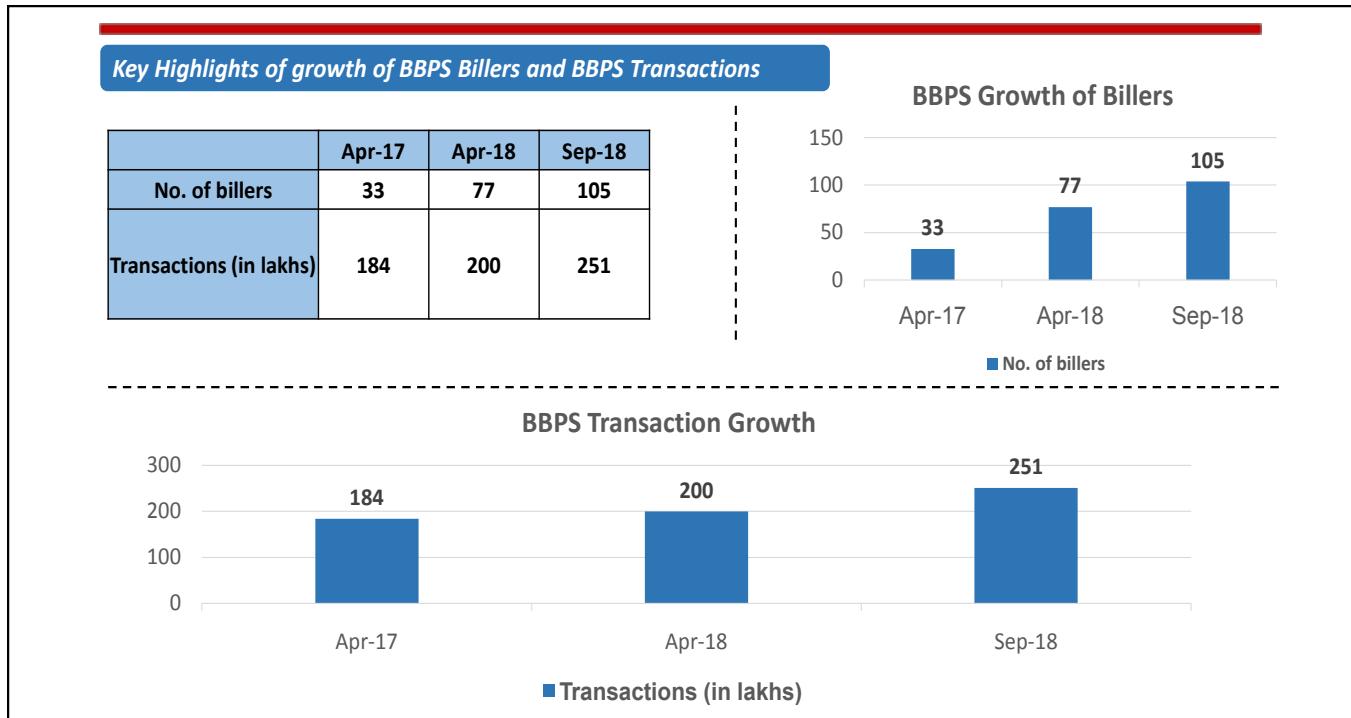
- For FY 2018-19, a target of 2025 crore digital payment transactions was allocated to 40 Ministries/Departments. MeitY also assigned targets to States/UTs in proportion to State/UTs' respective contribution to the population and GDP of the country. For FY 2018-19, a target of 2500 crore digital payment transactions was allocated to 36 States/UTs.

- MeitY has been actively engaged in promotion of Bharat Bill Payment System (BBPS) and pursuing all the Utility Billers (Power/Gas/Water/Telecom/DTH) throughout the country for onboarding on BBPS. Bharat Bill Payment System is a unified platform, which aggregates multiple billers onto a single platform. BBPS provides an interoperable and easily accessible bill payment service to consumers. On-boarding of all utilities on the BBPS platform would be a major enabler of digital payments by providing an easy interface to citizens for digital payment of bills. As a result of efforts made by MeitY and NPCI, the number of BBPS on-boarded billers has significantly increased from 33 in April - 2017 to 105 in September-2018.

- MeitY has been making efforts for promotion of BHIM, BHIM QR, BHIM Aadhaar and Rupay Card. All Ministries and States have been requested for promotion of these modes of digital payments. Further, all Payment Service Providers/aggregators have been asked to ensure adoption of BHIM and Rupay Cards.

DigiDhan Dashboard has been developed to create a platform for accurate reporting, monitoring and analysis of all digital payments transactions occurring in the country. It will help in tracking the growth of digital transactions in the country and will provide inputs for effective planning of promotional activities. DigiDhan Dashboard (http://digipay.gov.in/dashboard/default.aspx) was launched by Hon'ble Minister of Electronics and IT on 13th February, 2018 during the conference of State IT Ministers and State IT Secretaries held on 12-13 February, 2018.

- MeitY organised a camp for issue of on-spot RuPay debit card to MeitY employees. MeitY along with SBI on-boarded 300 DMS booths on Bharat QR.

- For tracking the growth of digital payment transactions by Ministries/Departments and States/UTs, two separate scorecards were prepared for seeking monthly report. This would also help in providing inputs for effective planning of promotional activities for digital payments.

- **Smart City Campaign:** A special campaign was undertaken in the 100 smart cities and 9 Ministries/Departments/Agencies to accelerate the adoption of digital payments from 1st July 2018 to 31st October 2018. Various State and Central Government

**Key Highlights of growth of BBPS Billers and BBPS Transactions**

| | Apr-17 | Apr-18 | Sep-18 |
|---|---|---|---|
| No. of billers | 33 | 77 | 105 |
| Transactions (in lakhs) | 184 | 200 | 251 |

**BBPS Growth of Billers**



**BBPS Transaction Growth**



Growth of usage of Bharat Bill payment system



Digital Payment Dashboard launched by Hon'ble Minister of Electronics and IT during the conference of State IT Ministers and State IT Secretaries held on 12-13 February, 2018

agencies collecting payments from citizens in various Smart Cities were requested to report information related to actual collections and share of digital payments in such collections, on the Smart City Dashboard.

- Smart City Dashboard has been especially developed by MeitY in association with NIC, to monitor digital payment ecosystem in 100 Smart Cities. A multi-dimensional approach is taken to drive adoption of digital payment based on three broad parameters - cash Vs digital payment, enabling digital payment acceptance infrastructure and promotion activities for wider adoption of digital payments.

- The following Ministries/Departments/Agencies are required to upload the progress made in promoting digital payments on the Dashboard:

  (i) Ministry of Housing and Urban Affairs (ii) Ministry of Civil Aviation (iii) Ministry of Petroleum and Natural Gas (iv) Department of Posts (v) Ministry of Railways (vi) Ministry of Power (vii) Ministry of Road Transport Highways (viii) Department of Telecom and (ix) Department of Financial Services.

- Transaction data in respect of 100 smart cities, as on 31st October, 2018 are as follows:

  Total Transactions – 1,03,91,316.67
  Total Digital Transactions – 25, 70,132.13 (23.74%)



Hon'ble Minister of Electronics and IT launching DigiVaarta on 28th September 2018

- Till date more than 100 grievances, pertaining to digital payments, received on the Centralized Public Grievance Redress and Monitoring System (CPGRAMS) portal were resolved. Cases relating to cyber digital frauds were also analyzed and resolved with the support of Police Departments. Due to MeitY's efforts many disputes of wrong online transactions were resolved and the petitioners received their money back.

  Fraudsters carrying out fraudulent financial activities through a website, namely, www.egramdigital. co.in. were apprehended with the help of Police.

- To promote and create awareness about benefits of digital payments and incentives schemes being offered by MeitY and other Ministries/Departments, through social media platform and websites, various creatives were prepared in collaboration with NPCI and the same were uploaded on MeitY's social media handle/page (twitter and Facebook).

**MDR Reimbursement Scheme**

- In order to promote digital transactions, MeitY has come out with MDR Reimbursement Scheme for a period of two years from 1st January 2018. As per the scheme, Government will bear the Merchant Discount Rate (MDR) charges on transactions up to ₹2,000 made through Debit Cards, BHIM united payments interface (UPI) or Aadhaar-enabled payment systems.

**Strengthening Grievance redressal mechanism**

- MeitY has integrated Digital Payment Grievances along with Ministry of Consumer Affairs (MoCA) for utilizing it with National Consumer Helpline (NCH) platform of Department of Consumer Affairs (DoCA) in addition to the existing Grievance Redressal Mechanism of digital payments with the respective banks. 56 banks and other financial service institutions have been on boarded into NCH Platform. NPCI has also been integrated as a convergence partner in National Consumer Helpline (NCH) platform. The NCH platform is live and receiving digital payment related grievances.

## 2.4.2 e-Learning

E-Learning is an effective tool for quality and lifelong education to learners. E-Learning is the learning facilitated and supported by Information Communication Technologies (ICT). Advancements in ICT have made possible the availability of quality education on 24x7 basis to millions of people in a cost effective manner. The use of ICT in education has opened the doors for "anytime, anywhere" learning. Supplementing the formal way of education with e-learning tools/content and use of ICT in formal education is important to facilitate enhanced learning environment; especially when there is large gap in demand and supply of quality content and educators. The Ministry has been financially supporting R&D projects in this area at various academic educational institutes, R&D Labs etc for development of tools and technologies to promote e-learning.

The project "Rollout of Online Labs (OLabs) for schools" being implemented by CDAC, Mumbai jointly with Amrita Vishwa Vidyapeetham, Kollam, Kerala, aims to create infrastructural and support framework for making OLabs (online labs for schools) accessible and usable by students and teachers across India and to train approximately 30,000 teachers across India in effective use of OLabs resources to enhance the teaching learning experience. Total duration of the project is 3 years with budget outlay of ₹816.00 lakh. The project was further extended for one year. Online Labs (Olabs) is available for public access at www.olabs.edu.in. For Olabs Offline, Olabs Live bootable DVD and Olabs Windows Installer is available and is updated periodically with the website dump. Helpdesk is hosted at http://support.olabs.co.in/. Various queries regarding Olabs training, login and feedback on lab contents are being received. Gmail account is also setup for receiving queries through emails. Different queries about the OLabs website from educators, teachers, researchers and educational institutions are received on gmail. Support number is also available. With regard to training of CBSE teachers, so far 24,646 CBSE teachers have been trained from 7,645 CBSE schools.

## 2.4.2.1 Language Computing

**(1) Text To Speech (TTS) in Indian Languages:**

**Development of Text to Speech System (TTS) integrated with screen reader in Indian Languages:**

Under the consortium mode project, Text to Speech System for 13 Indian Languages, namely, Hindi, Bengali, Marathi, Tamil, Telugu, Malayalam, Gujarati, Odia, Assamese, Manipuri, Kannada, Bodo and Rajasthani have been developed using fully open source engines.

**Technology Transfer and TTS integration with Mobile devices :**

- Integration of TTS in mobile devices will enable large section of the society particularly rural and tier-2 and tier-3 cities to have voice based information access in Indian Languages.

- MOU has been signed with OS Labs India Pvt Ltd for integration of the TTS in 9 Indian languages in Android based Regional Operating System INDUS OS so that the same may be available in mobile/wireless devices. So far TTS with Indian OS has been integrated with 8 different mobile handset manufacturers.

- TTS has been successfully integrated with INDUS OS and has currently made available in 8 models of Indian Mobile Manufactures, namely, Micromax, Swipe, CelKon and Karbonn. The models would be launched in market.

- TTS Systems for SMS Application, WhatsApp, Emails and Web Browser in mobile devices has been made in 7 Indian languages, namely, Hindi, Gujarati, Marathi, Malayalam, Tamil, Telugu and Bengali.

- New voices for Gujarati and Malayalam were built as part of collaboration with 'Enability Foundation for Rehabilitation' and 'Timbre Media' respectively.

- Android Applications

- KAVI-PTS: This application was developed by Enability Foundation for Rehabilitation' for vocabulary development through picture-based software solutions. This application uses TTS voice models for Hindi and Tamil.

- Applications that benefit the unlettered two language learning applications were developed at IITM – (1) Tamil learning app and (2) Hindi learning app.

### (2) Automatic Speech Recognition (ASR)

Automatic Speech Recognition (ASR) systems for current agriculture commodity prices in local markets and local weather information to users in a convenient manner for 11 Indian languages/ dialects have been developed for the following States: Andhra Pradesh, Assam, Bihar, Gujarat, Jharkand, Karantaka, Maharashtra, Odisha, Tamil Nadu and Telangana, Uttar Pradesh and West Bengal. The system have been built from scratch using open-source tools/software so that it can be freely used by MeitY/NIC and other e-governance projects with no licensing issues or cost. The systems would act as a voice interface for NIC Agmarknet portal (http://www.agmarknet.nic. in) and India Meteorological Department (IMD) AgriMet websites.

- Deployment effort in collaboration with the Ministry of Agriculture and India Meteorological Department, Ministry of Earth Sciences has been initiated for ASR system.

### (3) Multi-Lingual Basic Information Processing Tools

Lack of content in Indian languages is a big challenge and it was discovered that there is lack of content creation tools. To bridge this gap, language CDs containing various software tools like Libre Office, Open Type Fonts, Keyboard Drivers, Firefox Web Browser, E-mailing Client, etc. have been released for free public use for all 22 constitutionally recognized Indian languages.

Various different PSUs, Banks, Educational Institutions, etc are using these software tools for their day to day working. As on date, more than 13 lakh CDs have been distributed and there have been about 1.45 crore downloads. These software tools can also be downloaded freely from http://www.ildc.in.

### (4) Language Technology Information Dissemination and Repository

TDIL Data Centre (www.tdil-dc.in)portal provides language technology services and resources developed under various TDIL projects. NLP applications, such as, MAT, WebOCR, IndoWordNet, HindiWordnet, Glossary tool, UTRRS, Sanskrit NLP tools, Sanskrit E-learning application, Sandhan-CLIA, TTS, Mobile based MT service, LPMS etc. have been hosted on the portal for public use. Text to Speech systems as a browser plug-in for Mozilla and Chrome Browser for eight Indian languages, namely, Hindi, Bengali, Marathi, Tamil, Telugu, Malayalam, Odia and Gujarati languages are also available on the portal. Portal framework has been migrated to latest 3.x which is more secure and upgraded framework. User engagement and interaction with portal has recorded 31 lakh plus visitor, 295 research community profiles and 13,000 registered users. So far 485 linguistic resources and tools have been made available on the portal including POS tagged and Chunked text corpus, Speech Corpus, Pronunciation Lexicon Specification (PLS) lexeme and speech data, Dictionaries, Lexicons, Fonts, Research papers etc.

### 2.4.3 Initiatives on Accessibility

1. A National Policy on Universal Electronic Accessibility was formulated by Ministry of Electronics and Information Technology (MeitY) and it was notified on October 25, 2013. The policy facilitates equal and unhindered access of electronics and ICTs products and services by differently-abled persons.

TDIL Website

2. As part of Accessible India Campaign, a flagship programme of Department of Empowerment of Persons with Disabilities(DEPwD), MeitY has issued letters to Secretaries of Government Ministries/Chief Secretaries of States on 3rd August 2018 to make websites of respective Ministries/ State Governments accessible. It was informed to them that NIC had formulated guidelines for Indian Government websites. The second version of the guidelines had been released by NIC in February 2018. It is available on the website at guidelines. gov.in. Resources pertaining to the techniques and best practice for compliance to the guidelines are also provided in the website.

## 2.5 Vision Document for Digital North East 2022

The Government of India accords the highest priority towards the sustainable development of the country's North Eastern Region that stands apart with its rich and distinct cultural heritage and strategic position. **Digital North East** is envisioned as an integral part of the Digital India programme, which would help in leveraging the power of Information Technology to leapfrog the overall development of the region and realize its full potential. Taking this forward, the **'Vision Document for 'Digital North East 2022'** was released by Shri Ravi Shankar Prasad, Hon'ble Minister of Electronics and Information

Technology, Government of India on 11th August, 2018 at Guwahati, Assam in the presence of Chief Ministers and IT Ministers of North East States and senior officials of Central Government Ministries and officials for State Governments of NER .

The Vision Statement for Digital North East India 2022 is, "Leverage digital technologies to transform lives of people of the North East India, enhance ease of living and ensure inclusive and sustainable growth". The Mission Statement focuses on fast track implementation of Digital India Initiatives in the North Eastern Region through optimum utilisation of ICT, bountiful natural resources and vibrant human resources.

The Vision Document provides a roadmap for bringing about a Digital transformation of the North Eastern Region through an accelerated implementation of the various initiatives under the Digital India programme of the Government. The document identifies eight digital thrust areas, namely,; Digital infrastructure, Digital services, Digital empowerment, Promotion of Electronic manufacturing, Promotion of IT and ITeS including BPOs, digital payments, Innovation and Startups and Cyber security.

The major objectives of the Vision Document for Digital North East 2022 include high speed broadband connectivity to all Gram Panchayats, mobile connectivity to uncovered villages of NER, creation of Cloud Hub with Disaster Recovery Centre, expansion of Common Services Centres, provide better access to quality health, education and agricultural services through digital technology, promote local tourism, art and culture, handicrafts, handloom, establish Start-up Hub in NER, promote entrepreneurship and employment opportunities in electronics manufacturing, BPO, IT-ITeS industry etc.

Specific strategies and initiatives required to be undertaken in each thrust area have also been identified, so as to extend the benefits of the digital transformation to the people of the region in an inclusive and affordable manner. State-wise roadmaps for implementing digital initiatives in the North East States have been prepared.

The Vision Document has been formulated with collaboration of various Central Ministries including Ministry for Development of North Eastern Region (DoNER) and Department of Telecommunication (DoT). Wide consultations were also done with State Governments of North Eastern Region to identify the strengths and opportunities in North East.

The Vision Document for Digital North East 2022 will not only enhance the growth and development of the North Eastern Region but will also fulfill the goals of Digital India and will accelerate progress towards a Trillion Dollar Digital Economy.

## 2.6 Digital India Publications

India's digital story is one of an ICT - led development by use of technology that is affordable, inclusive and transformative. The Digital India Programme aims to transform India into a knowledge-based economy and a digitally empowered society.



Digital India Publications

### 2.6.1 Release of the Yojana on Digital India

The December, 2018 Issue of Yojana magazine on Digital India was released by Shri Ravi Shankar Prasad, Hon'ble Minister of Electronics and Information Technology on 30th November, 2018 in Ministry of Electronics and Information Technology (MeitY) in the presence of Shri S.S. Ahluwalia, Minister of State (E&IT). The event saw the participation of senior officers from Ministry of Electronics and Information Technology (MeitY) and Ministry of Information and Broadcasting.



Release of special issue of Yojana on Digital India

Yojana is a development monthly magazine, devoted to socio-economic issues. It provides a platform for discussion on problems of social and economic development of the country through in-depth analysis of these issues. The magazine is published by Ministry of Information and Broadcasting.

The December issue on Digital India has been brought out to propagate and disseminate the initiatives of Digital India leading to digital inclusion and empowerment to the masses of the nation. The articles in the magazine highlight different aspects and domain areas of the digital economy of the country. These have been written by eminent authors representing the digital sector.

Yojana on Digital India covers the entire gamut of the programme from policy perspective given by Shri Ravi Shankar Prasad, Hon'ble Minister for Electronics and Information Technology, highlighting the transformation led by Digital India, a story of Digital Empowerment and Digital Inclusion. Initiatives under Digital Identity, Digital Infrastructure, Digital Literacy and Skilling, and Digital Delivery of Services are generating pathways to a future powered by technology.

The power of technologies has grown at a pace far exceeding our ability to leverage them in key social sectors. The new era requires speed: in thought, in action, in governance and regulatory changes, as explained by Shri R. Chandrasekhar, the former president of NASSCOM. Shri R. S. Sharma, Chairman, Telecom Regulatory Authority of India has pointed out that the regulators have the onerous responsibility of maintaining a balance between encouraging innovation, protecting consumers, creating an environment for orderly growth of industry as well as address unintended consequences of disruptions. Regulations should be adaptive, collaborative and impact assessment of regulation should be done.

Cyber security issues in digitalization and the changing paradigm of Cyber security and methodological approach has been given by Ms. Rama Vedashree, CEO, Data Security Council of India. A special article on Aadhaar as empowerment enabler and a game changer by Shri Ajay Bhushan Pandey CEO, UIDAI has also been included in the issue. Aadhaar ensures that the benefits reach directly to the deserving beneficiaries in a hassle-free manner.

It also includes the article on inclusive growth and transformative impact of Digital India leading to ease of living by Ms. Simmi Chaudhary, Economic Adviser, MeitY. The dynamics, opportunities and the growth in the electronic manufacturing sector of India has been highlighted by Shri Pankaj Mohindroo, Chairman of India Cellular and Electronics Association.

Shri Lalitesh Katragadda, founder of Indihood, Chief Product Adviser for Avanti Finance in his article has shared his idea of how Digital India is at the heart of Poorna Swaraj. The importance of the use and proliferation of language technology for Indian languages in digital devices, has been explained by Shri Rajiv Sangal, Professor, Language Technologies Research Centre, IIIT Hyderabad. Rapid advances in IT has revolutionized the role of libraries, therefore, the needs of digitisation of traditional libraries more and more for

the growth and development in education and research is highlighted by Shri Ajit Mondal, Assistant Professor, Head, Department of Education, Surendranath College for Women, Kolkata.

The magazine provides an apt platform to showcase India's position in the digital revolution as the country is generating future pathways powered by technology and leading towards Trillion Dollar Digital Economy.

### 2.6.2 Digital Bharat, Saksham Bharat - A Compendium on Digital India

Digital Bharat, Saksham Bharat – A compendium on Digital India covers the entire gamut of the Digital India programme from policy to implementation perspective, highlighting the transformation led by Digital India, a story of digital empowerment and digital inclusion. The compendium provides an apt platform to showcase India's position in the digital revolution as the country is generating future pathways powered by technology that is affordable and inclusive. This has been brought out with an objective to disseminate and propagate the success of Digital India among masses. It outlines initiatives that provide digital identity, digital infrastructure, digital literacy & skilling, and digital delivery of services to millions of citizens.



Release of Digital Bharat, Saksham Bharat Compndium

### 2.6.3 Towards a New India Transforming the Digital Dream to Reality

Another publication in the series is Coffee Table Book titled as **"**Towards a New India Transforming the Digital Dream to Reality" prepared with the objective to disseminate and propagate the success of Digital India. The document is divided in 8 sections – Digital Access to All, Digital Empowerment through Digital Innovation, Digital Entrepreneurship, R&D, Cyber Security, Global Impact, Reaching Out and Trillion Dollar Digital Economy, highlighting the proves of Aadhaar enabling Direct Benefit Transfer, JAM trinity, etc., digital platforms engaging citizens and delivering services online, manufacturing promotion leading to 268 mobile and mobile components manufacturing units generating 6.7 lakh employment opportunities and many more initiatives of Digital India.



On 21st and 22nd February, 2019**, Digital Bharat, Saksham Bharat – A compendium on Digital India and Coffee Table Book titled as "Towards a New India Transforming the Digital Dream to Reality"** were released by **Hon'ble Minister for Electronics & Information Technology and Law & Justice** at Stein Auditorium, India Habitat Centre, New Delhi.

Publications highlight the transformation brought out through Aadhaar, the Government has provided digital identity to 123 crore residents of the country with 99 % coverage of adult population. The combination of Jandhan bank accounts, mobile phones and digital identity through Aadhaar is helping the poor in receiving the benefits directly into their bank account. Rs. 6.21 lakh crore have been disbursed through Aadhaar based DBT to beneficiaries of 438 Government schemes which, have led to saving of over Rs. 1.1 lakh crore in the last 4 years by removing fictitious claimants. Increased use of digital payments in the country has brought transparency and accountability. Over the past four years digital payment transactions have grown multifold. BHIM/UPI has grown multi-fold in the span of two years. UPI consumers made over 67 crore transactions with a value of over Rs. 1 lakh crore in the month of January, 2019 alone. Currently, there are 134 banks offering UPI services to their customers.

Digital delivery of services has simplified the way citizens interact with Government to avail various services and enhanced the ease of living of the citizens. Throught the National Scholarship Portal, which has 1.4 crore students registered, scholarships worth Rs 5,295 crore have been disbursed in last 3 years. Jeevan Pramaan has improved the ease of verification of pensioners using Aadhaar as digital identifier. 2.48 crore Digital Life Certificates have been submitted since 2014. DigiLocker provides access to over 349 crore certificates in digital format on a single platform. To make governance easily accessible to people, UMANG (Unified Mobile Application For New Age Governance) is the platform created by the Government that enables access of 339 Government services to citizens through their mobile phones, thus expanding the digital outreach of the citizens. There has been a stupendous growth in electronic transactions (e-Transactions) in various e-Governance services. Over 8,919 crore e-transactions have been recorded since its inception, till December, 2018. Common Service Centres (CSCs) are bringing e-services to the doorsteps of people in the rural areas in an affordable

manner. There are around 3.12 lakh CSCs across the country providing over 350 services ranges across sectors like education, health, agriculture etc. and have generated employment for 12 lakh persons including 55,000 women. CSCs have become centres of digital empowerment being actively involved in providing digital literacy. Under Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA), Government is implementing the world's largest digital literacy programme under which 1.96 crore people in rural backward areas have already been imparted training to become digitally literate and a total of 6 crore will be trained, thus, bridging the digital divide and helping people access benefits of the digital world.

The BPO movement for smaller town aims to create employment opportunities and secure a balanced regional growth by promoting local entrepreneurs, employment to women and differently-abled persons. 53,300 seats have been allocated to 184 companies, resulting in setting up of 268 units distributed across 110 locations of 26 States & 2 UTs. BPOs have started operation at several locations, including, Bhaderwah, Budgam, Jammu, Sopore and Srinagar in Jammu and Kashmir, Guwahati, Kohima, Imphal in North-Eastern region, Baddi and Shimla in Himachal Pradesh, Patna and Muzzaffarpur in Bihar, Jaleshwar in Odisha.

The Government is promoting electronics manufacturing to accelerate the movement towards Make in India, Make for India, and Make for the World. Towards making India manufacturing hub for electronics and mobile devices, 268 unique mobile and mobile component manufacturing units have been setup in last 4 years, providing direct and indirect employment opportunities to 6.7 lakh citizens.
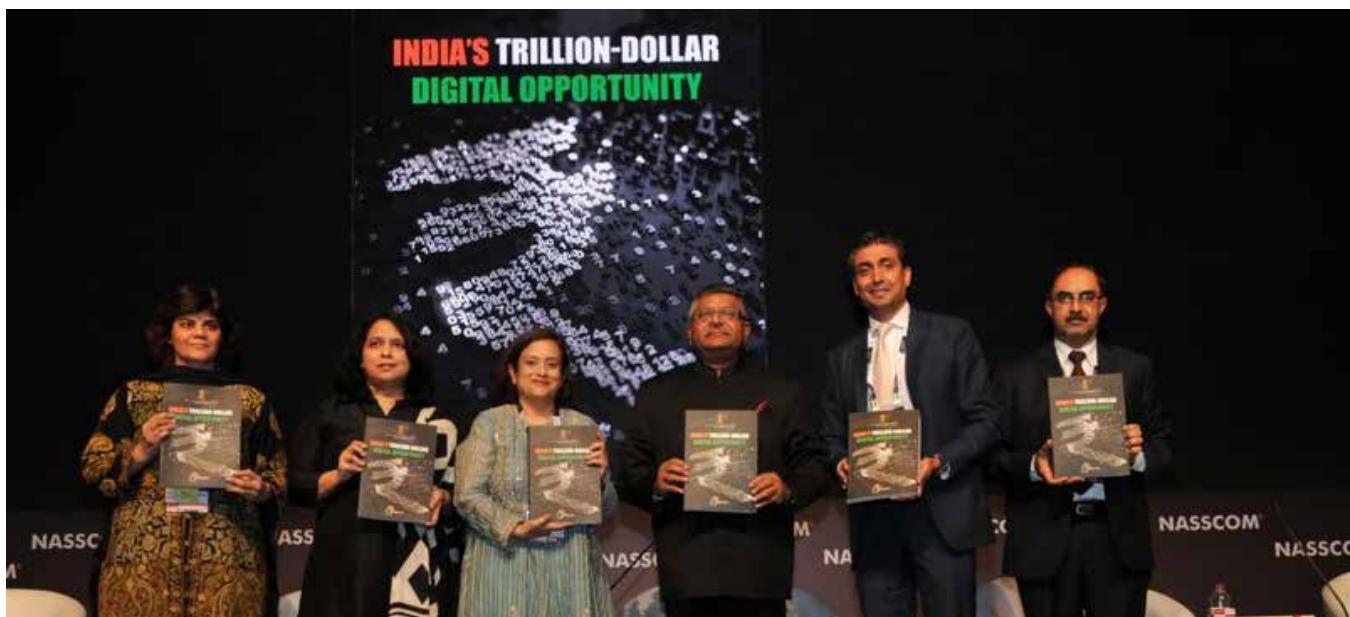
To create an inclusive, safe and secure cyber space for sustainable development, the Cyber Swachhta Kendra (Botnet Clearing and malware analysis centre) has been setup to provide alerts to users for preventing loses of financial and others data. A robust Data Protection Framework is also being enacted.

### 2.6.4 India's Trillion Dollar Digital Opportunity

`India's trillion-dollar digital opportunity' a new report by the Government of India's Ministry for Electronics and Information Technology (MeiTY), takes stock of the massive digitally-enabled change that is under way and lays out a vision and road map for coming years. The report, which builds on a research collaboration with McKinsey & Company, is a collaborative effort, with data, inputs and case studies from a wide range of government, business and civil society entities, undertaken over the past year.

The report finds that India can create up to $1 trillion of economic value from the digital economy in 2025, with about half of the opportunity originating in new digital ecosystems that can spring up in diverse sectors of the economy. Currently, India's digital economy generates about $200 billion of economic value.

The report was released by the Hon'ble Minister of Electronics and Information technology on 19th February, 2019.



Release of India's Trillion Dollar Digital Opportunity

Key findings of the report includes that India is the second-fastest digitizing economy amongst 17 leading economies of the world, as per Country Digital Adoption Index, that is based on 30 metrics to measure digital adoption in 17 mature and emerging digital economies, including Brazil, China, Indonesia, Russia, South Korea, Sweden, and the United States. Even within India, the digital divide is narrowing fast, as less affluent states leapfrog to catch up with more affluent ones on dimensions such as internet subscriber growth, and Common Service Centres.

On the back of rapid progress in internet infrastructure and usage, thirty digital themes can be scaled up nationally to accelerate progress in nine priority areas. The report lays out a roadmap for Digital India 2.0 and outlines the enablers required in nine strategic areas, ranging from creating 21st century IT infrastructure and software capabilities, to using digital to serve key national priorities, such as healthcare, education and energy for all, doubling farmers' income, Make in India, next-gen financial services, jobs and skills of the future, and e-governance. These themes can help create up to $1 trillion of economic value in 2025 and empower millions of workers, entrepreneurs, small and large businesses, and consumers in rural and urban parts of the country.

India's digital economy of the future could generate productivity and output sufficient to support 60 million to 65 million workers in 2025, while redeployment and reskilling of existing workers will also be required. Digital technologies fundamentally change work, and create demand new types of skills and job roles. The report estimates that some 40 million would need to be retrained and redeployed in new jobs. Aside from digital coders and solution providers, many types of work will become digitally-enabled and necessitate workers to be trained as users of digital technologies. For example delivery personnel and drivers in the logistics and transportation sectors, healthcare workers, or advisory service agents in areas such as financing and agriculture, will need retraining.

Capturing the potential value of a $1 trillion digital economy is neither certain nor automatic, and will need concerted action and extensive collaboration between government and business entities. For India to achieve its full digital potential and become the digital factory of the world, cross-cutting enablers are needed, like providing reliable, affordable, visual broadband to every Indian, improving ease of operations for digital businesses and unlocking the flow of capital to them, facilitating a booming open-API ecosystem, supporting digital innovators through government procurement, and strengthening centres of higher education and innovation in new and emerging technologies like AI. Without decisive, significant, and speedy action by the government and business sector, **India would be on a more business-as-usual digital trajectory that implies creating economic value of $500 billion to $650 billion by 2025**, rather than the $1 trillion possible in the full-potential scenario, the report says.

The 'Team India' spirit of partnership and collaboration will be critical, across central and state governments, the private sector, industry associations and the social sector. It will build a digital dynamism to deepen, widen, and scale up the digital economy in the coming years, creating huge economic value and empowering millions of people across all walks of life.

# Chapter 3
# Make in India: Electronics Manufacturing



The Government attaches high priority to electronics hardware manufacturing. The electronics manufacturing sector requires continuous push with the overall objective of promoting 'Make in India', not only to meet the domestic demand but also to promote India as a global hub for electronics manufacturing. The sector has the potential to generate domestic wealth and employment, apart from enabling cyber-secure ecosystem. The demand of Electronics System Design and Manufacturing (ESDM) is expected to rise rapidly to about USD 400 billion by the year 2025.

Several policy initiatives under the "Digital India" and ""Make in India" programmes are designed to facilitate investment, foster innovation, protect intellectual property, and build best-in-class manufacturing infrastructure towards creating conducive environment for attracting investment in the electronics hardware manufacturing sector. The intent of the Government is to provide a level playing field for domestic manufacturers to enable them to compete with imports in the sector by rationalization of tariff structure, simplification of procedures, enabling policies, providing incentives and upgrading infrastructure. As a result of various measures taken over the last few years, production of electronics hardware has shown significant increase. The demand of electronics hardware is increasingly being met by domestic production.

The new National Policy on Electronics 2019 (NPE-2019) has been formulated to reflect the new aspirations, requirements and realities of the electronics manufacturing sector in the country and the emerging international dynamics. The focus of the NPE-2019 is on promoting an eco-system of manufacturing (group of industries) which form supply chain of a product as against emphasis of existing policy on promoting individual industries, thereby increasing value addition and exports.

The following initiatives have been taken to promote electronics manufacturing in the country:

## 3.1 Modified Special Incentive Package (M-SIPS)
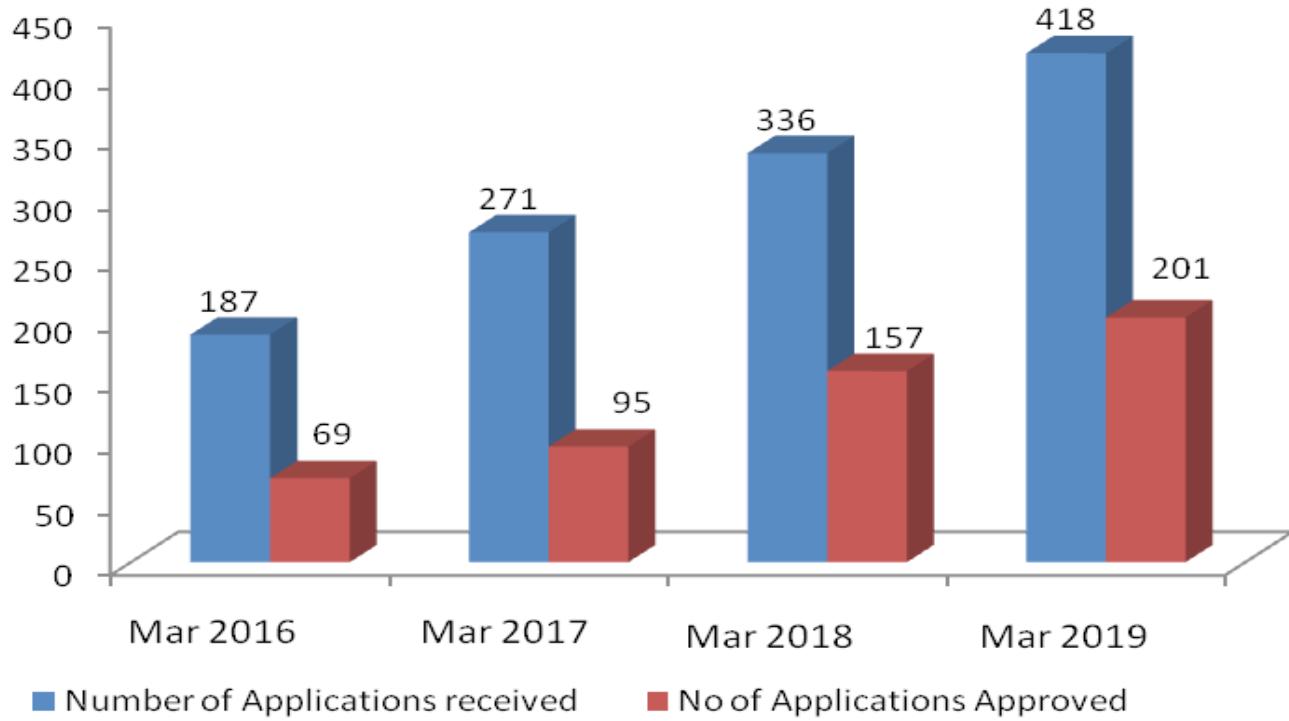
In order to promote large scale manufacturing in the country, a Modified Special Incentive Package Scheme (M-SIPS) was announced by the Government in July 2012 to offset disability and attract investments in Electronics System Design and Manufacturing (ESDM) Industries. The scheme provides incentive for investments in capital expenditure - 20% for investments in Special Economic Zones (SEZs) and 25% in non-SEZs. The incentives are provided on reimbursement basis. The policy provides for an inter-ministerial Appraisal Committee to evaluate investment applications.

The Union Cabinet in its meeting held on 21st July, 2015 approved the extension of M-SIPS and also approved amendment of M-SIPS in order to simplify the procedure and enhancement of scope and the notification for amendment in M-SIPS (simplifying procedure, enhancement of scope and extension for 5 years) was issued on 3rd August 2015. Further, the Union Cabinet in its meeting held on 18th January, 2017, approved certain amendments in the M-SIPS policy which were notified on 30th January, 2017. As per the aforesaid amendments, applications under the Scheme will be received till 31st December, 2018 or till such time that the incentive commitment reaches ₹10,000 crore, whichever is earlier. Incentives under the scheme will now be available for investments made within 5 years from the date of approval. As per the directions of the Cabinet, a separate committee headed by Cabinet Secretary has been set up for mega projects, envisaging more than Rs. 6,850 crore investment (investment above 1 billion USD). The scheme has been closed on 31 December 2018 to new applications.

As on 31st March 2019, 418 applications with proposed investment of Rs. 1,12,861 crore are under consideration under M-SIPS. Out of these 418 applications, 201 applications with proposed investment of approximately Rs. 52,083 crore have been approved; 20 applications with proposed investments of approximately Rs. 5,048 crore have been recommended by the Appraisal Committee for approval; 197 applications with proposed investment of Rs. 55,730 crore are under appraisal. In addition, there are 2 mega projects applications with proposed investments of approximately Rs. 37,576 crore. However, these mega projects are in the initial stage of appraisal.

For verification of disbursement claim applications under the scheme, M/s. IFCI Limited has been appointed as verification agency. So far under this scheme, incentives of approximately Rs. 487.52 crore have been disbursed to 59 applicants. Out of the total disbursed incentives of Rs. 487.52 crore, Rs. 318.67 crore have been disbursed in the current financial year i.e. FY 2018-19 to 45 applicants (53 claim applications) as on 31st March 2019.

Legend:
- ■ Number of Applications received
- ■ No of Applications Approved

| | Mar 2016 | Mar 2017 | Mar 2018 | Mar 2019 |
|---|---|---|---|---|
| Number of Applications received | 187 | 271 | 336 | 418 |
| No of Applications Approved | 69 | 95 | 157 | 201 |

## 3.2 Electronic Manufacturing Clusters (EMC)

To create and strengthen the infrastructure ecosystem for electronics manufacturing, the Government notified Electronics Manufacturing Cluster (EMC) Scheme in October, 2012 to provide support for creation of world-class infrastructure for attracting inve stments in Electronics System Design and Manufacturing (ESDM) sector. The scheme was open for receiving applications for a period of five years from the date of its notification i.e. upto October, 2017. Further period of five years is available for disbursement of funds to the approved projects. Assistance for the projects in Greenfield Electronics Manufacturing Clusters is available upto to 50% of the project cost subject to a ceiling of ₹50 crore for every 100 acres of land. For larger areas, pro-rata ceiling applies. At the lower end, the extent of support is decided by the Steering Committee for Clusters (SCC) subject to the ceiling of ₹50 crore. For Brownfield EMC (Common Facility Centre), 75% of the cost of infrastructure, subject to a ceiling of Rs. 50 crore is provided as grant.

Under the scheme, MeitY received 50 applications [46 applications for setting up of Greenfield EMCs and 4 applications for setting up of Common Facility Centres (CFC) in Brownfield Clusters] from 19 states across the country. Of these, twenty (20) Greenfield EMCs and three (3) Common Facility Centres (CFCs) in Brownfield Clusters have accorded final approval measuring an area of 3,565 acres with project cost of ₹3,898 crore including Grant-in-aid of ₹1,577 crore from Government of India. These EMCs are poised to attract an investment of ₹54,836 crore and are expected to generate 6.43 lakh employment opportunities in coming years. The details are as under:

**List of Final Approved Greenfield EMCs**
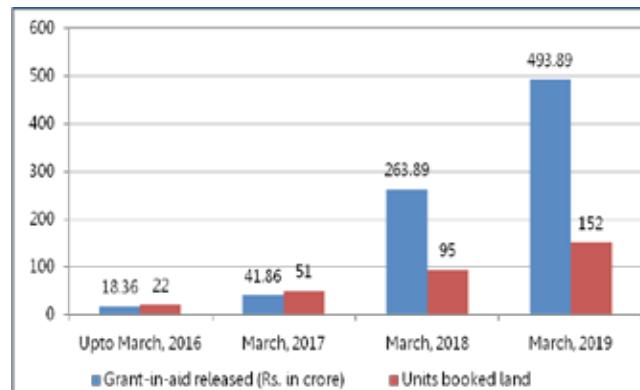
| S.No. | State | Location/City |
|---|---|---|
| 1 | Andhra Pradesh | Village-Cherivi, Satyavedu Mandal, Chittor District |
| 2 | | Vikruthamala Village, Yerpedu Mandal, Chittor District |
| 3 | | Renigunta and Yerpedu Mandal, Chittoor District, Near Airport Tirupati |
| 4 | Assam | Bongora (Village), Chayani (Mouza), Palasbari (Revenue Circle), Kamrup (R) (District) |
| 5 | Chhattisgarh | Village-Tuta, Sector-22, Naya Raipur, Tehsil-Abhanpur, District- Raipur |
| 6 | Gujarat | Village-Tunda, Taluka- Mundra, District-Kutch |
| 7 | Goa | Village-Tuem , Taluka- Pernem, North Goa District |
| 8 | Jharkhand | Adityapur, Saraikela-Kharsawan District |
| 9 | Kerala | Kakkanad Village, Kanayannur Taluk, Ernakulam District |
| 10 | Madhya Pradesh | Badwai-Bhopal |
| 11 | | Purva-Jabalpur |
| 12 | Odisha | Infovalley, Bhubaneswar Industrial Area, Khurda District |
| 13 | Rajasthan | SPL-1, Salarpur, Khuskhera, Bhiwadi |
| 14 | | Karoli Industrial Area, Bhiwadi, Alwar District |
| 15 | Telangana | E-city, Fab City, Hyderabad |
| 16 | | Maheshwaram, Ranga Reddy District |
| 17 | Uttar Pradesh | Plot No. 6/A, Sector-24, Yamuna Expressway |
| 18 | | Plot No. 1, Block-C, Ecotech-VI Industrial Area, Greater Noida |
| 19 | West Bengal | Sector-IV & V, Falta Industrial Centre, P.S. Ramnagar, South 24 Parganas District |
| 20 | | Naihati Town, North 24 Parganas District |

**List of Final Approved Common Facility Centres (CFCs)**

| S.No. | State | Location/City |
|---|---|---|
| 1 | Karnataka | Plot No. 336/4 & 336/5, Hebbal Industrial Area, Mysore |
| 2 | Maharashtra | Plot No.-P 30, Shendra Five Star Industrial Area, Aurangabad District |
| 3 | | Plot No. J/P-8, J 462 and J 462/P, Pimpri Industrial Area, Pune |

The infrastructure development within these EMCs is under progress. Till now, Government Grant-in-aid amounting to Rs. 493.89 crore, including an amount of Rs. 230 crore in FY 2018-19 has been released to 19 EMCs.

152 units have booked about 655 acres of land for setting up of their manufacturing facilities within these EMCs. Of these, 19 units have commenced their commercial production with an investment of Rs. 4,403 crore in various verticals of electronics and have provided employment opportunities to about 8,786 persons.



3.3 Electronics Development Fund (EDF)

Electronics Design and Manufacturing sector is characterized by high velocity of technological change. Intellectual Property is possibly the most critical determinant of success, not only for the companies of this sector but also to the countries and economies as a whole. Creating a vibrant ecosystem of innovation, research and development (R&D) with active industry involvement is essential for a thriving electronics industry. It is with this objective that an Electronics Development Fund (EDF) has been set up as a "Fund of Funds" to participate in professionally managed "Daughter Funds" which in turn will provide risk capital to companies developing new technologies in the area of Electronics, Nano-electronics and Information Technology (IT). This fund is expected to foster R&D and innovation in these technology sectors

and encourage more entrepreneurs towards product and technology development.

M/s. Canbank Venture Capital Funds Ltd. (CVCFL), a 100% subsidiary of Canara Bank, is the Investment Manager and MeitY is the anchor investor of EDF. The fund was launched on 15.02.2016 by Hon'ble Minister for Electronics & IT. EDF is expected to invest in 11 Daughter Funds over a period of 4-5 years. The total targeted corpus of these 11 Daughter Funds is Rs. 5,576 crore and the amount committed by EDF to these 11 Daughter Funds is Rs. 659 crore. As on 31st March 2019, EDF has invested Rs 67.09 crore in six Daughter Funds, which in turn have made investments of Rs. 286.87 crore in 58 Ventures/Startups. Employment opportunities generated in supported Startups were 5,647.

3.4 Compulsory Safety Standards for Electronics

Keeping in view the safety of Indian consumers and to curb the inflow of substandard electronic products, the "Electronics and Information Technology Goods (Requirements for Compulsory Registration) Order, 2012" was notified on 3rd October, 2012 under the provision of Compulsory Registration Scheme of BIS Act, 1986. This Order had come into effect from 3rd July 2013. The Order necessitates creation of institutional mechanism for developing and mandating standards and certification for electronic products to strengthen conformity assessment infrastructure nationwide. The surveillance is being conducted by MeitY.

As per the Order, the manufactures seeking registration of goods with the Bureau of Indian Standards (BIS), have to get their products tested at BIS recognised labs. Testing is also to be performed on selected samples during the surveillance, subsequent to registration. At present, 44 products categories (including Indian language support for mobile phones as per IS 16333 (Part 3)) have been added to the schedule of the Order in phased manner and the order has came into effect for all the product categories.

The Compulsory Registration Scheme has resulted in high compliance of notified electronic goods to Indian safety standards and more than 17,000 registrations have been granted by BIS to manufacturing units covering approximately 90,000 products models/series.

The surveillance process has been revamped and the Modified Market Surveillance Policy is also available on the website of MeitY.

**Scheme for setting up/up-gradation of Electronic products testing/Quality Control Laboratories**

To strengthen the conformity assessment infrastructure, MeitY notified "Scheme for setting up/up-gradation of Electronic product testing/Quality Control Laboratories" on 25th August 2013.The objective of the scheme is to encourage setting up testing facilities by Central/State/ Academic Institutions which will be used for evaluating goods under the "Electronics and Information Technology Goods (Compulsory Registration Order) 2012. The following project proposals have been approved:

- CEC, IIT Madras, Chennai for total GIA of ₹140 lakh.
- CSIR, Central Institute of Mining and Research



(CIMFR), Dhanbad for total GIA of ₹142.75 lakh.
- MPSEDC, Bhopal for total GIA of ₹127.50 lakh.
- NRTC, Parwanoo for total GIA of ₹140.27 lakh.
- Institute for Design of Electrical Measuring Instruments (IDEMI), Mumbai for total GIA of ₹150 lakh.

## 3.5 Growth of Electronics Sector:

Indian electronics industry manufactures a varied range of electronic goods across the entire spectrum of electronics and ICT, from entry level to state-of-the-art electronic products. The Government of India has taken several initiatives to promote a healthy and friendly environment for the growth of manufacturing sector in the country. The Government's "Make in India" programme, launched in 2014, is aimed at increasing domestic manufacturing and reducing India's dependence on the services sector, thereby imparting a healthy mix of contribution from all sectors to the Indian Economy. Another flagship initiative, "Digital India", too targets a substantial boost in the domestic manufacturing of electronics and reducing India's dependence on imports in this important sector.

The new National Policy on Electronics 2019 (NPE 2019) envisions positioning India as a global hub for Electronics System Design and Manufacturing (ESDM) by encouraging and driving capabilities in the country for developing core components, including chipsets, and creating an enabling environment for the industry to compete globally.

The electronics sector has several verticals in terms of its main constituents. At present, the availability of production data of this sector is limited to the information provided by various Electronics Industry Associations. Based on the same, the production profile of the electronics sector is as follows:

**Production Profile of Electronics Sector (in INR crore)**

| Sl. No. | Item/Vertical | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 |
|---|---|---|---|---|---|---|
| 1. | Consumer Electronics | 55,806 | 55,765 | 64,742 | 73,524 | 77,000 |
| 2. | Industrial Electronics | 39,374 | 45,083 | 62,214 | 69,057 | 80,850 |
| 3. | Computer Hardware | 18,691 | 19,885 | 20,382 | 21,401 | 21,180 |
| 4. | Mobile Phones | 18,900 | 54,000 | 90,000 | 1,32,000 | 1,70,000 |
| 5. | Strategic Electronics | 15,700 | 18,055 | 20,760 | 23,562 | 28,270 |
| 6. | Electronic Components | 39,723 | 45,383 | 52,099 | 59,132 | 67,706 |
| 7. | Light Emitting Diode (LED) Products | 2,172 | 5,092 | 7,134 | 9,630 | 13,000 |
| | Computed Total | 1,90,366 | 2,43,263 | 3,17,331 | 3,88,306 | 4,58,006 |
| Notes: (1) Data above is as provided by respective Industry Associations. (2) Source : 1 - CEAMA; 2,5,6,& 7 - ELCINA; 3 - MAIT ; 4 - ICEA | | | | | | |

The total production of the aforesaid verticals of electronics sector in India is estimated to be about INR 4,58,006 crore in 2018-19, compared to INR 3,88,306 crore in 2017-18, exhibiting a growth of about 18%. As a result of various initiatives taken by the Government and efforts of Industry, production of electronics in India has grown at a Compound Annual Growth Rate (CAGR) of about 25% during the last four years.

The global electronics production is estimated to be USD 2 trillion, out of which, India's electronics production was about USD 60 billion during the year 2017-18. The demand for electronic products in India has grown from about USD 45 billion in 2008-09 to about USD 106 billion in 2017-18, while domestic production has increased from USD 23 billion to USD 60 billion over the above period, leaving a wide deficit which has been met through imports. Indian market for electronic goods is growing at a CAGR of about 27% and is expected to reach USD 400 billion by 2025.

## Consumer Electronics

Indian consumer durables market is broadly segregated into urban and rural markets, and is attracting marketers from across the world. Global corporations view India as one of the key markets from where future growth is likely to emerge. The growth in India's consumer market would be primarily driven by

a favourable population composition and increasing disposable incomes. Consumer Electronics is the most visible vertical of electronics. The efforts made under "Make in India" and "Digital India" programmes and policies undertaken by government have promoted domestic manufacturing in the area of consumer electronic goods to discourage reliance on imports.

Some of the initiatives taken by the government are increasing the Basic Customs Duty (BCD) on several consumer electronic goods to encourage companies to substitute imported goods with domestically manufactured goods; permitting 100% FDI in the consumer electronics manufacturing sector via the direct route and providing CapEx subsidy under the Modified Special Incentive Package Scheme (M-SIPS), etc. Due to these efforts, foreign companies were encouraged to set up manufacturing facilities in the area of consumer electronics without the need to establish a joint venture or some other form of partnership with a domestic entity. In distributing consumer electronic goods to their end users, however, a local partner is both legally and practically required.

Television plays an important role in home consumer electronics. The television market currently consists of televisions that cover a wide range of new technologies that go beyond the conventional cathode ray tube (CRT)

format. Increasing innovation coupled with decreasing prices has augmented the penetration of flat-panel displays across all income groups in the country. Usage of television is no longer an urban phenomenon now with penetration of television in rural India having grown exponentially. TV manufacturers have rapidly adopted marketing of liquid crystal displays (LCD)/ light-emitting diode (LED) TVs as they offer sharper, higher resolution pictures. With the decreasing trend in the prices of LCD/LED televisions, the penetration of these TVs is increasing significantly. The domestic production of LCD/LED TVs has gone up from 0.87 crore units in 2014-15 to 1.6 crore units in 2017-18.

## Industrial Electronics

Industrial electronics is an empirical barometer of overall growth in the contribution of the manufacturing sector in the economy. The spurt in investments due to the "Make in India" programme is bringing significant interest in engineering, electrical, automotive and electronics segments which are the driving force behind the growth of industrial electronics sector. The key application segments of the industrial electronics industry are process control equipment, test and measuring equipment, power electronics equipment, automation and analytical instruments. These technologies are gaining ground as modernization, automation and robotics are the future growth areas.

The power electronics space is dominated by unorganized regional players, which is expected to grow at higher rate due to huge demand and low penetration. Inverters and UPS are also becoming household items driving the growth of this segment. Some of the Indian players have set up global tie-ups over the last few years and have brought in newer technologies into the Indian industry. Solar Photovoltaic and allied equipment is another segment which is likely to grow at a sustained high growth rate.

As a secondary demand constituent, industrial electronics segment is dependent on overall growth

in GDP and rate of growth of manufacturing. The industrial electronics sector is witnessing growth due to enhanced digitization and robotics applications in Industry 4.0. Additionally, the impetus on Smart Cities and IoT will bring a whole new focus and demand on smart and automation electronics.

## Computer Hardware

Computer hardware comprises desktops, laptops, note books, tablets/net books, servers, other computing devices, microprocessor based systems like Customer Premises Equipment, security hardware and appliances, storage devices and computer peripherals like scanners and imaging devices, standalone printers and thin-clients. With the advent of technology, varieties of mobiles, viz., smart phones and hand-held devices with the capabilities/power/ features of computers have been entering the market. Hence, the usage of conventional desktops has diminished for personal purposes. However, the usage of the computers and its peripherals in commercial and industrial establishments and offices is likely to grow at a steady pace.

## Mobile Phones

The domestic manufacturing of cellular mobile handsets and their sub-assemblies/parts and components has emerged as one of the flagship sectors under the "Make in India" initiative of the Government. The Phased Manufacturing Programme (PMP) for cellular mobile handsets and related sub-assemblies/ parts manufacturing has been implemented with the objective of progressively increasing the domestic value addition for establishment of a robust cellular mobile handsets manufacturing eco-system. As a result of implementation of the PMP, the sector is steadily moving from Semi Knocked Down (SKD) to Completely Knocked Down (CKD) level of manufacturing.

India has rapidly started attracting investments into this sector and cellular mobile handsets manufacturing

has emerged as a flagship sector in the domestic electronics manufacturing space. As per India Cellular & Electronics Association (ICEA), the production of mobile handsets has gone up from 6 crore units valued at INR 18,900 crore in 2014-15 to an estimated 29 crore units valued at INR 1,70,000 crore in 2018-19. As many as 268 manufacturing units for cellular mobile handsets and their sub-assemblies/parts/components have been set up in the country during the last 3-4 years, resulting in estimated employment for about 6.7 lakh persons (direct and indirect). Most of the major brands (both foreign and Indian) either have already set up their own manufacturing facilities or are in the process of doing so or have sub-contracted manufacturing to Electronics Manufacturing Services (EMS) companies operating from here.

During this process India has become the second largest mobile handset manufacturing nation globally. India has also become the second largest smart phone market globally. India's rise as the fastest growing smart phone market in the world has given rise to innumerable opportunities in manufacturing, app eco-system, employment generation, etc.

The Government of India provides utmost priority to promotion of electronics manufacturing in the country as a whole, with particular focus on development of mobile handsets and their parts/components manufacturing eco-system, which has assumed greater significance under the "Make in India" and "Digital India" flagship programmes. Some of the important initiatives undertaken by the Government for development of this sector are:

i.  Imposition of 20% BCD on mobile handsets to encourage their domestic manufacturing.

ii. Establishment and implementation of the Phased Manufacturing Programme (PMP) roadmap which has led to imposition of BCD in the range of 10% - 15% on notified sub-assemblies of mobile handsets to encourage their domestic manufacturing.

iii. Extension of the M-SIPS deadline till 31st December 2018.

There is indeed a tremendous potential in mobile handsets manufacturing eco-system for the nation in future in terms of employment generation, value addition, forex savings, ability to transform the socio-economic identity of citizens, contribution in uplifting the economy, etc.

**Strategic Electronics**

Electronics is a key area of defence technologies and has become a vital component of nearly all the weapon systems, platforms and equipment designed and developed for defence purposes. The strategic electronics segment consists of military communication systems, radars and sonars, network centric systems, electronic warfare systems, weapon systems, satellite based communication, navigation and surveillance systems, navigational aids, underwater electronic systems, infra-red (IR) based detection and ranging system, disaster management system, internal security systems, etc.

However, the sector is dependent on imports and foreign technology. Recently, few domestic small and medium scale companies have come up and they have the capability to absorb technology and meet stringent requirements of strategic electronic equipment. Some of these companies provide EMS services and meet critical supply requirements of MNCs as well as Defence PSUs. These include companies such as Rangsons, Centum Electronics, Kaynes Technology, Data Patterns and more. Some of the larger Indian business groups are foraying into strategic electronics sector and these include Tata, L&T, Wipro and HCL, who have the capability and resources to take up big offset projects and collaborate with global leaders. Since 2017 there has been focus on increasing defence production, R&D, indigenization as well as support to MSMEs and start-ups. All the Defence Public Sector Undertakings (DPSUs) have been activated and assigned ambitious targets for indigenization.

## Electronic Components

The policies and schemes of the Government, including, inter-alia, rationalization of tariff structure, Phased Manufacturing Programme (PMP), Modified Special Incentive Package Scheme (M-SIPS) and notification of electronics products under the Public Procurement (Preference to Make in India), Order 2017 for the growth of electronics sector, under the umbrella of "Make in India" and "Digital India" programmes and increase in the BCD on LED Lights, Set Top Boxes (STBs), Energy Metres, Flat Panel TVs, Mobile Phones, Microwave Ovens etc., will have a cascading positive impact on the domestic demand for relevant components. It is also expected that the export in the components segment shall witness a gradual upward trend as Merchandise Exports from India Scheme (MEIS) benefit for electronic components has also been increased. The focus by the Government and the Industry on Electric Vehicles (EVs) will also add value to the sector, encouraging domestic manufacturing.

BCD has been imposed on Printed Circuit Board (PCB) assembly of mobile handsets and notified telecom equipment with intent to strengthen the domestic EMS and components segment in India. The emerging high growth areas for domestic manufacturing are LED lighting, automotive electronics, energy meters, solar energy, mobile phones and IT products apart from the existing sectors, viz., telecommunications, consumer electronics and industrial electronics, which are driving the growth of electronic components manufacturing in the country.

The Indian electronic component production is dominated by electro-mechanical components (like printed circuit boards, connectors, etc.,) with 29% share and passive components (like wound components, capacitors, resistors, etc.) with 24% share. The shares of active components (like ICs, diodes, transistors, etc.) and the associated components (like optical disc, magnets, RF tuners etc.) of the components industry are about 18% and 29%, respectively.

The Electronics Manufacturing Services (EMS) industry in India is growing rapidly and key global players as well as a number of domestic companies are operational in the country. This segment needs very high efficiency of operations to stay profitable. Availability of components and an effective supply chain is vital for EMS companies for their growth. Domestic companies have generally followed the business model of staying in low-volume and high-mix business segments, where the margins are better. However, the EMS players need to operate in high-volume and low-margin segments to compete with the global players.

## Light Emitting Diodes (LEDs) Products

The lighting infrastructure in India is evolving rapidly through the replacement of conventional products with LED lighting products, driven by increasing government initiatives for energy conservation, rising consumer awareness for energy efficient products and innovative products offered by the industry. India, being the second most populous country and third major electricity consumer (as per World Factbook), has been witnessing ever widening demand vs. supply gap in electricity. Consequently, the market for energy efficient products such as LED lighting products is bound to grow riding on the initiatives encouraging the use of LED lights and increasing focus on smart city projects, efficient public distribution system and ever increasing need for smart, connected lifestyle and energy efficiency measures. As per the Electric Lamp and Component Manufacturers Association of India (ELCOMA), the domestic LED market will grow to INR 26,100 crore by 2020 making the LED market approximately 80% of the total lighting industry.

## Automotive Electronics

The Indian automotive manufacturing sector is one of the fastest-growing in the world. The industry produced a total 3,09,15,420 vehicles including passenger vehicles, commercial vehicles, three wheelers, two wheelers and quadricycle in 2018-19, as against 2,90,94,447 vehicles in 2017-18, registering a growth of about 6.3 percent over the same period last year[1].

Automotive Mission Plan 2016-26 targets India to be among the top three in the world for engineering, manufacturing and export of vehicles and auto components. The growing presence of global automobile Original Equipment Manufacturers (OEMs) in the Indian manufacturing landscape has significantly increased the localization of their components in the country. India has become the preferred designing and manufacturing base for most global auto OEMs for local sourcing and exports. Incentives from the government, rising disposable incomes, lower auto financing interest rates, increasing FDI in the automotive sector, along with the country being ranked at 30th position in the global manufacturing index by the World Economic Forum, are the factors expected to drive the automotive industry in the country, registering a CAGR of over 10% over the forecast period. The global automotive electronics market size is expected to reach about USD 410 billion by 2025, according to a study conducted by Grand View Research, Inc. The market is anticipated to expand at a CAGR of 8.6% over the forecast period.

With the growth of automobile industry and the increasing digitization of automobile controls, automotive electronics has come to occupy an important segment of the electronics industry. Some key technologies used in automotive electronics are Anti-lock Braking System (ABS), Body Control Module

1   Performance of Auto Industry during 2018-19: Society of Indian Automobile Manufacturers (SIAM)

(BCM), Tyre Pressure Monitoring System (TPMS), Electronic Power Steering (EPS) etc., while parking, cam, crank and oxygen sensors are the key sensors. Automotive Components Manufacturing Association (ACMA) has projected that Indian Automotive Electronics sector will reach approximately INR 36,500 crore by 2020. The global market for automotive electronics is estimated to be about 230 billion USD in 2020.

## Medical Electronics

Medical devices play a crucial role from the diagnosis to the after-care phase of medical treatment and significantly impact affordability and access to healthcare. As per the Industry estimates, the global medical devices market is expected to grow to about USD 332 billion by 2020, due to rising prevalence of chronic diseases, ageing population, increasing income and affordability, resulting in higher demand and utilization of healthcare services. (Source : Medical Device Manufacturing in India - A Sunrise, Department of Pharmaceuticals, GoI).

The Indian medical devices market is among the top twenty in the world by market size, and fourth in Asia after Japan, China and South Korea. The Indian market is estimated to register a 2017-2022 CAGR of 9.5% in INR terms and 8.7% in USD terms (Source: National Statistics, Fitch Solutions). The Indian medical device market is expected to record remarkable growth and will continue to reduce its dependence on imports, as domestic manufacturing develops under the "Make in India" initiative. The Government has taken various steps to promote this sector and created excellent opportunities for the domestic manufacturers, which include the following:

• 100% FDI in medical devices under automatic route

• Notification of Medical Device Rules 2017

• "Make in India" initiative for promoting domestic manufacturing

- Scheme for Financing Common Facility Centres (CFCs) at Medical Device Parks
- CapEx subsidy under the M-SIPS scheme
- Preferential Market Access in Public Procurement
- Several policy measures to address the challenges of medical devices industry.

In addition, to promote scientific and technological research in medical electronics sectors in India, MeitY in association with Biotechnology Industry Research Assistance Council (BIRAC) is implementing Industry Innovation Programme on Medical Electronics (IIPME). The programme aims to fund a portfolio of Indian led pilot projects that target innovations in the multi-disciplinary areas, comprising of electronics, engineering, medical devices, healthcare, software, algorithms and information technology. MeitY will provide a funding support of INR 10.5 crore over a period of 3 years, which has been extended till December 2019. Under this programme, support is provided at seed, early transition and transition to scale stages. 25 proposals are being supported through BIRAC under the programme out of which 18 proposals are in Idea-to-PoC stage, 5 proposals are in Early Transition stage and 2 proposals are in Transition to Scale stage.

## Exports

Government has taken several measures for the growth of the exports of electronics hardware sector. Special Economic Zones (SEZs) set up to enable hassle-free manufacturing and trading for export purposes and EHTP units are the major contributors to exports. 100% Income Tax exemption on export profits is available to SEZ Units for 5 years, 50% for next 5 years and 50% of ploughed back profits for 5 years thereafter. The Electronics Hardware Technology Park (EHTP) Scheme is an export oriented scheme for undertaking manufacturing of electronic goods.

Merchandise Exports from India Scheme (MEIS) benefits are available for export of electronic goods under the Foreign Trade Policy. The other schemes for export promotion are Export Promotion Capital Goods (EPCG) Scheme, Duty Exemption and Remission Schemes, Duty Free Import Authorization (DFIA) Scheme, Deemed Exports, etc. Due to the effective steps taken, electronics exports have been showing signs of improvement during the year 2018-19, as compared to the year 2017-18.

As per the Directorate General of Commercial Intelligence and Statistics (DGCI&S) data, the export of electronic goods was about USD 6,393 million (INR 41,555 crore) during 2017-18, as compared to USD about 5,963 million (INR 38,760 crore) during 2016-17. However, in 2018-19, till February, the total export of Electronics was about USD 7,901 million (INR 51,356 crore).

## Imports

As per DGCI&S data, the total import of electronics into India in 2017-18 was about USD 52,891 million (INR 3,43,789 crore) as compared to the import during the preceding year 2016-17, which was about USD 42,879 million (INR 2,78,713 crore), an increase of 23.3% in USD terms and 18.9% in INR terms. However, in 2018-19, till February, the total import of electronics into India was about USD 52,707 million (INR 3,42,5934 crore).

## 3.6 Public Procurement (Preference to Make in India) Order 2017

The Government has issued Public Procurement (Preference to Make in India) Order 2017, vide the Department of Industrial Policy and Promotion (DIPP) Order No.P-45021/2/2017-B.E.-II dated 15.06.2017 and subsequent revision vide Order dated 28th May, 2018 to encourage 'Make in India' and to promote manufacturing and production of goods and services in India with a view to enhancing income and employment.

In furtherance of the aforesaid Order, Ministry of Electronics and Information Technology has issued notification for 11 electronic products viz., Desktop PCs, Laptop PCs, Tablet PCs, Dot Matrix Printers, Contact and Contactless Smart Cards, LED Products, Biometric Access Control/Authentication Devices, Biometric Finger Print Sensors, Biometric Iris Sensors, Servers and Cellular Mobile Phones, vide notification no.33(1)/2017-IPHW dated 14.09.2017 and notification no. 33(5)/2017-IPHW dated 01.08.2018 for providing preference to domestically manufactured electronic products, respectively.

## 3.7 Development and Implementation of Indian Conditional Access System (iCAS)

A major impediment in design and development of domestic STBs was identified as the Conditional Access System (CAS) license. Therefore, the need as well as an opportunity was felt to develop Indian CAS (iCAS) for boosting the development and manufacturing of STBs in the country. MeitY, through a novel PPP model, has funded a unique project for the development and implementation of Indian Conditional Access System (iCAS) for Set Top Boxes (STBs) in November, 2014. The development stage of iCAS was successfully completed in November, 2015. The iCAS is available to domestic STB manufacturers at a price of USD 0.5 per license for a period of three years, as against market price of USD 3-5 per license for other competing products. The implementation of iCAS in the cable networks is underway. Over 14,00,000 STBs with iCAS have been deployed with more than 150 cable operators. Doordarshan has also decided to adopt iCAS for its Free Dish DTH platform, thus giving thrust to 'Make-In-India' initiative.



iCAS™ STB Manufacturing plant ISO 9001: 2015, ISO 14001, ISO 18001 certified

Production Floor

Automated SMT Process

Automated iCAS™ Serialization & Testing Process

Box Building Process by Robots

## 3.8 Tariff Rationalization:

**Rationalization of Tariff Structure**

Rationalization of tariff structure for electronics hardware manufacturing sector is an on-going exercise. To promote domestic manufacturing of electronic goods, several steps have been taken during the year, which, inter-alia, include:

**(i) Implementation of Phased Manufacturing Programme (PMP) for the year 2018-19:** PMP for cellular mobile handsets and sub-assemblies/ parts/components thereof for the year 2018-19 has been implemented. Basic Customs Duty (BCD) has been increased from Nil to 10% on the following goods for use in manufacture of cellular mobile handsets vide Customs Notification Nos. 36, 37, 38, 39 and 40/2018, all dated 02 April, 2018:

- Printed Circuit Board Assembly (PCBA).
- Camera Module.
- Connectors.

**(ii) BCD exemption on identified capital goods:** BCD has been exempted on import of 36 capital goods used in the manufacturing of specified electronic goods, vide notification no.71/2018-Customs dated 28.09.2018, by amending notification no.25/2002-Customs dated 01.03.2002.



iCAS™ enabled Set Top Boxes

iCAS™ enabled DVB - Cable SO STB

iCAS™ enabled DVB - Cable HD STB

iCAS™ enabled DD Free Dish DVB-Satellite (S2) DTH SD STB

**Phased Manufacturing Programme (PMP) for cellular mobile handsets and sub-assemblies/parts/ components thereof**

The cellular mobile handsets and components manufacturing has emerged as one of the flagship sectors under the "Make in India" initiative of the Government.

The production of mobile handsets is estimated to go up from ₹18,900 crore (60 million units) in 2014-15 to ₹1,70,000 crore (290 million units) in 2018-19. As per the India Cellular and Electronics Association (ICEA), about 268 units are manufacturing cellular mobile handsets and components in the country. The total manufacturing capacity for mobile phones in the country is estimated to be about 350 million per annum. It is estimated that about 6.7 lakh persons are employed (directly and indirectly) by the units manufacturing mobile phones and parts/components thereof. Most of the major brands (both foreign and Indian) either have already set up their own manufacturing facilities or are in the process of doing so or have sub-contracted manufacturing to Electronics Manufacturing Services (EMS) companies operating from the country.

The differential Excise Duty dispensation, which was enhanced to 11.5% in favour of domestic cellular mobile handset manufacturers vis-a-vis imports in the Budget 2015-16 [i.e. Countervailing Duty (CVD) @12.5% on imports of cellular mobile handsets and Excise Duty @1% without input tax credit] gave an impetus to the Assembly, Programming, Testing and Packaging (APTP) model of manufacturing of cellular mobile handsets. The Excise Duty based Phased Manufacturing Programme (PMP) was formulated and implemented in 2016-17 for Charger/Adaptor, Battery Pack and Wired Headset, with the objective to substantially increase the domestic value addition for establishment of a robust cellular mobile handsets manufacturing eco-system in India. As a result, India rapidly started attracting investments into this sector

and significant manufacturing capacities have been set up in India during the past 3-4 years. The following PMP roadmap, formally notified in April 2017, has enabled the cellular mobile handsets and related sub-assembly/component industry to plan their investments in the sector. Presently, the PMP has been implemented based on Basic Customs Duty (BCD) based differential duty in favour of domestic manufacturers:

| Year | Sub-Assembly |
|------|--------------|
| 2016-17 | (i) Charger/Adapter, (ii) Battery Pack, (iii) Wired Headset (Implemented - 15% BCD) |
| 2017-18 | (iv) Mechanics, (v) Die Cut Parts, (vi) Microphone and Receiver, (vii) Key Pad, (viii) USB Cable (Implemented - 15% BCD) |
| 2018-19 | (ix) Printed Circuit Board Assembly (PCBA), (x) Camera Module, (xi) Connectors (Implemented - 10% BCD) |
| 2019-20 | (xii) Display Assembly, (xiii) Touch Panel/Cover Glass Assembly, (xiv) Vibrator Motor/Ringer |

**Ease-of-doing Business**

**(i) Procedural simplification for import of second hand manufacturing plant and machinery:** Ministry of Environment, Forests and Climate Change (MoEF&CC) vide notification dated 11th June, 2018 has simplified the import of used plant and machinery having a residual life of at least 5 years for use by the electronics manufacturing industry, through the amendment of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

**(ii) Relaxation of ageing restriction imposed for duty free import of electronic goods for repair or reconditioning, from 3 years to 7 years:** The Department of Revenue vide notification no.60/2018-Customs dated 11th September, 2018 has amended the notification no.158/95-Customs dated 14th November, 1995, relaxing the ageing restriction for specified electronic goods manufactured in India and re-imported into India for repairs or for reconditioning.



Shri Narendra Modi, Hon'ble Prime Minister of India and South Korean President Mr. Moon Jae-in inaugurated Samsung Electronics facility in Noida in Uttar Pradesh on 9th July 2018. The expanded factory will be the world's largest mobile phone production unit in terms of number of devices rolled out every month.



Inauguration of Samsung Electronics Facility

## 3.9  National Policy on Electronics (NPE 2019)

Electronics industry is a meta sector and supports increasing productivity and efficiency of other sectors of the economy.

The National Policy on Electronics 2019 (NPE 2019) was notified on 25th February, 2019 and was published in the Gazette of India on 2nd March, 2019. The salient features of the NPE 2019 are as follows:

- The new National Policy on Electronics 2019 (NPE 2019) has been formulated to reflect the new aspirations, requirements and realities of the electronics manufacturing sector in the country and the emerging international dynamics. The NPE 2019 is focused on promoting an eco-system of manufacturing (group of industries) which form supply chain of a product as against emphasis of existing policy on promoting individual industries. NPE 2019 aims to increase domestic value addition and combining potential of both domestic demand and export with the aim to make India a global hub of manufacturing. The policy promotes generation of intellectual property in India and deepening of the domestic research, development and designing capabilities.

- NPE 2019 also envisages intervention in emerging sectors of electronics like IoT, 5G equipment, Sensors, drones, additive manufacturing (3D printers), robotics, etc. and to promote their R&D and manufacturing. Among the sectors, Medical Electronics, Strategic Electronics, Automotive and Power electronics have been especially identified as thrust areas for promoting manufacturing in India.

- Concept of trusted value chain in electronics has been introduced, which will help in addressing concerns related to cyber bugs and data thefts from our equipment. There is also focus on skilling, re-skilling and employment generation.

- To provide a supportive environment, NPE 2019 envisages extending of the Phased Manufacturing Programme (PMP) to products other than mobile phones, maintaining a progressive duty regime and incentivizing the industry to compensate for disabilities as compared to other manufacturing economies. The NPE 2019 will also enable India to take advantage of the global shifts in electronics manufacturing locations.

- Implementation of NPE 2019 will lead to formation of several schemes and initiatives in consultation with the concern Ministries/Departments for the development of Electronics System Design and Manufacturing.

- The NPE 2019 aims to achieve production of electronics goods worth USD 400 billion in India by 2025, which implies compound annual growth (CAGR) of about 32%.

## 3.10  Marketing and promotions to attract Investment in ESDM sector

MeitY engaged with the stake holders of the Electronics System Design and Manufacturing (ESDM) sector through various activities:

**International Conferences**

- **2nd India–Korea Business Summit:** During the 2nd India–Korea Business Summit, MeitY has organised a parallel session on Electronics System Design and Manufacturing, Skill Development (ESDM) to scale up the special strategic relationship through trade and investments on 27th February, 2018 at New Delhi. Hon'ble Minister of Electronics and IT, Shri Ravi Shankar Prasad chaired the session. Shri Sanjay Kumar Rakesh, Joint Secretary, MeitY presented market opportunities, GoI policies and business environment in India to attract investment in ESDM sector from Korea. Leading South Korean

companies like Samsung and LG also presented and shared 'Make in India' initiatives impact and their growth journey in India. The States of Andhra Pradesh and Assam presented business environment and available infrastructure for electronics companies in the States during the session.



- **Working Group Meeting on High–Tech (China):** Shri Sanjay Kumar Rakesh, Joint Secretary, MeitY attended the bilateral working Group meeting on High-Tech under 5th India- China Strategic Economic Dialogue (SED) on 13th May, 2018 at Beijing, China. He participated in the high level meeting chaired by the Vice Chairman, Niti Aayog at Beijing, China.

- **Exploring Cooperation in Electronics Manufacturing with big US ICT companies for innovation (US):** Shri Ravi Shankar Prasad, Hon'ble Minister for Electronics and Information Technology led a Government- Industry delegation to USA and had interactions with the prospective investors in Electronics System Design and Manufacturing with special focus on promoting manufacturing on medical Electronics on 26th August, 2018. He also, interacted with major IT companies, investors, venture capitalist and IT companies operating in USA.



- **Government-Industry Delegation to China:** A Government- Industry Delegation led by Shri Ajay Sawhney, Secretary, MeitY visited China for promotion of investment in ESDM sector during 19-23 March, 2018. The delegation comprised of 37 participants from Government, States and Industry to participate in investment promotion events/meetings. The delegation also met with Mr. Luo Wen, Vice Minister, Ministry of Industry and Information Technology (MIIT). The delegation also interacted with Chinese Associations- China Electronics Chamber of Commerce (CECC), WECC and CPCA Expo participants, to explain market opportunities, policies and business environment in India. The delegation had various one-to-one meetings with the mobile phone and their parts/component manufacturer's viz., VIVO, OPPO, Foxconn, Wistron, Huawei, Salcomp, AAC (Apple Supplier Company), Transsion, Spreadtrum etc.

An Indo-China Business Seminar on investment opportunities in electronics Sector in India was orgnaised on 23rd March, 2018. Shri Ajay Sawhney, Secretary, MeitY delievered the keynote speech, which was followed by presentation from Shri S.K. Marwaha, Director, MeitY on the theme "Make-in-India" with special focus on electroncis sector. The partner associations, ICA and ELCINA gave their respective presentations and showcased the opportunities available in India. The seminar got an overwhelming response with about 400 participants.

- **Taitronics 2018:** A Government- Industry Delegation led by Shri Pankaj Kumar, Additional Secretary, (MeitY) visited Taiwan during 10-12 October, 2018 for promotion of Investment in ESDM sector and participation in TAITRONICS 2018.

  During the visit, the delegation participated in the India-Taiwan Electronics meet and had various one-to-one meetings with the Taiwanese ESDM companies and organizations, industry, Industrial Technology Research Institute (ITRI), Hsinchu Science Park, Wistron, Innolux, Pegatron, Passive System Alliance (PSA), Taiwan Semiconductor Manufacturing Company Ltd. (TSMC), Industrial Development Bureau (IDB) and Taiwan-India Business Associations (TIBA) members with the objective of attracting investment in the ESDM sector.



- **6th India – Japan Joint Working Group (JWG) Meeting, Industry Round Table and Industry visit to Japan during September 25 -27 2018:** 6th India-Japan Joint Working Group (JWG) meeting on Electronics and IT was held during 25 -27 September, 2018 in Japan. The Indian delegation was led by Shri Sajay Kumar Rakesh, Joint Secretary, MeitY and the Japanese delegation was led by Mr. Hiroshi YOSHIDA, Deputy Director-General for IT Strategy, METI, Japan. Prior to the JWG meeting G2G level, an India-Japan Industry Round Table was held on 25th September, 2018 in METI, Japan. During the Industry Round Table, industry bodies of both sides presented their collaboration plans and case studies/experiences were shared by Indian and Japanese companies. Thereafter, an Industry- Government interaction was held, wherein, industry representatives discussed the new proposal and issues Government officials. During the Government level JWG meeting, both sides reviewed the JWG activities and industry suggestions, way forward for the cooperation in digital policy (e.g. Cyber Security), use of emerging technologies in social sectors and held detailed discussion on draft MOC on digital partnership. Besides, METI organised visit to Renesas fab facilities, meeting with SEAJ, visit to AIST (AI research centre). The delegation visited and met representatives of Furukawa, Murata and Tachibana and discussed their plans for investment in India.

- **Government Delegation to China:** Mr. Sanjay Kumar Rakesh, Joint Sectrary, MeitY along with Invest India visited Shenzhen, People's Republic of China during 27-29 March, 2019 for investor road shows and high level one to one meetings with Foxconn, TCL, Nokia, Innolux, Sharp, CTC Transsion etc. to attract investment in ESDM sector.



**National Conferences**

- **9th Source India Conference on Electronics Supply Chain:** Shri S.K. Marwaha, Director, MeitY participated in the 9th Source India Conference on Electronics Supply Chain organised by ELCINA on 24th January, 2018 at Chennai as an eminent speaker. Over 125 organisations participated as exhibitors, delegates and/or buyers with over 220 delegates. Buyers from a variety of segments including IT/Computers, mobile handsets, automotive, telecom and EMS sector participated. The electric vehicle segment was introduced this year which had strong participation and interest among all delegates. The buyer-seller meet after the conference was very actively attended with over 200 delegates. These interactions would result in enhanced domestic sourcing and spur manufacturing, which is the need of the hour.

- **IESA Vision Summit:** Indian Electronics and Semiconductor Association (IESA) organised IESA Vision Summit, Feb 27-28, 2018 at Leela Palace, Bangalore. Shri Sanjay Kumar Rakesh, Joint Secretary, MeitY was the Guest of Honour for the event. He emphasized the need to resolve issues to move forward and the importance of two way communication in understanding and resolving issues related to electronics manufacturing in India. He encouraged foreign collaborators to work in India and promote international partnerships. The IESA Vision Summit also saw the participation from states like Andhra Pradesh, Bihar, Chhattisgarh and Karnataka.



- **Roundtable with Electronic Components Industry:** A roundtable with Indian Electronic Components Industry was organised on 4th December 2018 at MeitY chaired by Shri Ajay Prakash Sawhney, Secretary, MeitY. The discussions were held on the importance and status of electronic components industry in India and the constraints faced by this segment of ESDM industry and the way forward to encourage component/parts/raw materials manufacturing in the country. The participants from industry also presented their views and recommendations on how they can kick start this sector and break the vice-like grip that global manufacturers have on market.

- **Electronics Summit 2019:** The Electronics Summit 2019 was held in New Delhi with the focus on increasing the value addition through developing local OEMs and eliminating the constraints to help India's participation in global value chain. Shri Ajay Prakash Sawhney, Secretary, MeitY and Shri Sanjay Kumar Rakesh, Joint Secretary, MeitY attended the summit which also had participation of industry leaders who shared their global understanding on how India can move volume and value-based manufacturing in the global value chain. The summit provided an opportunity to meet over 20 Large OEMs, more than 12 global supply chain heads and 250+ top suppliers across the world. The event provided an opportunity to global giants for discussing sourcing requirements with Indian counterparts.

- **IPCA Round Table:** IPCA Round Table Meeting was held on 15th January 2019 in Electronics Niketan, New Delhi under the chairmanship of Shri Ajay Prakash Sawhney, Secretary MeitY. IPCA gave presentation on the present scenario of World Printed Circuit Board (PCB) production with the present status of the PCB industry in India. The importance to promote indigenous manufacturing of PCBs was discussed in the context of the current demand of different PCB types and the PCB materials in the country for various sectors and the recent initiatives taken up by IPCA.

- **Round Table on Logistics & Supply Chain in India:** Ministry of Electronics and Information

Technology (MeitY) in partnership with MAIT organized a 'Round Table on Logistics & Supply Chain in India' during the annual 'Electronics Manufacturing Summit 2019' on 11th February, 2019 in New Delhi. The objective of the Round Table was to bring together senior representative from the government, industry leaders from ESDM & Logistics sector, to deliberate on effective supply chain management in India that will mitigate logistics disabilities and make electronics manufacturing viable and competitive.

- **Twitter Handle:**

In the global scenario of cyberspace prominence, social media has emerged as an increasingly preferred media by the decision makers and general public at large to communicate, interact and engage with each other. Taking view of this emerging reality, social media forms an important media vehicle for Electronics India to engage with the stakeholders.

Electronics India operates in a space which is a symbiosis of electronics and information technology, with all the stake-holders making an extensive use of the new forms of communication and media tools, especially the social media. As a matter of fact, the social media has been developed out of the industry that Electronics India focuses to nurture and grow.

Hence, given its characteristics to potentially give "voice to all", immediate outreach and 24x7 engagement, social media offered a unique opportunity to Electronics India to engage with various ESDM stakeholders in real time to make policy making more stakeholder centric.

In order to tap this media tool, MeitY launched a Twitter handle "Electronics_GoI", which is being well preferred by all the ESDM stakeholders and engagement medium by the people with MeitY.
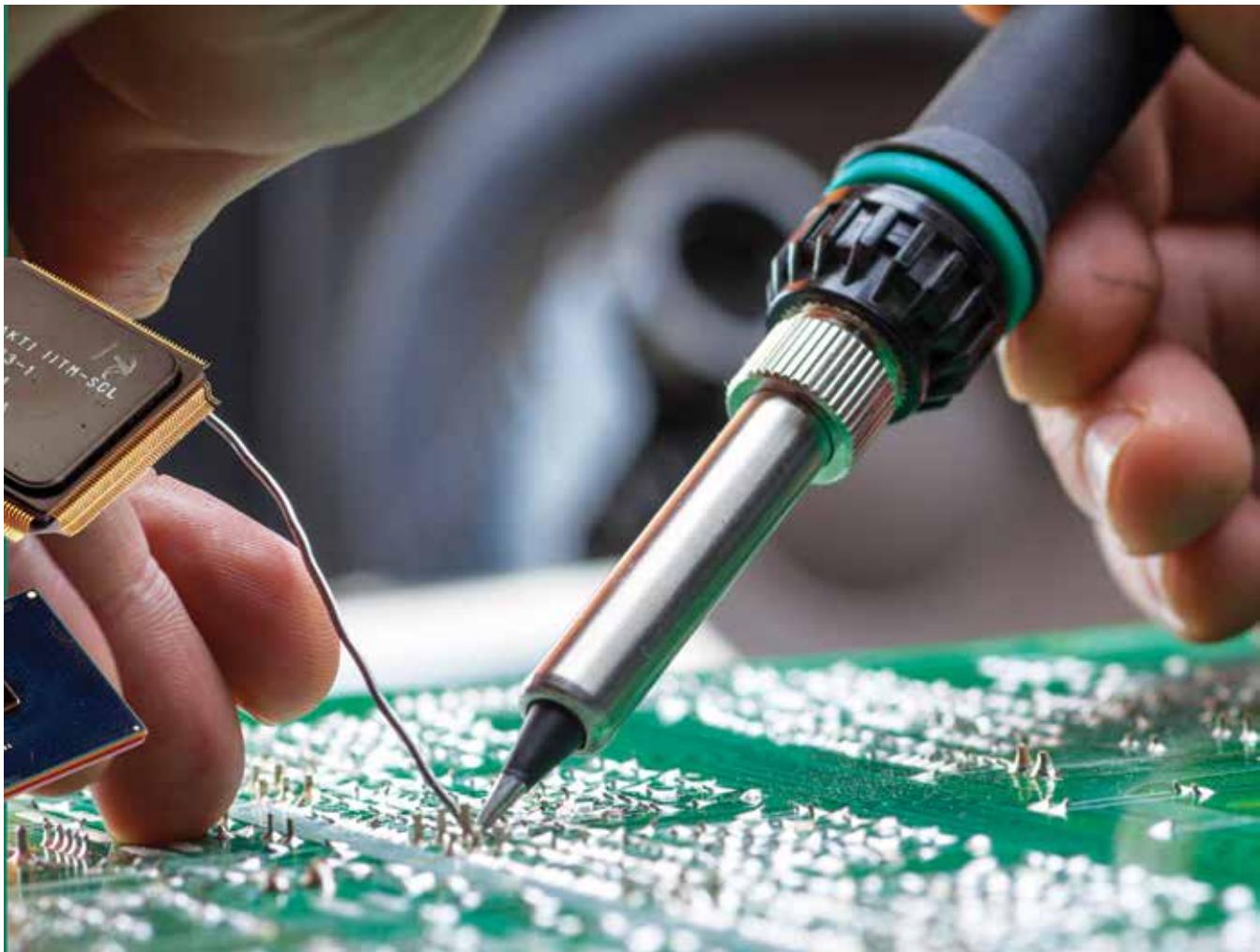
- **B2B Portal:**

  In order to attract investment into ESDM sector and create opportunities to introduce latest technologies to Indian industry a need was felt of a common platform where the technology providers, technology seekers and JV seekers could come together to explore possibilities of tie up.

  In its endeavour to encourage development of Electronics System Design and Manufacturing (ESDM) ecosystem in India, MeitY created a platform on its website which helps various technology players to explore potential partners for technology transfer and joint ventures for electronics manufacturing in India.

  Till now the platform has been utilized by 41 multinational and domestic companies to display their intent to seek suitable partners. Link for the Portal is: "http://www.MeitY.gov.in/esdm.

## Chapter 4

# Make in India: Software and Services



VIBRANT IT ECOSYSTEM

### 4.1 Global Perspective

The Indian Information Technology/Information Technology enabled Services (IT/ITeS) industry has contributed immensely in positioning the country as a preferred investment destination amongst global investors and creating huge job opportunities in India, as well as in the USA, Europe and other parts of the world. The industry has differentiated itself in the global competition on account of consistent service and guaranteed results and has also helped forge strong bilateral ties with nations.

The Indian IT-Business Process Management (IT-BPM) industry has played a key role in India's economic growth over the last ten years. Over the last decade, the industry has grown over five fold in revenue terms, thus contributing a substantial share to India's GDP. More importantly, the industry has led the economic transformation of the country and altered the perception of India in the global economy.

The global sourcing market continues to grow at a higher pace compared to the IT-BPM industry. The global IT and ITeS market (excluding hardware)

expected to reach USD 1.4 trillion in 2018-19 and the global sourcing market reached USD 194-198 billion. India continued as the world's top sourcing destination with a share of about 55 percent. In FY 2017-18, Indian IT and ITeS companies set up over 271 new global delivery centres around the world. IT-industry is fueling the growth of startups in India with the presence of around 7,000-7,200 start-ups making India the world 2nd largest start-up ecosystem. Many of these are working on very niche technologies – AI, blockchain, robotics, analytics, automation, cyber-security etc. These start-ups, coupled with new and emerging technologies, are enhancing the digital economy of the country and are creating IT and electronics led new job opportunities in both traditional as well as new sectors of the economy, such as, transport, health, power, agriculture, and tourism.

As per NASSCOM's (National Association of Software and Services Companies) estimates for FY 2018-19, industry revenue (excluding hardware) would touch USD 164 billion, up from USD 151 billion in FY 2017-18, showing a growth of over 8%. In addition, e-commerce would fetch over USD 43 billion, assuming the existing 11% Y-o-Y (Year on Year) growth pattern. India's IT-BPM industry revenue is expected to reach USD 181 billion. The industry employs more than 4.1 million people with an addition of about 172,000 people (approx) in FY 2018-19. IT-BPM exports from India are expected to reach USD 136 billion during FY 2018-19, with over 8% growth.

Driven by the increased digital adoption and growing Internet Economy, India's domestic IT-BPM (excluding hardware) is expected to reach USD 28 billion at 8% growth in FY 2018-19. India has the 2nd largest Internet user base after China with over 432 million subscribers, with more than 300 million smartphone users.

The Government has identified Information Technology (IT) and IT enabled Services (ITeS) as one of 12 champion service sectors for realizing their full potential. Government of India has also undertaken a consultative approach with the industry associations and industry members to discuss measures to improve the overall state of the IT industry and key challenges being faced towards realizing the USD 1 trillion digital economy by 2022. Goods and Services Tax (GST) is one of the biggest tax reforms undertaken by the country. Other efforts include measures to streamline the tax regimes, streamlining procedures and improving the overall ease of doing business. Government initiatives, such as, Start-up India, Digital India and Smart Cities are expected to give boost to e-Governance and m-Governance related business activities. There is significant push from the Government to go digital and adoption of digital payments. Efforts are also being made to diversify and increase presence in other markets, such as, Europe (besides UK which is a mature market), Africa, South America, Israel, Australia, China and Japan.

## 4.2 BPM Industry Promotion

MeitY is working towards the vision of Digital Inclusion and to create new opportunities in the digital economy India BPO Promotion Scheme (IBPS) and North East BPO Promotion Scheme (NEBPS) have been initiated in 2015 under IT for Jobs pillar of Digital India programme. These schemes aim to incentivize setting up of BPO/ ITeS operations across the country, particularly in small towns/cities, to create employment opportunities and promote dispersal of the industry for balanced regional growth. A total of 48,300 seats under IBPS and 5000 seats under NEBPS have been planned till March 2019. Seat distribution to States and UTs was based on population as per 2011 Census. The outlay of the Scheme is 493 crore (IBPS) and 50 crore (NEBPS).

**Salient Features**

- Financial Support: These schemes provide financial support up to 1 lakh per seat in the form of Viability Gap Funding (VGF) towards Capital and Operational expenses for a period of 3 years. Duration of these schemes was up to March 2019, however VGF dispersal is to continue beyond this period.

- **Special Incentives:** These schemes also provide

special incentive for promoting local entrepreneur, employment to women and physically challenged persons, setting up operations at other than State capital, and providing employment beyond target.

- **Effective Implementation:** To ensure transparency and smooth implementation of these schemes processes, such as, bidding, reporting, monitoring and disbursement are made completely online and done through  dedicated  Web Portal www.ibps.stpi.in  and www.nebps.stpi.in  which are one stop web portal to know bidding details, status, news, alerts and other related information regarding India BPO Promotion Scheme (IBPS) and North East BPO Promotion Scheme (NEBPS) . These web portals also provide special login for bidders to submit progress report,   raise disbursement requests related to financial support and special incentives etc.

- **Focus on Employment generation through IT/ITES**: The disbursement of financial support under these schemes is directly linked with the outcome i.e. employment generation.


Operational Units under BPO Promotion Scheme

### Location of BPO/ITeS Units under IBPS and NEPBS

Some of the Operation Units are at:

Patna, Muzaffarpur, Raipur, Shimla, Sagar, Bhubaneswar, Cuttack, Jaleshwar, Kottakuppam, Bhaderwah, Budgam, Jammu, Sopore, Srinagar, Aurangabad, Bhiwandi, Sangli, Wardha, Bareilly, Kanpur, Varanasi,  Guwahati, Jorhat, Kohima, Imphal, Madurai, Mayiladuthurai, Tiruchirappalli, Tiruppattur, Vellore, KarimNagar, Tirupati, Guntupalli, Rajamudry.

### Operational Units under BPO Promotion Scheme

| Overall Status of BPO Promotion Schemes | |
|---|---|
| Total Seats in IBPS and NEBPS | 53,300 |
| Total Seats - Allocated | 52,825 |
| Total Seats – Operation Started | 40,175 |
| Total Units | 297 |
| Total Units – Operation Started | 202 |
| Tier-II/III Cities covered | 120 |
| Current Employment Generated | 26,500 |

### Impact

**Dispersal of Industry**: Growth of  IT/ITES sector in India has traditionally remained confined to a few select urban clusters. BPO Promotion Schemes are facilitating in expanding the base of IT/ITeS industry and creation of employment opportunities beyond metros. Under IBPS and NEBPS, 202 units have set up at about 100 locations distributed across 27 States and UTs during the year 2018-19.

**Journey towards Digital India through bridging of the digital divide:** The NEBPS and IBPS were launched in 2015 and 2016 respectively. As the location of BPO/ITeS operations is client driven, and the metro cities were excluded from these schemes, the industry response to these schemes was not very encouraging at the beginning but gained momentum over the period of time. The BPO/ITeS units in Tier-II/III cities are changing the digital profile of the nation by creating job opportunities in ITeS sector and developing the ecosystem for the dispersal of IT industry.

- **Empowerment and inclusion of marginalized groups of the society:** The schemes encourage employment to women and differently abled persons. Under these schemes, special incentives have been provided to the units encouraging employment to women, and specially abled persons. Out of the total employment provided by BPO/ITeS units under these schemes, around one third are women.

- **Jobs opportunities near home with the ease of living:** The BPO/ITeS units starting in Tier-II/III locations are providing job opportunities to the youth near their home which would reduce the migration to metros and lower the attrition rate. The BPOs in small towns and cities are providing services in local languages, which would create employment opportunities for the local youth and services provided in local languages that results in better customer satisfaction.

**North East BPO Promotion Scheme (NEBPS)**

Government has also launched North East BPO Promotion Scheme (NEBPS), under Digital India Programme, to incentivize setting up of 5,000 seats BPO/ITeS Operations in North East Region (NER), create of employment opportunities for the youth and growth of IT-ITeS Industry. NEBPS provides similar financial support as IBPS with outlay of ₹50 crore. Till March, 2019, 15 companies have been selected to set up 20 units for a total of 1,625 seats BPO/ITeS operations spread across the 6 States of NER, namely, Assam, Nagaland, Meghalaya, Manipur, Arunachal Pradesh and Tripura. Out of these, 12 units have started operations for a total of 1,175 seats with initial employment to over 500 persons. Further details of the scheme are available at www.MeitY.gov.in/nebps and https://nebps.stpi.in.

## 4.3 National Policy on Software Products

The Union Cabinet, chaired by the Hon'ble Prime Minister Shri Narendra Modi approved the National Policy on Software Products – 2019 on February 28, 2019 to develop India as a Software Product Nation. The policy aims to develop India as the global software product hub, driven by innovation, improved commercialization, sustainable Intellectual property (IP), promoting technology start-ups and specialized skill sets. Further, the policy aims to align with other Government initiatives such as Start-up India, Make in India and Digital India, Skill India etc so as to create Indian software products industry of USD 70-80 billion with direct & indirect employment of 3.5 million by 2025.

The salient features of the policy are as follows:

- To promote the creation of a sustainable Indian software product industry, driven by intellectual property (IP), leading to a ten-fold increase in India share of the Global Software product market by 2025.

- To nurture 10,000 technology startups in software product industry, including 1,000 such technology startups in Tier-II and Tier-III towns and cities and generating direct and in-direct employment for 3.5 million people by 2025.

- To create a talent pool for software product industry through (i) up-skilling of 1,000,000 IT professionals, (ii) motivating 100,000 school and college students and (iii) generating 10,000 specialized professionals that can provide leadership.

- To build a cluster-based innovation driven ecosystem by developing 20 sectoral and strategically located software product development clusters having integrated ICT infrastructure, marketing, incubation, R&D/testbeds and mentoring support.

- In order to evolve and monitor schemes & programmes for the implementation of this policy, National Software Products Mission will be set up with participation from Government, academia and industry.

## 4.4 International Cooperation Division (ICD)

With the Government's outlook on digital diplomacy, digital economy and launch of digital india

programme, MeitY has synergized its efforts to expand IT/ITeS sector globally including diversification to geographies, domain expertise, high skill work forces to enhance business opportunities. Efforts have been made to evolve strategic cooperation with potential foreign partners in emerging and frontier areas of information and communication technology under bilateral and multilateral framework of cooperation. The Ministry regularly engages with various Governments, including academic and industries bodies for forging partnerships for mutual progress and also provide an opportunity for sharing of knowledge and experience. The International Cooperation Division has been involved in the following tasks:

- Aligning foreign collaboration activities with India's 'Digital India Programme' and 'Make in India' initiatives of the Government of India.

- Strengthening India's position on multilateral fora for different issues like e-commerce, digitalization, digital divide, digital government, digital infrastructure and gender divide etc.

- Creating a conducive environment for international cooperation to help industries to cooperate with the industries of other countries.

- Fostering, encouraging and promoting research and development in the application of information technology related facilities.

- Coordinating technical and policy issues with international bodies/institutions like G20, RCEP, UN and its associated organisations ((UNESCO, UNCTAD, UNDP, ECOSOC, ESCAP etc.), ASEAN, SCO, BRICS, SAARC, WSIS, World Bank, WTO, ADB, World Economic Forum (WEF), to safeguard India's interest.

- Initiating joint projects like IT institutes, software parks, programmes for joint R&D and facilitating IT advisers etc.

- Showcasing India's ICT strength across the globe by organizing, sponsoring and participating in

trade fairs, symposiums, exhibitions etc.

The International Cooperation Division has been pursuing the above objectives through Memorandum of Understandings (MoUs), Joint Working Groups (JWG) meetings, projects in other geographies/countries, participating in major international events to showcase India's strength and enhance business opportunity for Indian IT industry. Issues regarding India's IT exports including mobility of Indian IT professionals have been handled at various bilateral fora and platforms from time to time. India has emerged as a fast growing e-commerce destination. This is reflected through the fact that FTAs being signed have a specific chapter on e-commerce. The division has spearheaded negotiations on e-commerce issues in FTAs being signed under RCEP, WTO, BRICS, Broad-based Trade and Investment Agreement (BTIA) etc. India has actively participated in the G20, deliberations on digital economy held through G20 Digital Economy Task Force (DETF) forum in 2018. The Digital Agenda for Development was negotiated and adopted during the G20 Digital Ministers' Meeting in August, 2018 at Salta, Argentina. The DETF forum adopted the digital economy Ministerial Declaration to strengthen the cooperation in digital economy.

Hon'ble Minister for Electronics & Information Technology conveyed India's success story of social inclusion through Digital India programme for social empowerment and highlighted the important role played by India's home grown technologies, for promoting digital payment, including importance of interoperable open-source technologies, so that these platforms can be used by others to develop more innovative structures as well as leading to new norms of digital identity based authentication, which are a generation ahead. He also emphasized on Internet access for all, cyber-space linked with local ideas, data protection and individual privacy, data to improve business (anonymous, objective and consent based) and reinvestment by social media and other digital platforms in largest markets, to create more infrastructure and generate more job opportunities.

Hon'ble MEIT stressed that India had taken a serious note of reported misuse of social media platform data and that the purity of the democratic process should never be compromised.

India's views received wide appreciation and support from several delegations including the hosts Argentina, Germany and the EU. Several other countries like Saudi Arabia, Russia, Indonesia and Japan expressed a keen desire to work with India in a range of IT and cyber related fields.

India also presented a Non-paper on "National Digital Platforms for Empowerment" which entails India's success story of leveraging the amalgamation of various public digital platforms, such as, bank accounts (Jandhan), unique digital identity (AADHAAR), mobiles phones (Mobile) and its linkage with public cloud (Meghraj), digital locker (DigiLocker), Unified Payment Interface (UPI), Bharat Interface for Money (BHIM), Aadhaar Enabled Payment Systems (AEPS) etc. for digital and financial inclusion, and to provide citizen centric services. The Non-paper was well received by all the members, international organisations and other stakeholders during the meeting.

MeitY has spearheaded the negotiations on e-commerce chapter under various fora/Free Trade Agreements (FTAs), such as, Regional Comprehensive Economic Partnership (RCEP), WTO, BRICS, and EU-India Bilateral Trade etc.

## 4.5 Cooperation through Bilateral Interaction:

To strengthen cooperation with other emerging economies, the MoUs/Agreements in the field of Information Technology and Electronics were signed with Japan. The MoUs were based on a comprehensive study on potential cooperation areas in ICT domain. In addition to these MoUs, specific MoUs on Cyber Security cooperation were also signed with Seychelles and Morocco.

Joint Working Group (JWG) meetings with Uzbekistan, Vietnam, Germany, Belgium and Japan were held during the year to further ICT and IT/ITeS trade with

these geographies and also to forge cooperation in the area of innovation and R&D. A concrete outcome based action plan and specific initiatives including projects were identified for furthering such cooperation.

Hon'ble Minister (E&IT) paid a visit to USA during 26-29 August, 2018 on his return journey from Argentina. During the visit at San Francisco, Hon'ble Minister (E&IT) interacted with several senior CEOs and industrialists and visited top IT companies, such as, IBM, Google, GE. He also attended Round Table meetings with potential JVs, Investors, Start-ups of USA and Indian entrepreneurs interested to invest in India. Hon'ble Minister (E&IT) addressed a Town Hall event with more than 60 participants from industry, civil society, India diaspora, and media, around India's digital transformation, inclusive growth model, and opportunities for investment.

Shri Ravi Shankar Prasad, Minister of Electronics and IT and Law and Justice visited London, UK during 6-10 July 2018 at the invitation of Mr. David Gauke, MP Lord Chancellor and Secretary of State for Justice of UK and attended IT related events to expand bi-lateral IT cooperation with UK. The IT related programme included Round Table conference on India-UK collaboration in IT sector organised by NASSCOM and TECHUK, address at Asia House on the topic "India a land of digital opportunities", address at Bar Council of England on "India –The investment destination" and bilateral meeting with Mr. Jermy Wright, Secretary of State for Digital, Culture, Media and Sports of UK.

A delegation led by Shri S.S. Ahluwalia, Hon'ble MOS(E&IT) visited Iceland under Abhinav Pahal to connect/communicate Government of India,during 5-8 June, 2018. During the visit Hon'ble MOS had a Call with the President of Iceland, met Minister of Tourism, Industry and Innovation of Iceland, had a meeting with experts in Electronics, IT and Water sector and discussed about India's digital success story.

During the year various high level delegation visited India from EU, USA, German, Japan, Malaysia, Kazakhstan, Uzbekistan, China, Belgium and Canada.

## 4.5.1 International Projects in ICT

To showcase India's prowess in IT/ITeS, MeitY has been assisting the Ministry of External Affairs, to execute a number of projects in developing and least developed countries. Under such initiatives, more than 40 Centres of Excellence in IT, IT Parks, Capacity Building Institutes, tele-medicine and tele-education facilities, e-network have been established till date. During the year, e-Library project in Bhutan as per Hon'ble PM's announcement; Sustainable IT Infrastructure for Advanced IT Training using Conventional, Virtual Classroom and e-Learning Technologies in Cambodia and Lao PDR; Centre of Excellence in IT at Casablanca – Morocco; Upgradation of Existing IT Infrastructure and deployment of Integrated Web Based Office Automation System and development of Portal at CARICOM Secretariat in Guyana and Office in Barbados and Jamaica were operationalized. Following projects are also under execution during the year:

**Completed/Ongoing Projects during FY 2018-19**

- Centre of Excellence in IT in San Jose – Costa Rica.

- Centre of Excellence in IT in Roseau – Commonwealth of Dominica.

- Setting up of a sustainable IT Infrastructure for Advanced IT Training using conventional, virtual classroom and e-learning technologies in Phnom Penh -Cambodia

- Setting up of a sustainable IT Infrastructure for advanced IT training using conventional, virtual classroom and e-learning technologies in Myitkyina – Myanmar.

- Setting up of a sustainable IT Infrastructure for Advanced IT Training using conventional, virtual classroom and e-learning technologies in Vientiane – Lao PDR.

- Setting up of a sustainable IT Infrastructure for Advanced IT Training using conventional, virtual

classroom and e-Learning technologies in Hoi Chi Minh City – Vietnam.

- ICT Resource Centre at Nelson Mandela African Institute of Science and Technology in Arusha – Tanzania.

- Setting up of Centre of Excellence in IT in Cairo – Egypt.

- Setting up of Centre of Excellence in IT in Casablanca – Morocco.

- Up-gradation of existing IT Infrastructure and associated software at CARICOM Secretariat in Guyana and Offices in Barbados and Jamaica.

- Accreditation of India – Myanmar Centre for Enhancement of IT Skills in Yangon as Authorized Training Centre of CDAC for 3 years

- Setting up of Centre of Excellence in IT in Port Moresby – Papua New Guinea.

- Setting up of Centre of Excellence in IT in Vanuatu in Port Vila – Vanuatu.

- Setting up of Centre of Excellence in IT in Apia – Samoa.

- Setting up of Centre of Excellence in IT in Alofi – Niue.

- Setting up of Centre of Excellence in IT in Suva – Fiji.

- Setting up of Centre of Excellence in IT in Nauru.

- Setting up of Centre of Excellence in IT in Rarotonga – Cook Islands.

- Setting up of Centre of Excellence in IT in Georgetown - Guyana.

- Special Training Programme under ITEC for trainers from CsEIT in several countries

- Setting up of India – Namibia Centre of Excellence in IT in Windhoek.

- Supply of 150 Desktop Computers and Associated Software to Sao Tome and Principe

**New Initiated Projects FY 2018-19**

- Implementation of e-Aushadhi (Drugs and Vaccine Distribution Management System) in Fiji

- NexGen Centre of Excellence in IT (NexGen CoE IT) in Tunis – Tunisia.

- NexGen Centre of Excellence in IT (NexGen CoE IT) in Amman – Jordan.

- Capacity Building in Research, Development and Innovation in ICT and Electronics in Ghana through India – Ghana Kofi Annan Centre of Excellence in IT (AITI – KACE) by CDAC

- Accreditation of Jawaharlal Nehru India – Uzbekistan Centre of IT in Tashkent as ATC of CDAC for 5 years

- Accreditation of India – Peru Centre of Excellence in IT in Lima as ATC of CDAC for 4 years

## 4.6 Growth of Software and Services Sector

The sector is in a transitional phase and in order to sustain its competitive advantage, it needs to constantly upgrade itself in line with global trends. Given the recent developments in the global market for Indian IT services, especially on account of growing protectionism in key economies, it is imperative to think differently and collaboratively. Every sector requires re-skilling and the fast changing digital technology area requires it even more. According to NASSCOM, the skills profile is set to undergo a rapid change as demand for skills around digital technologies grows exponentially. Many firms have established dedicated programmes to re-skill their existing employees.

While Indian IT companies have shown strong character and readiness to face new challenges by upgrading their capabilities and offerings in line with emerging technologies and exploring collaborative opportunities with global manufacturers, challenges of the future must also be foreseen, to prosper in this increasingly competitive global environment.

Some pointers, given below, provide a glimpse of the developments, during the year and projected, in the Indian IT-ITeS sector:

- IT exports are projected to grow over 8 percent in 2018-19, and generate about 1,72,000 new jobs during the same period;

- Indian start-up ecosystem ranks second among global start-up ecosystems with around 7,200 start-ups;

- Increased penetration of internet (including rural areas) and rapid emergence of e-commerce are the main drivers for continued growth of data centre co-location and hosting market in India;

- 100+ Centres of Excellence focussing on Blockchain, IoT and Analytics;

- India is the fastest growing market for the e-commerce sector. Revenue from the sector is expected to increase from USD 43 billion in 2018 to USD 120 billion in 2020;

- The internet industry in India is expected to double and reach USD 250 billion by 2020, growing to 7.5 percent of gross domestic product (GDP);

- Driven by the fast adoption of digital technology, the number of internet users in India is expected to reach 829 million by 2021;

- The Indian Healthcare Information Technology (IT) market is valued at USD 1 billion currently and is expected to grow 1.5 times by 2020;

- India's business to business (B2B) and business to consumer (B2C) e-commerce market is expected to reach USD 700 billion and USD 102 billion respectively by 2020; and

- India's digital economy is projected to reach USD 1 trillion by 2022.
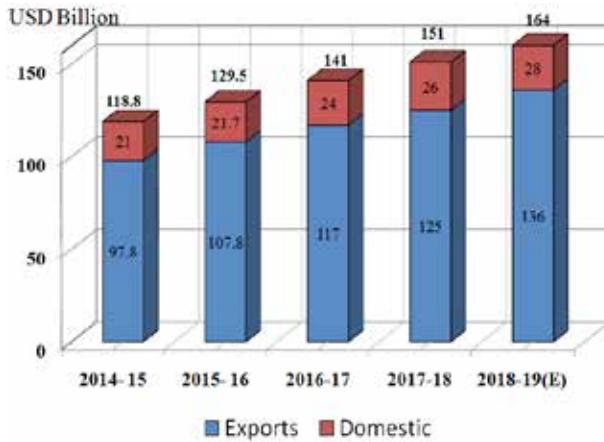
The industry's core competencies and strengths have

attracted significant investments from major countries. The computer software and hardware sector in India attracted cumulative Foreign Direct Investment (FDI) inflows worth ₹9,354 crore during April-June 2018 period.

Leading Indian IT firms are diversifying their offerings and showcasing ideas in blockchain, cloud computing, big data analytics, artificial intelligence and machine learning to clients using innovation hubs, CoE's, research and development centres, in order to create differentiated offerings.

### 4.6.1 Overall IT-ITeS Performance

The IT-ITeS industry revenue aggregate (exports + domestic) is expected to grow over 8 percent and projected to reach USD 164 billion in FY 2018-19 as compared to USD 151 billion in FY 2017-18. The total IT-ITeS industry revenue including hardware is expected to reach USD 181 billion in FY 2018-19 as compared to USD 167 billion in FY 2017-18. The IT-ITeS industry revenue trend over the past 5 years is depicted below:
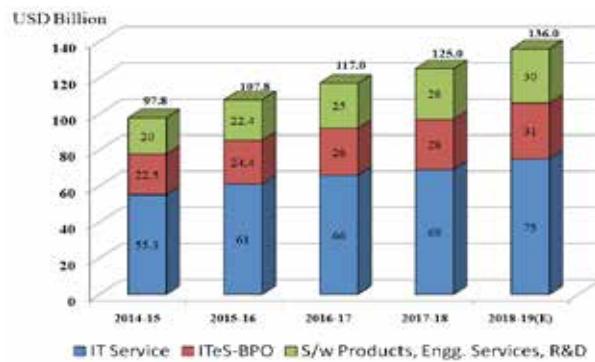


Indian IT-ITeS industry revenue
Source: NASSCOM*, E: Estimated

### 4.6.2 Exports Revenue
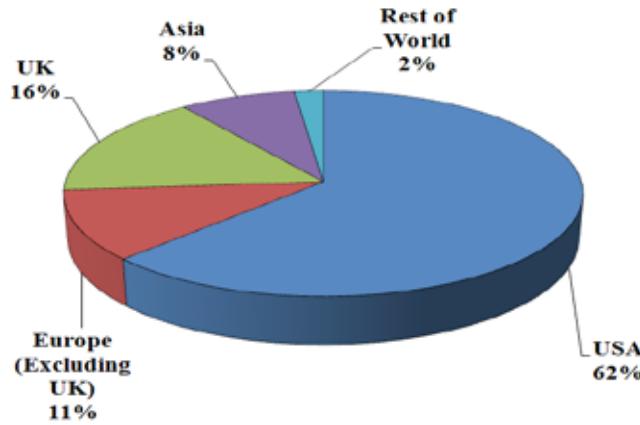
IT-BPM exports are projected to reach USD 136 billion showing an 8% increase. engineering research and Development (ER&D), digital projects and embedded solutions, product engineering and new technologies are key growth drivers. The IT- ITeS industry export

trend over the past 5 years covering IT Services, ITeS/BPO, Engineering R&D and Product Development segments is depicted below:



Export of various segments in IT/ITeS Sector
Source: NASSCOM*, E: Estimated

USA, UK and EU account for 90% of the total IT-ITeS exports. However, there are new challenges surfacing in these traditional geographies. Demand from Asia Pacific (APAC), Latin America and Middle East Asia is growing and new opportunities are emerging for expanding in continental Europe, Japan, China and Africa.
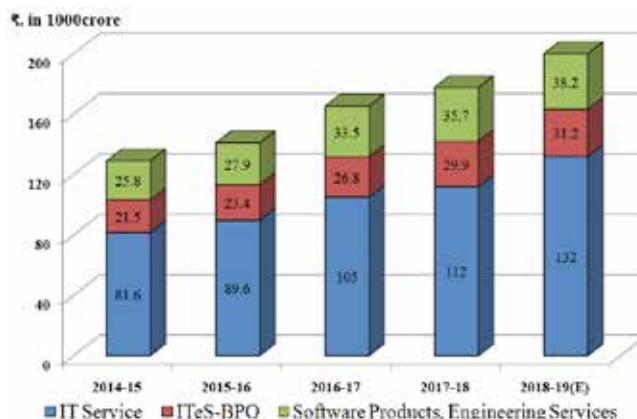


Pattern of IT-ITeS Exports across Geographies (2018-19P)
Source: NASSCOM*, E: Estimated, P: Projections

### 4.6.3 Domestic Revenue

The size of the domestic market is becoming significant now in the IT-ITeS sector, though it largely remains export driven. In FY 2018-19, the domestic market (excluding e-commerce and hardware) is expected to reach USD 28 billion. The Government initiatives such

as Digital India, Start-up India, Smart Cities, and Digital Payments are catalysing growth in this segment. The domestic revenue trend over the past 5 years covering IT Services, ITeS/BPO, Engineering R&D and Product Development segments is depicted below:



Source: NASSCOM, E:Estimated

### 4.6.4 IT-ITeS Employment Scenario

The direct employment in the IT services and BPO/ITeS segment is expected to grow over 4.3 percent and add around 1,72,000 employees during the year 2018-19 reaching a total of 4.14 million, which is a significant achievement for the sector. In addition to being one of the largest job provider and creator in the organised industry segment, this sector also plays a key role in enabling higher levels of employment in other verticals, such as, transportation, real estate and hospitality, security services, and housekeeping. The estimated indirect employment generated by the sector is over 10 million. The Table below gives employment trend over the past 5 years.

**Direct employment in the IT-ITeS segment (in millions)**

|  | 2014-15 | 2015-16 | 2016-17 | 2017-18(E) | 2018-19 (P) |
|---|---|---|---|---|---|
| Direct Employment | 3.485 | 3.688 | 3.863 | 3.968 | 4.14 |
| Net Addition | 0.218 | 0.203 | 0.173 | 0.105 | 0.172 |

Source : NASSCOM

The skills profile in the industry is set to undergo a rapid change as demand for skills around digital technologies grows exponentially in the wake of new technologies and digitization initiatives of the Government. Subject experts and hybrid professionals are being added around emerging job roles. New job roles include cyber security, mobile app development, new user interfaces, social media, data scientists, and platform engineering. New skills are being demanded by new technologies/ areas, such as, big data analytics, cloud and cyber security services, IoT, service delivery automation, robotics, artificial intelligence, machine learning/NLP (Natural language processing). NASSCOM is working with its members to establish a comprehensive digital skilling platform to re-skill 1.5–2.0 million workforce over the next 4 to 5 years.

### 4.7 Software as a tool for Economic Growth

Software is a powerful catalyst for economic change with the potential to make business more efficient and the economy more prosperous. Over the past decade, software innovation has unleashed unprecedented advances, grown our economies, improved our security, and most important, increased our standards of living.

# Chapter 5

# Innovate and Design in India

## 5.1 Creation of Research Eco-System

### 5.1.1 National Supercomputing Mission (NSM)

National Supercomputing Mission (NSM): Building Capacity and Capability has been launched by Government in 2015, which is to be jointly steered and implemented by MeitY and DST over a period of 7 years. The programme is being implemented by C-DAC and IISc.

The main objectives of the mission are:

- Creation of state-of-the-art HPC facilities and infrastructure to enhance the national capability to enable cutting-edge research in various domains

in solving grand challenge problems.

- Development of HPC applications for major science and engineering domains.

- Promote research and development in HPC leading to next generation exa-scale computing readiness.

- Human resource development to handle and spearhead HPC activities in the country.

An integrated approach is being followed for building systems with scalable architecture, ranging from workstation class having performance of a few teraflops to single rack mid-range self-contained systems with performance of 100 teraflops to high end systems with

performance up to 10s of petaflops.

It is planned to establish several supercomputing systems of different computational powers in various academic and R&D institutions in India. These systems will be deployed using both Build approach and Buy approach. Major focus is on Build approach to implement HPC systems under this mission.

Under Build approach it is envisaged to design and manufacture the sub-systems of HPC system locally in India. C-DAC is entrusted with building systems indigenously in phased manner (Phase-I: Assembly in India, Phase-II: Manufacturing in India, Phase-III: Design and Manufacturing in India) with all the phases to start simultaneously.

Progress:

a) In phase-I plan is to build two 650 TF systems and one 1.3 PF system to be installed at IIT Varanasi, IISER Pune and IIT Kharagpur respectively and to build cumulative capacity of 10 PF in Phase-II.

   Bidding Process for Phase-I and Phase-II has been completed and order has been placed to M/s Atos Systems Pvt Ltd. All three systems would be deployed by September, 2019.

   Under Phase-III, design and development of server motherboard and Open 19 based hardware frame work is in progress.

b) Four pilot systems of 100TF with different technologies (Intel, IBM, ARM and AMD) have been planned to evaluate for deciding technology most appropriate for Phase-III design. The systems once developed can be deployed as per requirement of mission.

   The first 100TF system with Intel Skylake processor has already been built and put under operation.

c) HPC Lab at C-DAC Pune for HPC system design, development and integration and System Software Lab at C-DAC Bangalore for developing HPC System Software stack have been established.

d) Development of a next generation HPC network "Trinetra" that is scalable to higher speeds offering world class performance for use in HPC systems is in progress. The PCB for 100Gbps 3-D torus network is ready and being tested in the system.

e) Development of critical system software components and tools is in progress along with use of available Open Source Software components with appropriate modification, customization and optimization.

f) Applications development in the areas of weather and climate modelling, genomics and drug discovery, seismic imaging have been initiated in consortium mode involving C-DAC, academia, and industry.

g) Proposals have been evolved in exa-scale research involving areas, such as, System Architecture, System Software, Infrastructure Management, and Scalable Algorithms/Libraries for future HPC systems.

h) Under HRD short term (1-2 weeks) and medium term (6 months) training courses have been designed for faculty and industry professionals. Few batches have already been trained by C-DAC and IITs. HPC nodal centres are being identified across the nation for proliferation of these courses. Introduction of HPC at higher education level has also been planned at UG and PG levels and curriculum for the same has been designed.

i)  The first Supercomputer designed and built under National Supercomputing Mission (NSM) by C-DAC at Indian Institute of Technology (BHU), Varanasi was dedicated by Hon'ble Prime Minister Shri Narendra Modi to the scientific and research community of the nation in order to strengthen the research and development activities in the country. Named "PARAM Shivay", the supercomputer uses more than one lakh twenty thousand compute cores (CPU + GPU cores) to offer a peak compute power of 833 TeraFlops.v

### 5.1.2 Electronic Development Fund (EDF)

Electronics design and manufacturing is a sector, which is characterized by high velocity of technological change. Intellectual property is the most critical determinant of success, not only for the companies of this sector but also to the countries and economies as a whole. Setting up of EDF was one of the important strategies for creating an electronics industry ecosystem in the country. The Electronics Development Fund (EDF) is set up as a "Fund of Funds" to participate in professionally managed "Daughter Funds", which in turn will provide risk capital to companies developing new technologies in the area of Electronics, Nano-electronics and Information Technology (IT). This fund is expected to foster R&D and innovation in these technology sectors. EDF enables creation of an ecosystem for providing risk capital to industry to undertake research and development in these technology areas. It will, in the process, enrich the intellectual property in the country and encourage more entrepreneurs towards product and technology development.
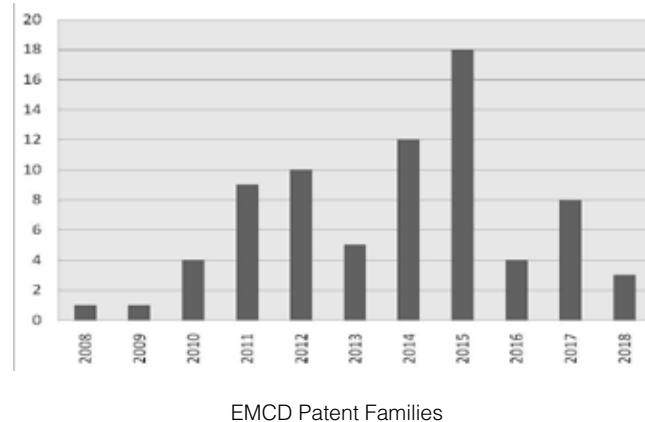
M/s. Canbank Venture Capital Funds Ltd. (CVCFL), a 100% subsidiary of Canara Bank, is the Investment Manager and MeitY is the anchor investor of EDF. The fund was launched on 15th February, 2016 by Hon'ble Minister for Electronics and IT. EDF will be investing in 13 Daughter Funds over a period of 4-5 years. The total targeted corpus of these 13 Daughter Funds is ₹6,950 crore and the amount committed by EDF to these 13 Daughter Funds is ₹857 crore. As at the end of second quarter of FY 2018-19, EDF has invested ₹53.52 crore in six Daughter Funds, which in turn have made investments of ₹177.37 crore in 47 Ventures/ Startups. Total employment in supported Startups was around 4,200.

### 5.1.3 R&D and IP development

#### 5.1.3.1 Electronics Material and Component Development

In last ten years, a total of 75 patents families have been filed under EMCD; out of which 68 are in National Phase and 20 are in International Phase of filling. 13% of these filed patents have already been granted. During the same duration, 6 technologies have been transferred to industry. This year three new patents has been filed in the area of e-waste recycling technology and Li-ion battery. Year wise EMCD patent filling is provided in figure below:



EMCD Patent Families
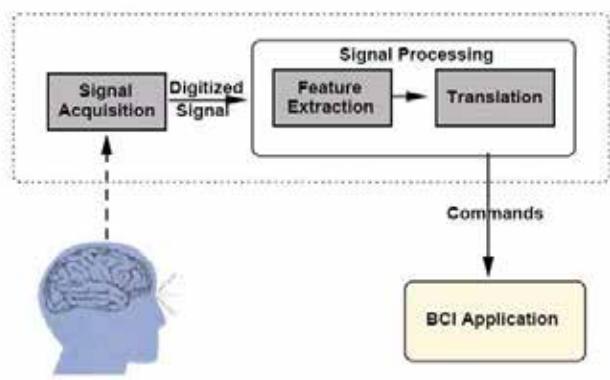
#### 5.1.3.2 Perception Engineering Initiatives

**Brain Controlled Robotic activity for Disabled, Paralytic and Stroke patients**: Contemporary research is being carried out under perception engineering by NBRC, Manesar, and IIT Delhi in the field of Brain Machine Interface. Brain Computer Interface (BCI) directly measures brain activities do signal processing and translates user's intent into the corresponding signals for application. Such systems are particularly useful for people with severe motor disabilities and who are in 'locked-in-state'.

One of the major challenges in designing BCIs is to handle massive amount of data generated during EEG recordings and to extract useful information out of it. Two novel Bayesian frameworks based on multi-variate and matrix-variate distributions has been introduced to handle representation of EEG data that arise in temporal and spatio-temporal settings, while maintaining good performance of Steady State Visual Evoked Potential (SSVEP) based Brain Computer Interface (BCI). One of the key features of matrix-variate based framework is to process simultaneously multi-channel EEG signals, thereby significantly reducing computational load and processing time. A comparative study of the proposed Bayesian CS based algorithms is conducted on 35 subjects, 40-target Steady State Visual Evoked Potential (SSVEP) based 64 channel EEG benchmark dataset using four frequency detection algorithms. Results show that multi-variate and matrix-variate Laplace based methods are highly useful for processing SSVEP based EEG signals irrespective of recognition methods in terms of classification performance. In particular, 30% samples are sufficient to guarantee around 95% (peak) detection accuracy.

First prototype of 3DOF articulated arm has been designed and realized. Subsequently, a 3DOF robot was successfully controlled using two mental commands and one facial expression, namely, wink. Also, an underactuated gripper for object manipulation was designed and fabricated which allows 4 degrees of freedom, but using just 2 degrees of actuation.



**Developing Novel Biomarker for Alzheimer's Disease:** National Brain Research Centre, Manesar has proposed to develop a unique predictive technology for detection of Alzheimer's disease (AD) at the earliest stages, i.e. amnestic mild cognitive impairment (aMCI) using a non-invasive state-of-art functional magnetic resonance imaging (fMRI) technique. Specifically, they aim to develop a unique predictive scale of visuospatial (VSP) deficits that will represent depreciative changes in VSP brain network of individuals as they develop aMCI and further, as they progress to AD. This VSP scale technology will thus be a correlative indicator of AD stage, and matching the VSP profile of a given individual to this scale will not only identify people who are likely to develop aMCI and/or AD but also provide a diagnostic indication of disease progression.
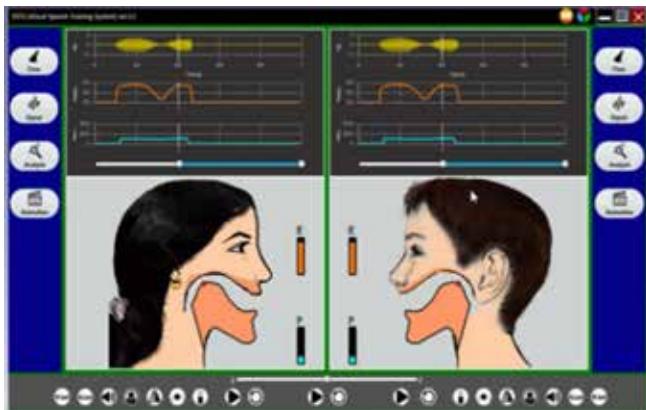
Based on functional connection networks determined between different brain regions, NBRC had developed a network model for VSP in 50 healthy subjects. NBRC has acquired data from 15 healthy young, 14 healthy old subjects and 3 MCI patients and characterized the functional changes in specific VSP regions with healthy ageing and transition to MCI in order to study how VSP network and scale alters over age. NBRC is in the process of acquiring and analysing data from more aMCI and AD subjects. Four patents were filed during the FY 2018-19.

- **Visual Speech Training Software for the Hearing Impaired:**

  Hearing loss (HL) and deafness are global issues which affect at least 278 million persons worldwide and two-thirds of them live in developing countries. In India, persons using hearing aids have been treated as persons with disability (PwD) in the Census 2011 and their number is 50,71,007 (26,77,544 males, 23,93,463 females). For the children with hearing disability to acquire speech, there is a need to provide a visual feedback of articulatory efforts involved in speech production to assist in the acquisition of speech and language despite a lack of auditory feedback.

A software, Vocal Tract Display developed at SPI Lab, IIT Bombay makes direct visualizations for vocal tract shape with speech signal. This software provides feedback of place of articulation during the production of utterances consisting of vowels, semivowels, and diphthongs.



Visual Speech Training Software (VSTS)

**Initiation of new projects in R&D in IT Group during FY 2018-19:**

**Quantum Computing Initiatives:** A brain Storming Session under the chairmanship of Secretary, MeitY was organized to discuss the roadmap for Quantum Computing Initiatives on 30th March, 2019 at Electronics Niketan, New Delhi. In the session, around forty representatives from Government, academia and industry participated. The experts presented the present status/achievements in the quantum computing area in India and the world. Based on the discussions first draft of "A Roadmap for Quantum Computing Initiatives" is being prepared.

Forest fire is one of the major threats to the environment. A large area of Indian forest is affected by forest fire. The forest fire is more catastrophic when it extends to nearby human settlements. To detect forest fire in real time with the help of wireless senor network and drone, a project has been initiated for the development of Forest Fire Detection. The pilot system would be deployed in North Eastern State. The proposed pilot solution will be monitoring forest environment 24/7,

detect outbreak of forest fire and will disseminate the information in real time to forest officials. This will help the mitigation team to act promptly to control the fire.

A large population of India is affected by anaemia which mainly includes children and pregnant women. It is a serious public health problem in India as anaemia affects physical and mental development of an individual. To diagnosis anemia, a project has been initiated to develop a Smartphone Based Artificial Intelligence Enabled Portable Low-cost anemia Detection Kit based on observation of nail and palm pallor.

A project has been initiated in the area of healthcare to develop quantitative assessment tools for analyzing the degree of facial paralysis during treatment of the patient using machine learning and computer vision tool.

A project on a "Artificial Intelligence (AI) Driven High Throughput Phenotyping to accelerate the crop yield" has been initiated. This would significantly improve the current cultivation and breeding practices by bringing in the automation.

A project in computational neurosciences to develop web based neuroinformatics/statistical tools for clinicians for monitoring, diagnosing and treating movement disorders has been initiated. It expects to convert a large body of information into actionable knowledge for clinicians and create positive societal impact.

## 5.1.3.3 Convergence, Communications & Broadband Technologies and Strategic Electronics

R&D initiatives in Convergence Communications, Broadband Technologies and Strategic Electronics is aimed at developing indigenous capability in the thrust areas which include - Next Generation Communications and Convergence technologies (Massive MIMO,

Software Defined Radio, Software Defined Networks, Network Function Virtualization (NFV), Cognitive Radio including white spaces, Heterogeneous Wireless Networks); Green Communication; Cyber Physical Systems, Internet of Things (IOT) and Machine to Machine (M2M), Wireless Sensor Networks; Convergence of wired/wireless networks and fixed mobile convergence; ICT applications in strategic sector; Broadband Wireless Access Technologies for last mile access; Visible Light Communication (VLC), Vehicular ad-hoc Networks (VANET); IP based products/services and Low Cost Broadband Internet access devices; Electro-magnetic wave applications; High power RF/microwave tubes; Terahertz (THz) wireless systems; ST Radar Systems etc.

**Achievements**

A number of technology development projects initiated at various institutions/R&D organisations across the country in the thrust areas were successfully completed. Next Generation Communications and Convergence have yielded notable achievements. "5G Research and Building Next Gen Solutions" project has been initiated with consortium of 5 premier academic/research institutions collaborating to do advanced research in 5G technologies, participate in global standardisation and develop advanced simulation and technology prototypes for 5G. More than 60 patents have already been filed in the project which include both national and international patents. Prototypes have been developed for full duplex nodes, Cloud RAN, Antenna design for mmWave, SDN test bed, the Control and Provisioning of Wireless Access Points (CAPWAP), CAPWAP based controller etc. The project will contribute towards 5G standardisation particularly addressing the aspects of heterogeneous networks, distributed connectivity and computing.

Notable achievements under different niche areas this year have helped in transforming systems to smart systems in various domains which include Safety Alert Systems using Dedicated Short Range Communication for on Road Vehicles, Design of Robust Communication Receiver based on OFDM in Interference Limited Channels for TVWS (IEEE 802.22), Development of Broadband Wireless Communication System using Terahertz Technology, Small Cell WiFi Networks for the enterprise, smart campus water management, Distributed Bayesian learning for Big Data with application to 4G wireless networks and Early Fire Detection and Safe Guiding Exit System.

**Ongoing Activity**

On-going projects supported in the identified thrust areas include 5G Research and Building Next Gen Solutions for Indian Market, Decision Support System for integrated hydro geological modelling, Low Power Terabit for Broadband Communication Links, Converged Cloud Communication Technologies, Energy Management in Wireless Sensor Networks, Development of Unified IP based Communication Platform for Voice, Video, data, Messaging and Chat services, Smart Campus Water Management, QoS Provisioning in Internet of Things (IoT), Collaborative Data Processing and Resources Optimisation for Post Disaster Management and Surveillance using Internet of Things, Big Data, Internet of Things and Cloud Computing: architecture, Issue and Application in Indian perspective, Development of National Disaster Spectrum and Disaster Communication Backbone architecture (DiCoBA) with Prototype Development etc. ST Radar for prediction of accurate weather patterns and providing warning of severe climatic conditions at Gauhati University for NE states is being installed and commissioned.

Under Indo-Dutch collaboration for collaborative research in pervasive communications and computing 5 projects are in progress: code self-verification for IoT devices, big imaging data approach for oncology,

data mining and prediction in airlines operations and privacy aware smart public buildings, crowd control management for Kumbh Mela using big data.

The promotion of R&D in the area of applied microwave electronics and engineering is being further strengthened by establishing two new centres of SAMEER. New centre specializing in high power microwave tubes/components, in collaboration with IIT Guwahati is being established. The Centre will focus on R&D of 3.1 MW magnetron at 2.998 GHz, design and development of 3 kW circulator at 2.998 GHz and 6 kW RF load at 2.998 GHz. Another new centre for Electromagnetic Environmental Effects (E3) is being established at Visakhapatnam for highly specialized state-of-the-art EMI/EMC test facilities including Electromagnetic Pulse (EMP) and Pulse Current Injection (PCI) to meet the requirements as per International EMC Standards.

**New Initiatives in the current year**

2nd phase of R&D collaboration between MeitY and NWO in the areas of IoT, Big Data and Emerging Technologies in ICT is being initiated.

## 5.2 Translation R&D

### 5.2.1 Green computing

Green computing or IT sustainability is the study and practice of environmentally sustainable IT or computing. This can include "designing, manufacturing, using, and disposing of computers, servers, and associated subsystems efficiently and effectively with minimal or no impact on the environment. Besides IT itself being green, it can support, assist, and leverage other environmental initiatives to achieve energy efficiency and reduce carbon footprint in every walk of life by offering innovative solutions. In addition to moving itself in a greener direction and leveraging other environmental initiatives, ICT could also help create green awareness by assisting in building communities, engaging groups and supporting education and green advocacy campaigns.

i)  MeitY has initiated development of technologies and solutions for Smart Cities using Internet of Things (IoT). Four centres of CDAC (Bengaluru, Chennai, Hyderabad and Thiruvananthapuram) are entrusted with the development work.

ii) The following solutions are being developed under this initiation:

| Solutions being developed for Smart City | | |
|---|---|---|
| **Smart Utilities** | **Smart Electrical Distribution** | Optimize energy delivery by monitoring demand requirements of the grid dynamically through a variety of sensor enabled devices |
| | **Smart Water Distribution** | Identify consumption patterns, water quality and detect leakages in real-time, leading to water conservation |
| | **Smart Waste management** | Smart bins and manholes and scheduling priority based collection and redressal systems |
| **Smart Mobility** | **Smart Transportation Management Systems** | A one-stop site that furnishes city wide travel information, given the origin and destination stations. Also hosts traffic information and path optimization through real-time updates |
| | **Emergency Services** | Optimal resource management and distribution, response planning of various emergency services |
| **Smart Environment** | **Air and Noise Pollution** | Monitor city pollution levels and provide warnings, to city planner and authorities |
| | **Surveillance** | Protect the city by monitoring the movement of people in various spaces |

### 5.2.2 Technology Development & Demonstration for Indian Industries

#### 5.2.2.1 National Mission on Power Electronics Technology Phase-II (NaMPET-II)

Under this programme, basic R&D in power electronics, product development, deployment and commercialization have been promoted. Major achievements in this programme include research, development and deployment of about 27 sub-projects/activities including Gallium Nitride (GaN) based semiconductors for PE applications, Medium Voltage Drives, High Voltage Power Supply systems which are attempted for the first time in India, generation of spin off projects worth ₹40.00 crore, eight technologies transferred to 17 industries, filing of 23 patents including 6 international patents etc. Vehicle Control Unit (VCU) for Electric locomotives, Grid Tied Solar Photo Voltaic Power Plants, Smart Energy Meter, Static Compensator, Solar Charge Control Unit (CCU) for Telecom Towers, High Speed Re-configurable Power Electronic Controller, Full Spectrum Simulator (mini) etc. are the major technologies transferred to industries for commercialization. NaMPET has been successful in establishing a good network of power electronics community including academic institutes, industries, R&D organisations and power electronics professionals in the country. Several technologies developed under this programme have been deployed at different sites to showcase the advantages and to inculcate the confidence among the industries on the developed indigenous technologies.

I). **Micro-grid for village application with integration of technologies developed in NaMPET-II:** A microgrid of 25KW capable of grid connected/standalone operation with indigenous Power Conditioning Unit (PCU) for Solar PV plant and intelligent load management system has been developed and deployed at a tribal village in Marayoor near Munnar, Idukki district of Kerala state. Villagers have been benefited by the deployment. The deployed technology is the outcome of NaMPET-II project.
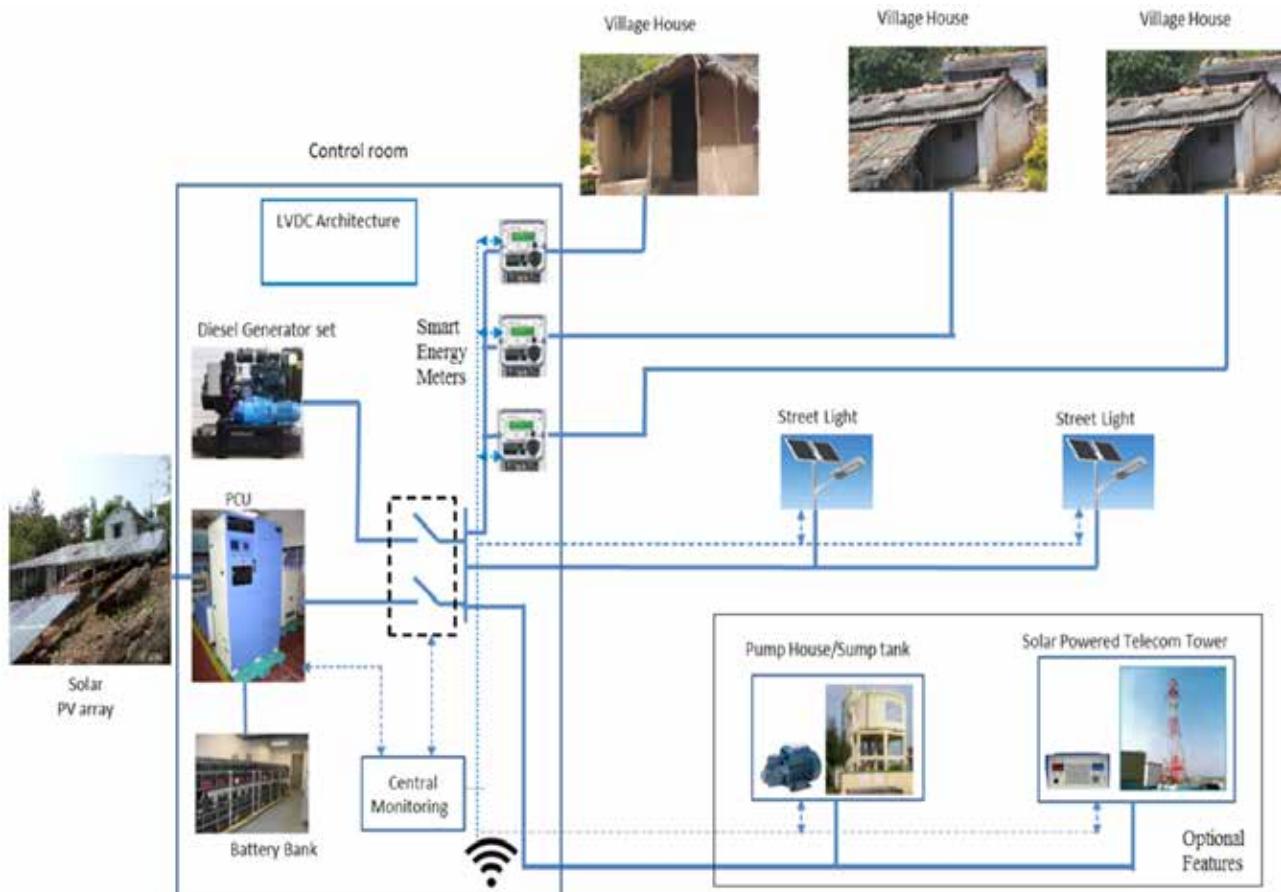
II). **Deployment of Grid Connected Solar Photovoltaic Power Plant of 330 kW:** A grid connected Solar PV power plant of 330kW has been deployed at CDAC-Pune building. The Power Conditioning Unit (PCU) for the mentioned PV plant is indigenously designed and developed under NaMPET-II project.
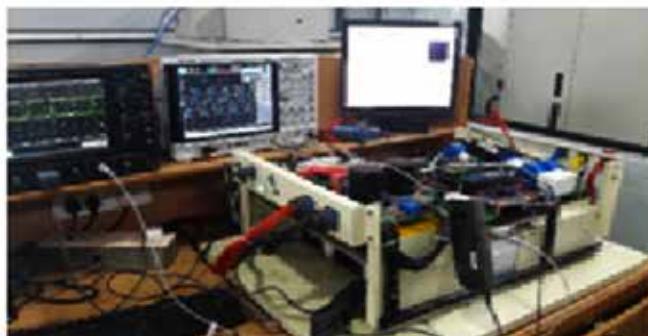


330 kW Power Conditioning Units (PCUs) installed at CDAC-Pune

III). A **Compact Energy Efficient Silicon Carbide (SiC) based three phase converter for PE Systems:** A 100 kVA, 3-phase converter for Power Electronics Systems has been designed, developed and demonstrated. The designed converter is based on Active Gate Driver (AGD) technology for SiC devices. The expertise gained through this activity will help in designing SiC based systems for several applications like SiC based converters for renewable energy sector, auxiliary converters for Railways, STATCOM etc.

Architecture of Microgrid installed at tribal colony of Marayoor Village in Iddiki District of Kerala



100 kVA SiC Inverter



Active Gate Driver (AGD) for SiC based Converters

## 5.2.2.2 National Mission on Power Electronics Technology (NaMPET-III)

Considering the impact created by the activities under earlier phases of NaMPET, and to address research, development and innovation in the areas of Wide Band

Gap (WBG) semiconductor applications for power electronics, deployment of technologies developed in earlier phases, and development of technologies for enabling e-mobility ecosystem, Indian Metro Rail, Smart Power Quality centre, high voltage power electronics for food processing, agriculture and health,

the third phase of NaMPET-III has been initiated as a collaborative programme.

### 5.2.2.3 Automation of the Sugar Plant using Indigenous Technology

The technologies/systems developed under Automation Technology Centre project of MeitY have been commissioned for automation of Thandava Co-operative Sugars Limited (TCSL), Visakhapatnam. A control room has been set up in the Sugar plant for housing various control equipment, several touch based displays projecting live data and controlling the processes are provided across the plant. Training on deployed automation systems have been imparted to TCSL Engineers. The automation system has been taken over by plant engineers. The initial field data has shown benefits in terms of savings in energy, increase in yield, productivity and improvement in quality etc.

### 5.2.2.4 Realization of Series Connection of Silicon Carbide (SiC) Devices in Converters with High Frequency Link Bidirectional DC-DC Converter for Grid Interfaces

This project has been initiated with the objectives to design and development of series connection of Silicon Carbide devices in converters with high frequency link bidirectional DC-DC converter for grid interfaces. LT-Spice simulation for series connection mechanism, design of power converter and design of Active Gate Driver for series connections is being developed in collaboration with IIT Madras.

### 5.2.2.5 Spectroscopic platform for detection of adulteration in milk

This project has been initiated with an aim for development of a portable system for detection of adulterants in milk through spectroscopic method. Under the project, identification of the spectral bands and data analysis for identification of urea, sugar and matltodextrin adulterants in raw milk has been investigated.

### 5.2.2.6 Development of vision enhancement system for foggy weather

Image processing based technology development and deployment project has been initiated at Bailadila Iron Ore mine, Bacheli Complex, in association with NMDC, Hyderabad. On successful completion, more working days with accident free environment are expected which are affected by fog, haze, rain etc.

#### 5.2.3 Medical Equipments/Tools

**Deployment of 6 MeV Linear Accelerator (LINAC) for cancer treatment:** Under the Jai Vigyan-II project, SAMEER has indigenously developed four LINAC machines for treatment of cancer. The LINAC machine at Indian Institute of Head and Neck Oncology, Indore is being used for patient treatment. On an average, 30 patients are being treated per day on this machine. The second LINAC machine has been installed and commissioned at Amaravati Cancer Foundation, Amravati. Treatment of the cancer patients has been started since August 2018 with an average 30 exposure per day. The deployment of third LINAC Machine at BKL Walawalkar Hospital, Chiplun, Maharashtra is in progress and radiation testing has been accomplished. For the remaining machine, identification of new hospital is in progress.

#### 5.2.4 Initiatives under Microelectronics Development

Some of the technologies developed/being developed indigenously under the R&D projects initiated by Microelectronics Development Division are as follows:
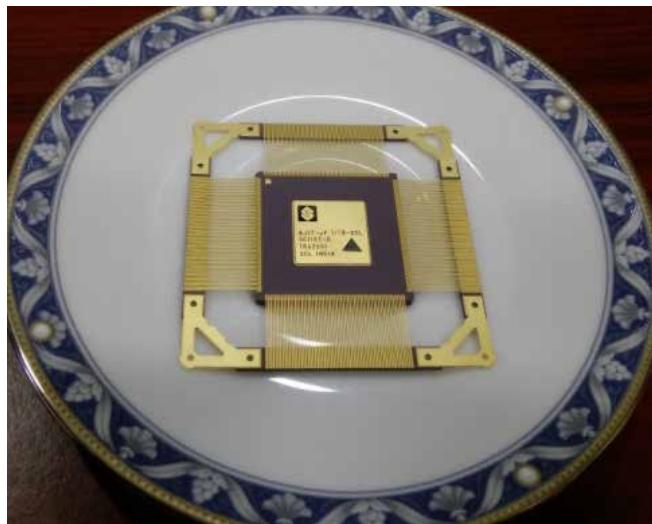
(i) IIT Hyderabad developed the low temperature, low pressure and fine-pitch bump-less Cu-Cu bonding Technology for 3D IC and heterogeneous integration applications. This technology has been transferred to the industry.

(ii) IIT Madras designed the RF circuits that make up the Bluetooth (Class 2) Transceiver in the 2.4-2.5

GHz ISM band compatible with the latest Bluetooth version 4.0 based on the requirement of ANURAG (DRDO).

(iii) 64-bit Microprocessor by IIT Madras and 32-bit Microprocessor by IIT Bombay designed using Open Source Instruction Set Architectures (ISA) fabricated successfully at 180nm technology node of SCL Mohali.



64-bit Microprocessor by IIT Madras



32-bit Microprocessor by IIT Bombay

### iv) Publications and Patents

11 Patents (national/International) filed and about 1,000 research papers have been published/ presented in national/international journals and conferences of repute in FY 2018-19.

**National/International Patents**

(i) Surface roughness based micro mixers.

(ii) A scalable compact digital-in concept comparator for ADC

(iii) N-Stage OTA Buffer Amplifiers with Unity Gain and High Input Dynamic Range and Tunable Gain for Driving Large Resistance Loads

(iv) FFT Block

(v) A Low-Power 11-bit SAR ADC with a novel capacitive DAC for IoT Sensor Applications

(vi) An auxiliary circuit in Analog-to-Digital Converter for adaptive sampling architecture.

(vii) Internet of Things (IoT) Enabled Energy Management System

(viii) On-Chip data jitter monitor

(ix) Wide range CML type Ring Oscillator

(x) Continuously variable precision and linear floating resistor using MOSFET.

### 5.2.5 Initiatives under Nanotechnology

Some of the devices developed/being developed under the Centres of Excellence for Nanotechnology established by Nanotechnology Initiatives Division are:

(i) A Highly Sensitive Field Effect (FET) Biosensor for detection of cancer biomarker has been fabricated from culture media of different cancer cell types at IIT Guwahati.

(ii) A gold nano particle based electrochemical sensor has been developed at IIT Guwahati for the quantitative estimation of -amylase in the blood serum. The sensor is integrated with a built-in source meter for immediate quantitative display of the electrical signal equivalent to unknown level of amylase in blood serum.

(iii) Si nano wire as label-free glucose sensor based on florescence quenching at IIT Guwahati.

(iv)	A paper based opto-electrochemical sensor has been developed at IIT Guwahati for the quantitative estimation of amylase in the blood serum. Three different prototypes have been developed in collaboration with the commercial experts. The prototypes have been tested against unknown blood serum samples in GNRC hospital, Guwahati. They have been able to identify the amylase level of the large number of patient samples. Presently, testing and optimization stage for this device is in process. AIIMS facilities at New Delhi have also been approached for standard sample testing. Process for ethical committee clearance certificates has been initiated.

(v)	A Lung Monitoring Device has been developed at IIT Guwahati to cater the needs of COPD patients. The prototype has been compared with the commercially available one and tested with the patients. The product design for the device has been initiated with the help of Design Department at IIT Guwahati, start-up companies, and commercial experts.

(vi)	A project entitled "Nanoelectronics Network for Research and Applications (NNetRA)" being implemented by IIT Bombay, IIT Delhi, IIT Madras, IIT Kharagpur and IISc Bangalore has been initiated in collaboration with DST and implementing agency as an umbrella programme for a period of four years with the vision of making India knowledge rich in nanoelectronics This project proposes to develop base-line technologies required for selected applications areas, such as, energy and environment, agriculture, healthcare and safety, where huge potential exists for commercialization and industrial scale production. The focus is on technology development using the state-of-the-art nanofabrication facilities in different areas established by MeitY at the Centre of Excellence in Nanoelectronics in the country. The NNetRA project caters to the root of the ecosystem,

enables these centres and delivers nano scale components. The NNetRA project will support many nano scale devices and sensors in various application areas.

(vii)	Three-Dimensional Nanostructure based Miniaturized and Flexible rechargeable lithium batteries for flexible electronics are being developed at Centre for Materials for Electronics Technology (C-MET), Pune by using shape-conformable solid-state electrolyte/separators, flexible electrode materials, flexible current.

viii)	Publications and Patents : More than 40 research papers have been published in national and international journals. Some of the patents published/filed/under process this year are as follows:

**International Patent**

(i)	"A device with integrated methods for reverse transcription polymerase chain reaction (RTPCR) and/or DNA/Protein array based analyses", Arun Chattopadhyay, Sunil Kumar Sailapu, Deepanjalee Dutta, Amaresh Kumar Sahoo, Siddhartha Sankar Ghosh.

(ii)	"A device with integrated methods for reverse transcription polymerase chain reaction (RTPCR) and/or DNA/Protein array based analyses", Arun Chattopadhyay, Sunil Kumar Sailapu, Deepanjalee Dutta, Amaresh Kumar Sahoo, Siddhartha Sankar Ghosh

(iii)	"A point-of-care system for detection of the physical stress at different parts of body", Mitradip Bhattacharjee, Sagnik Middhya, Dipankar Bandyopadhyay

(iv)	"A mobile RF radiation detection device", Mitradip Bhattacharjee, Dipankar Bandyopadhyay

(v)	"Method for the Fabrication of Ultralow Voltage Operated, Reduced Bias Stress, Multi-layer

Dielectric System Comprising n-Type Organic Field Effect Transistors," Anamika Dey, Ashish Singh, Parameswar K. Iyer

(vi) "Method for the Fabrication of Solution Process, Ultra-low Operating Voltage, Stable Organic Field Effect Transistor", Anamika Dey, Ashish Singh, Parameswar K. Iyer

(vii) "An Ultra-low Voltage Operated Organic Field Effect Transistor (OFET) based Bio-sensing System and A Method for Fabricating the Same", Anamika Dey, Ashish Singh, Deepanjalee Dutta, Siddhartha Sankar Ghosh, Parameswar K. Iyer

## 5.2.6 Initiatives under Electronics Components and Material Development

Electronics Components and Material Development Programme has been promoting research and development activity since 1986 to nurture electronics development in the country to boost local manufacturing. The current focus of the programme is development of technologies in the areas of energy storage and harvesting, semiconducting and printed circuit board, information display, optical technologies including optical fiber, indigenization of optical components, optical computing, silicon photonics and quantum communication, environment and e-waste, process technology development leading to product development and technology transfer to industries.

Eight technologies in the areas of transparent thin film, nano-ZnO powder, piezoceramic compositions and components, X-ray absorbing materials and medical apron, PCB recycling (black copper and valuable and precious metals) and silica fillers for space applications are ready for transfer for the current financial year, while four other technologies in the areas of e-waste recycling technology, aerogel supercapacitor and microwave substrates are under process for transfer to industry. Five technologies have also been transferred to industry this year:

**Photoconducting Paste (using Semiconductor Nanostructures) for Photo-patternable Thick Film Technology for Advanced Optoelectronic Applications:** Functional photo-conducting material based paste on hierarchical nanostructures of undoped and doped CdS, CdSe with high photoconductivity and desired band gap has been developed. The paste can be utilised to fabricate micro-photoconducitng cells of sensing element line of 100 micron with fast response of 1 ms to 25 ms. This indigenous patent sensor material technology has applications, such as, Automatic Headlight Dimmer, Night Light Control, Oil Burner Flame Out, Street Light Control, Absence/Presence (beam breaker), Position Sensor and many more. The technology has been transferred to M/s ANTS Innovation Pvt. Ltd. for local manufacturing.



- **Rechargeable emergency lamp using indigenous graphene supercapacitors:** An emergency lamp has been designed and developed using indigenous patented graphene based supercapacitors. A single module can be charged under 2 minutes which can then provide light for at least an hour. The lamp is very handy, light weight, cost effective and can be charged with solar panel. The product has potential to enhance literacy rates in remote areas where continuous electricity or no electricity is still an issue. The IPR protected technology has been transferred to a start-up company M/s. Aessar Technologies, Thrissur. The company has already setup production line and has started receiving orders.

- **Technology for recycling of plastic materials recovered from e-waste:** A patented indigenous technology for recycling of plastic materials from e-waste was developed under MeitY funding through CIPET Bhubaneswar which has been transferred to M/s Vansun Intermediates Pvt. Ltd. Chennai.

- **Laser modules:** Three indigenous patented technologies for laser have been developed. The module specifications include 20W pulsed fiber laser, 100 W CW fiber laser and 30W CW/QCW Thulium fiber laser at 1.94 μm along with the optical engine. The 20W and 30W technologies have been transferred to Bharat Electronics Ltd (BEL), Bengaluru and 100 W to  M/s Anant Technology Ltd, Hyderabad.

- Technology for Wearable Device and Analysis System for Early Detection and Screening of Breast Cancer: Patented Indigenous technology based on indigenous thermal sensors was developed under MeitY and the technology has been transferred to M/s Murata Business Engineering India Private Limited.

Currently five new technologies are under development:

- **Magneto-dielectric Printed Circuit Board Substrates:** Magneto Dielectric (MD) materials are artificially developed materials with permittivity and permeability values greater than unity which gives the material properties that can miniaturise antenna and components operating at Ultra High Frequency Range (UHF) and Very High Frequency Range (VHF) with minimal impact on the bandwidth of the antenna, achieving designs closer to the fundamental limit of electrically small antenna. Printed Circuit Board (PCB) substrates made using such MD materials are under development first time in India for applications in the frequency ranges up to 1GHz.



$$\eta = \sqrt{\varepsilon_r \mu_r}$$

- **PZT Actuators and Piezo Composites for Vibration Energy Harvesting:** Technology is under development of PZT actuators and piezo composite materials for harvesting of vibration energy. These transducers can be used to make smart shoes that can charge batteries, torches and many other applications.



- **EMI Shielding materials**: Electro Magnetic Interference (EMI) shielding materials with thickness less than 4mm having an absorption of at least -20 dB and covering a bandwidth of approximately 2-4 GHz in X and C band are under development. The material will be light weight, conformal, with high mechanical stability and cost effective. Such materials are used for strategic stealth technology applications, such as, antenna shielding in naval ships.



- **Indigenous Antenna for Navigation with Indian Constellation (NavIC):** NavIC is indigenous an

independent regional navigation satellite system developed in the country. NavIC is expected to be better (~5 meters) as compared to GPS (~20 meters) system. Development of suitable microwave substrates, simulation and fabrication of L1, L5 and S band antennas for NavIC system has been undertaken by MeitY through C-MET.

• **Supercapacitor-based power modules (SCPM) for applications in VVPAT of EVM:** C-MET has developed complete indigenous technology for making of aerogel supercapacitors and supercapacitor packs of values (cell: 0.47-50F & Packs: 125-300 F) for various electronics and energy storage applications and demonstrated the technology by establishing the semi-automated plant for production of carbon aerogel in pilot scale of 3-4 kg/batch per day. C-MET has also designed and fabricated machineries indigenously

for fabrication of aerogel electrodes. Based on the success of the technology, MeitY has now initiated to develope supercapacitor-based power modules (SCPM) for applications in next generation of VVPAT machines of EVM, in which SCPM would compensate use of large numbers of high power special MnO2 based battery packs.

## 5.3 Centres of Excellence

### 5.3.1 Nanotechnology Centres

Nanotechnology Initiatives Division at MeitY has established several Centres of Excellence in nanotechnology to take the basic R&D outcomes to the prototype and then to manufacture nano devices, subsystems, systems for social benefits.

(i) **Nano Fabrication Prototyping Facility for SMEs and Start-ups in the area of Micro Electromechanical Systems (MEMS) and Nano**



**PILOT PLANT FOR AEROGEL PRODUCTION**

**CARBON AEROGEL**    XRD Pattern

**AEROGEL SUPERCAPACITORS**

0.5-3.3 F    25 – 50 F    4.7-15.0 F

**Salient Features:**
✓ Complete Indigenous facility for production of carbon for making Aerogel Supercapacitors
✓ Installed capacity: 3-4 kg of carbon Aerogel per day per batch [≈ 15~20K of IF Supercapacitor/ batch]
✓ PLC based PC operated machineries coupled with high level of safety
✓ Process is reliable, ecofriendly & ensure highly reproducible with media recyclability of >95%
✓ TOT to industries have been identified and transfer of technology to 4 industries are in process

**Electromechanical Systems (NEMS) at IIT Bombay.**

A national prototype facility has been created, commissioned and fully operationalized to enable researchers and industrial partners/incubator companies to fabricate and manufacture nanoscale devices. This facility aims to provide facilities for scaling up of nano-manufacturing operations in contaminated and quality controlled environments also. It will be an accessible platform to bring technologies from Technology Readiness Level TRL 4 to TRL 9. Efforts are being taken to involve an industry for the utilization and making the facility self sustainable.

(ii) **Centre of Excellence in R&D in Theranostics Devices at IIT Guwahati**

Centre for Nanotechnology at IIT Guwahati is being created to provide a platform for the scientific and technological developments in the NE region of the country. The focus of the R&D at this centre is to develop interdisciplinary experimental facility in the NE region for the fabrication of theranostics devices based on chemical, biological, and environmental sensors, transistors, and MEMS/NEMS applications.

### 5.3.2 Innovation and IPR

India continues its momentum of being one of the most vibrant landscape for start-ups, strengthening its position as the second largest startup ecosystem across the world. Adding over 1,200 technology start-ups in 2018 including 8 unicorns despite global slowdown and economic downturn, India is witnessing a rapid rise in the tech start-ups, reaching a total number of tech start-ups to 6,200 focused on verticals like healthcare, fintech, and e-commerce/aggregators. These companies created 40,000 direct jobs with a total base of employment upto 1.6-1.7 lakh (3.0-4.0x indirect jobs). A majority of these companies are in the ICTE space, even focusing on emerging technologies like Internet of Things, Artificial Intelligence, Big Data, Machine Learning, Clouds etc. Several of the new age companies are raising money at valuations which far exceed the market capitalizations of many traditional and well-established players. However, many Startups do not reach their full potential due to limited guidance and access.

The Government of India taken a number of initiatives with regard to boosting startup ecosystem. Startup India is a flagship initiative of the Government of India, intended to build a strong eco-system for nurturing innovation and Startups in the country that will drive sustainable economic growth and generate large scale employment opportunities.

MeitY has also taken various initiatives and measures to improve innovation-led ecosystem with a Technology Incubation and Development of Entrepreneurs (TIDE) scheme, Centres of Excellence in IoT/FinTech space, technology and theme based incubation centres and programmes to support researchers, start-ups and MSMEs protect IPRs nationally and internationally. MeitY is going to launch an enhanced version of TIDE i.e. TIDE 2.0 scheme to promote technology incubation. A brief overview of such activities include:

- **Technology Incubation and Development of Entrepreneurs (TIDE) Scheme:** Technology Incubation and Development of Entrepreneurs (TIDE) Scheme was put in place by MeitY in 2008 to promote innovation by nurturing startups in Information Technology, Communications and Electronics (ICTE) domain. Under the TIDE Scheme, financial assistance is provided to institutions of higher learning to strengthen their Technology Incubation Centres for enabling young entrepreneurs to create technology startup companies for commercial exploitation of technologies developed by them. Under the scheme, 27 TIDE Centres and 2 Virtual TIDE centres have been supported at institutes of higher learning all over India.

The following are the main outcomes of the TIDE Scheme:

- 27 TIDE Centres and 2 Virtual TIDE centres supported at IITs/IIMs/NITs/Premier Institutes all over India.

- 207 startups benefited.

- 384 entrepreneurs emerged out of which 34 are women entrepreneurs.

- 52 startups attracted venture capitalists resulting into investments of ₹172.39 crore.

- Out of 207 startups, 95 have successfully graduated till date.

- More graduations are likely to follow as some of the startups incubated in recent years.

- 74 successful patents registered based on the products developed by the startups.

- Till date, 243 products have been developed by these startups.

- 2,846 jobs created throughout 27 TIDE Centres.

- **TIDE 2.0 Scheme:** The scheme aims to promote tech entrepreneurship through financial and technical support to incubators engaged in supporting ICT startups primarily engaged in using emerging technologies, such as, IoT, AI, Block-chain, Robotics etc. in seven pre-identified areas of societal relevance. It is being implemented through 51 incubators through a three tiered structure with an overarching objective to promote incubation activities at institutes of higher learning and premier R&D organisations, eventually leading to handholding of approximately 2,000 tech start-ups over a period of five years. The scheme also aims to provide a mechanism to establish necessary collaboration among the incubation activities so as to benefit them through complementary strengths. Efforts are being made to closely associate these incubators and through this network the complementary strengths can be leveraged and shared. This, in turn, would ensure that larger number of institutes possess matured incubation facilities, leading to technology start-ups moving out of metros to TIER 2 and 3 cities. To support tech startups addressing societal challenges in seven select thematic areas were identified based on national priorities particularly in the realm of:

(i)     Healthcare
(ii)    Education
(iii)   Agriculture
(iv)   Financial inclusion including digital payments
(v)    Infrastructure and transportation
(vi)   Environment and clean tech
(vii)  Clean Energy Solutions

- **Multiplier Grants Scheme:** Multiplier Grants Scheme (MGS) is to encourage collaborative R&D between industry and academics/R&D institutions for development of products and packages. Two projects have been supported and one more project has been initiated under the scheme as on date.

- **Support for International Patent Protection in E&IT (SIP-EIT) Scheme for SMEs:** A significant initiative of MeitY is the SIPEIT scheme SIPEIT encourages international patent filing by Indian MSMEs. As of now, 41 applications from startups and MSMEs have been supported since the inception of the scheme. SIP-EIT aims to provide financial support to MSMEs and Tech startups for international patent filing so as to encourage innovation and recognize the value and capabilities of global IP. The scheme for a period of 5 years provides 50% reimbursement upto a maximum of ₹15 lakh to Indian MSMEs and Startups.

- **IP Awareness Programme for E&IT Sector:** The aim of this scheme is to create a holistic sustainable model for creating IPR awareness among various stake holders. Till date, 70 IPR awareness workshops have been supported out of which 10 workshops have been supported in year 2018 with great success. As part of MeitY-European Patent

Office (EPO) workplan, the 6th Indo-European Conference was held on 29th November 2018, at Munich, Germany.

- **IPR Facilitation for MeitY R&D/Innovation Outcomes:** To translate the Ministry's various efforts for creating state-of-the-art R&D paradigm in the country, MeitY has been supporting its R&D societies and grantee institutions in filing IPRs which includes patents, copyrights, industrial designs and trademarks. MeitY's IPR portfolio now consists of a total of 65 granted patents with 281 patents filed, 494 copyrights and 87 registered trademarks.

- **Centre of Excellence (CoE) in Intellectual Property Rights:** With the growth of the IT industry as well as other technical sectors, an urgent need is felt to protect the IPR generated out in India. To cater this aim, a Centre of Excellence (CoE) on Intellectual Property Rights (IPR) is being implemented by CDAC, Pune and operational at MeitY and CDAC Pune. Apart from prior-art search, CoE on IPR is offering a bouquet of services in order to create awareness around the opportunities for protection of technologies which are outcomes of innovation and creativity.

- **Centre of Excellence (CoE) on FinTech at Chennai:** MeitY has initiated a Centre of Excellence (CoE) on FinTech at STPI, Chennai to provide infrastructure, resources, coaching/mentorship, technology support and funding to emerging start-ups in the FinTech sector. The Fintech CoE would establish ecosystem around FinTech with the latest trends and technologies in the financial services sector through a collaborative approach including NPCI, UIDAI and Partner Banks. The purpose of the FinTech CoE is to create holistic ecosystem so as to enable start-ups to experiment their innovative financial products or services within a well defined space and duration. The project aims to support 58 start-ups over a period of 5 years.

- **IoT OpenLab-a Centre of Excellence (CoE) for**

**Internet of Things at STPI Bangalore:** An IoT OpenLab - a Centre of Excellence (CoE) for Internet of Things in partnership with Arrow Electronics at STPI Bangalore has been initiated to provide academic and business mentoring of the startups in the IoT emerging technology area for developing products and/or services around IoT along with networking opportunities for the startups. The IoT OpenLab intends to support and nurture 100 start-ups per year with an overall target to support 500 startups over a period of 5 years.

- **ESDM Incubation Centre at Bhubaneswor:** An ESDM incubation centre with the objective of creating a holistic eco-system to promote ESDM innovation, R&D and create Indian intellectual property in the eastern region of the country has been initiated. The centre is being operated through STPI, Odisha in collaboration with Government of Odisha, IIIT Bhubaneswor and IESD. It aims to leverage 40 start-ups over a period of 5 years.

- **Establishment of Incubator for Electronics Start-ups in Delhi-NCR (Electropreneur Park):** The Electropreneur Park has been established in collaboration with Software Technology Parks of India (STPI), India Electronics and Semiconductor Association (IESA) and Delhi University (DU) with state of the art facilities at South Campus, Delhi University. The project aims to support 50 start-ups. As on date 13 startups are on-board and 5 startups have graduated. As an outcome, 14 new products, 12 working prototypes have been developed, 18 patents filed and ₹20 crore VC/Grants/CSR received by the onboard startups.

- **Electronics Incubator by IIITM-Kerala and KSUM at Cochin, Kerala:** The project for setting up of Consumer Electronics Incubator at Cochin, Kerala by Indian Institute of Information Technology and Management Kerala (IIITM-K) and M/s Kerala Startup Mission (KSUM) aims to creation of new enterprises focused on consumer electronics

through a holistic incubation ecosystem. This incubator will incubate 40 startups over a period of 4 years. Infrastructure setup has been completed. Testing and Equipment/IoT, Robotics Lab and Prototyping Room for SMT Assembly Line has been completed. 64 incubates are on-board out of which 13 incubates joined as pre-incubates. As an outcome, several products/working prototypes have been developed, 26 patents filed and 10 crore funding VC/Grants/CSR received to the onboard startups till date.

- **Setting up of Incubation Centre in the area of ESDM with focus on Medical Electronics at IIT Patna:** The incubation facility developed through MeitY and State Government partnership aims to incubate 50 startups over a period of 5 years. The primary objective of this is to promote innovation and entrepreneurship with the aim to identify, nurture and translate technological ideas and innovation in the broad area of ESDM sector with a focus in medical electronics. 13 startups have joined the Incubation Centre out of which 1 startup joined as pre-incubate.

- **Fabless chip design incubation centre at IIT Hyderabad:** The objective of the fabless chip design incubator is to incubate start-ups in semiconductor design. The vision is to provide one-stop service to start-ups intending to enter this space. This incubator will incubate 50 startups over a period of 5 years. 3 startups have joined the Incubation Centre and 3 more EoIs have been received.

- **Industry Innovation Programme on Medical Electronics through BIRAC:** With an aim to promote scientific and technological research in medical electronics sector and to address the pressing challenges associated with the development of innovative medical electronics and making it available, accessible and affordable to the people at the bottom of the pyramid, a project

has been initiated at Biotechnology Industry Research Assistance Council (BIRAC). Under this programme support will be provided at seed or idea to PoC, early transition and transitions to scale stages. 25 proposals are being supported through BIRAC under the programme out of which 18 proposals are in Idea-to-PoC stage, 5 proposals are in early transition stage and 2 proposals are in transition to scale stage.

- **Global Innovation and Technology Alliance (GITA):** To provide funding and support to industry and academic institutions for doing collaborative research to promote Innovation, IP, R&D and commercialization of products etc. in the ESDM sector, a project is being implemented by GITA. For this bilateral programme, Canada, Finland, UK, South Korea, Spain, Israel, Japan, Taiwan and Sweden have been identified. As on date, six projects have been initiated under India-Finland (01), India-Canada (02) and India-UK (03) call for proposals.

## 5.4 Cyber Security R&D

Cyber Security R&D is one of the key components of creating cyber security eco-system in the country. It is aimed at development/enhancement of skills and expertise in areas of cyber security by facilitating basic research, technology demonstration and proof-of-concept and R&D test bed projects. Research and development is carried out in the thrust areas of cyber security including (a) Cryptography and cryptanalysis, (b) Network and System Security, (c) Monitoring and Forensics and (d) Vulnerability Remediation and Assurance through sponsored projects at recognized R&D Organisations.

New projects are formulated/initiated in thrust areas identified on continuous basis to enable enhancement of expertise/skills in R&D for cyber security. Accordingly, R&D projects in the area of cyber security have a special focus and emphasis on R&D infrastructure creation, capacity building and enhancement of skills

and expertise in the interest of a conducive R&D eco-system in the country to support vision of robust Digital India and needs of the society. In addition, specific efforts have been made to nurture institutions and capacity enhancement in the entire North East Region.

**Cyber Security R&D Projects**

During the year 2018-19, R&D efforts were continued and strengthened. New projects have been initiated in the following areas:

- **Distributed Centre of Excellence for block-chain technology** : The objectives of the project are i) evolving an ecosystem around R&D Organisations, Government departments and academia to foster block chain technology, ii) design, development and pilot deployment/prototyping of block chain based applications in the domains of governance, banking and finance and cyber security, iii) research to address the issues and challenges related to block chain usage in identified applications domains, iv) evolving block chain framework using open-source implementations to suit the identified application domain requirements and v) capacity building in block chain technology.

- **Setting up of a Collaborative and Comprehensive Live Cyber Operations Specific Exercise Training Facility (Cyber Closet) for Indian Cyber Space:** The overall objective of the project is to setup and establish a state-of-art collaborative and comprehensive live cyber operations specific exercise training facility (**Cyber Closet**) for Indian Cyber Space to prepare and enable an organisation to test the systems (critical infrastructure), processes and people against cyber-attacks.

- **Establishing Security Evaluation, Research and Exploratory Testing Centre:** The aim of the project is to establish a 'Security Evaluation, Research and Exploratory Testing Centre' which will act as a centre of excellence for developing security testing and assessment in response to

rapidly evolving cyber threats. The centre will be involved in research to proactively address the most critical security issues across multiple vertical technology products and system in sectors like telecommunications, defense, financial transactions, industrial automation, smart grid, medical electronics etc. with focus on identifying unknown vulnerabilities.

- **Setting up of Cyber Forensic Training Facility (Cyber Forensic Lab) for NICFS:** The objectives of the project are: i) setting up and establishing a state-of-art cyber forensics training facility (Cyber Forensic Lab) in National Institute of Criminology and Forensic Science ii) capacity building of NICFS officials in cyber forensics and in use of the developed training facility for R&D and for various training programmes of NICFS, iii) conduct of various levels of training programmes on cyber security and cyber forensics for participants of various programmes of NICFS and iv) creation of an e-learning system for online training support and access of training materials.

- **Development of Cyber Crime and Cyber Forensics Resource Centre for the State of Bihar:** The aim of the project is (i) to provide cyber forensic services support to law enforcing agencies, ii) to provide broad range of cyber security related training support for different categories of Government and non-Government agencies, iii) to undertake problem oriented research activities in the areas of cyber forensics and allied areas and iv) to facilitate MSME sector to undertake commercial activities in the areas of cyber security.

- **Development of Tool for Detecting of Application Layer Distributed Denial of Service Attacks on Web Applications:** The project aims to develop a tool for detecting workload based application layer Distributed Denial of Service (DDoS) attacks on web applications.

The R&D activities in the programme will be carried

forward during 2019-20 to promote research and development of indigenous cyber security solutions, proof of concepts and prototypes and skilled manpower in the thrust areas of cyber security with special focus on mobile device security, cloud security and cloud forensics, intelligent traffic analysis, predictive intelligence based on big data analytics, malware detection and advanced cyber forensics.

**Efforts/activities in North East**

Efforts were made to continue and strengthen the cyber security activities in the North East region. The efforts were towards strengthening the R&D capability building and training and awareness creation activities. During 2018-19, new project "Setting up State of Art Digital Forensic Data Centre" to provide forensic services including remote forensics live acquisition and analysis of digital evidence, virtual training services to NE States has been initiated. The objectives of the project is to (i) set up digital Forensic Data Centre with all forensic tools and to offer forensic services by sharing the resources in the facility with virtual technology concept for North Eastern States. The digital forensic data centre is proposed to act as repository of digital forensics tools for NE States and the services will be offered in cloud environment, (ii) creating web based virtual environment laboratory with training content covering latest trends in cybercrimes, seizure/acquisition and analysis of digital evidence, building case scenarios with advanced forensics techniques to enable LEA officials to gain hands-on forensics investigative skills in various area like disk forensics, mobile forensics, network forensic, social media etc. through the virtual mechanism, the training outreach will be maximized and (iii) based on the need expressed by law enforcement development and integration of web related evidence acquisition tool including automated screen capturing while acquiring web related evidence like media files and documents with forensically sound methods.

## 5.5 Societal Reach R&D

### 5.5.1 Medical Tools, Equipments and Software

i.  **Repair of Maintenance of Medical Electronics Equipment:** Medical Electronics Laboratories for repair and maintenance of medical electronic equipment and training of medical and paramedical personnel have been established at NIELIT, Shillong and NIELIT, Kohima and NIELIT Silhar. The Medical Electronics Lab has been set up and training of 217 candidates (NIELIT, Shillong – 146, NIELIT, Kohima- 74 and Para medical Staff-10) has been completed. By virtue of the training some of the participants trained from NIELIT, Shillong and NIELIT, Kohima have got employment. Six staffs associated with the project at NIELIT Silchar had been trained in this domain by NIELIT Calicut.

ii.  **Design and Development of 1.5 Tesla Magnetic Resonance Imaging (MRI) Systems**: The objective of the proposed project is to design and develop an indigenous low cost 1.5 Tesla MRI System for medical imaging. Magnetic Resonance Imaging (MRI) is a medical imaging technique used in radiology to visualize internal structures of the body with high contrast images. Various subsystems, such as, image reconstruction, image visualisation, RF systems, RF coil etc have been developed. The coils and software have been integrated with commercial scanner for testing purpose. Technical design of magnet, bobbin, vacuum-impregnation system, external interfacing shield and MRI cryostat has been improvised and ready for fabrication and winding.

iii.  **High energy 30 MeV linear accelerator (LINAC):** The objective of the project is to design and develop 30MeV electron linear accelerator with 5-10kW beam power. The proposed LINAC will generate Molybdenum (Mo-99) which will be used to elute radio isotope Technetium (Tc-99m). The novel Tc-99m radio labelled analogues generated will also be clinically assessed. Various sub system

have been designed, fabricated and being tested. Integration of first phase of the system is expected by September 2019.

iv. **Design and Development of Indigenous Colour Doppler Ultrasound Scanner with centralised PNDT database compliance:** NIELIT Calicut is developing an Indigenous Color Doppler Ultrasound Machine with Pre-natal Diagnostic Technique (PNDT) Compliance. Design of complete hardware of transceiver board, digital beam former board and power management and debugger boards is completed and released for fabrication. Design of QT-QML based Human Machine Interface is completed and integrated with touch screen based GUI, in the prototype enclosure. Board build up, integration testing and prototype validation is expected to be completed within 1 year.

v. **Studies on detection of cancer, processing infrared images and developing appropriate Instrumentation system for initial deployment in N.E. States:** A new labview based analysis programme has been developed for collected infrared images containing double step analysis on the subjects. In this system the data is analysed in two steps. First the difference of right to left breast image temperature is compared and then the abnormal/comparatively higher temperature breast is analyzed using the images which were collected in different ambient temperature. The first collaborative data collection programme (Breast Cancer Screening Camp), was conducted at Cachar Cancer Hospital Silchar from 20th June 2018 to 29th June 2018 and two consecutive data collection programmes were also arranged at B Barooah Cancer Institute, Guwahati during August 2018 using IR camera along with clinical reports like, ultrasonography and/or mammography test and patient's questionnaire for breast cancer screening.

vi. **Certification Schemes for Compliance with**

**EHR Standards:** This project will make it possible to implement standardized Electronic Health Record at National/State level for e-Governance in health care sector. It will also help public and private healthcare operators to become compliant to notified EHR standards of Ministry of Health and Family Welfare. Towards certification of EHR standards compliance, C-DAC in collaboration with STQC has developed techniques, methodologies, and tools for evaluation and certification of EHR related systems. Pilot testing of the scheme is in progress with CDAC's e-Sushrut application.

vii. **Maxillo-Facial Surgery Planning and Simulation System:** This project aims to develop a reliable and cost effective planning and simulation system for maxillo-facial surgery. The tool will enable precise 2D cephalometric analysis and interactive manipulations of three dimensional reconstructions of the facial tissues in order to visualize the patient's postoperative appearance. CDAC team alongwith AIIMS has developed prototype tool of a GUI based 3D simulation module. Integration and testing of the application is in progress at AIIMS.

viii. **Development of Thermal Tomography for the Detection of breast cancer and to predict the Size and Location of the Cancerous Tissue:**

The main objective of the project is to develop an analysis system for accurate prediction of human breast abnormality using thermal tomography. The project team has just initiated the development of 2D thermal imaging software in open source, such as, python.

ix. **Development of Low Cost Automated Screening System for Cervical Cancer (CerviSCAN - II):** The aim of the project is to develop a complete economically viable system for primary screening of cervical cancer which is most prevalent cancer among women in India. The project has been initiated recently.

### 5.5.2 Agriculture

#### 5.5.2.1 Smart Warehouses Technology

The technology development and deployment have been completed for safe storage of rice grains. The development includes sub-systems like Conveyorized System with on-line identification of bags, moister measurement, thermal disinfection, fumigation, measurement of concentration of gases etc. Entire system and sub-systems have been developed, commissioned and being tried as a pilot project in a godown of Food Corporation of India (FCI) at Raipur. This wil provide benefits like safe storage of food grains etc. for a longer period.

#### 5.5.2.2. Design and development of Automated Aquaponics System for Vertical Farming in India

This project has been initiated with an aim to design, development and deployment of automated aquaponic system with real time monitoring and control of electrical conductivity (EC) and other nutrient in solution for vertical farming. In this project, a new method of farming is being investigated which requires less land and water but provide high yield. Finalization of system requirement specifications (SRS) and identification of sensors/components/sub systems have been completed.

### 5.5.3 Healthcare

#### 5.5.3.1 A thumb imprint is enough to detect jaundice

Now, a thumb imprint is all that is required for detecting hyperbilirubinemia, a condition in which the amount of bilirubin in the blood is in excess and turns the sclera of the eye, urine and even the skin yellow. Hyperbilirubinemia is commonly seen in people with jaundice and newborns; a person is said to have jaundice when the bilirubin concentration in the blood typically exceeds 12 ppm in adults and 50 ppm in a newborn.

Researchers at the Indian Institute of Technology (IIT) Guwahati have tested the sensitivity and specificity of a simple, quick, point-of-care test for detecting excess bilirubin in patients with jaundice.

While visual observation of yellow colour of the sclera and/or urine is routine for detecting jaundice, it is confirmed by a blood test. A team led by Prof. Arun Chattopadhyay from the Department of Chemistry and Centre for Nanotechnology, IIT Guwahati used thumb imprints to detect hyperbilirubinemia. The results were published in the journal Scientific Reports.

#### 5.5.3.2 Paper-Based Amylase Detector for Point-of-Care Diagnostics



A transmittance based system/kit for point-of-care quantification of biomarker samples comprises a stage supporting a detection unit, an optical transmittance unit, and a signal processing unit. The detection unit i.e. reactive substrate is capable of undergoing a specific biomarker sample interactive reaction and generating a quantifiable optical signal proportional to the concentration of the said biomarker sample wherein the intensity of the color varies with the concentration of the analyte in the bio-sample. The simple, single step, cost-effective easily disposable system/kit is useful for point-43 of-care detection of a host of important biomarkers, such as, amylase, creatinine, or albumin, among others.

## 5.5.4 Rehabilitation of Divyang
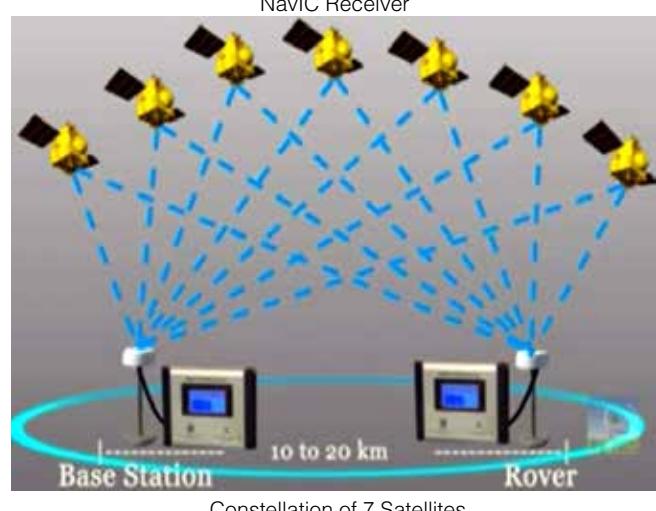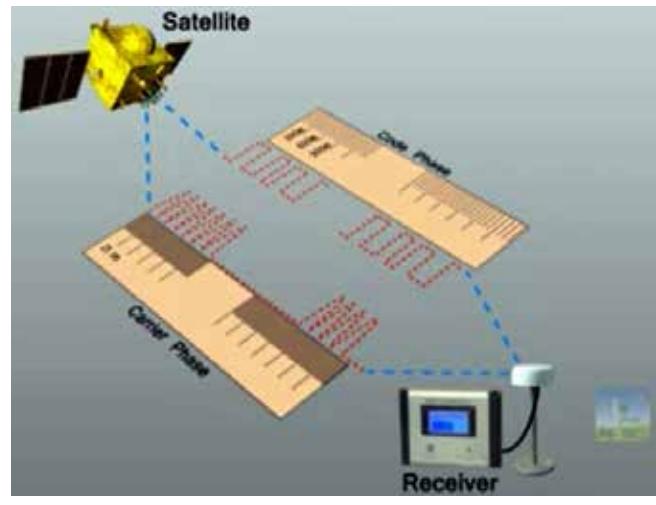
a) **ICT Centre of Excellence on Tactile Graphics:** The project has application for social development of Divyang. The project team has worked closely with NCERT and created tactile diagrams for a number of text books i.e Science and Maths books for Grades 6 to 10, Economics primer, India map book Tactile Diagrams for Engineering Mathematics, Menstrual Hygiene Management Books (Hindi and English), NCERT Economics module (Macro, Micro and Mathematics). These books have been designed and produced by IIT, Delhi for visually impaired children. NCERT has distributed more than 3,500 copies of the various books in tactile format throughout the country. A start-up company under the project "Centre of excellence in tactile graphics" has been incubated for production of tactile diagrams.

## 5.5.5 Societal Miscellaneous

### 5.5.5.1 Design and Development of NavIC Receiver

For effective use of Navigational services based on Indian Constellation of Satellites, named NavIC (Navigation with Indian Constellation), a prototype of Integrated Chip for NavIC Receivers with Multi-Constellation support (i.e. NavIC (L5 and S frequency band) and GPS (L1 frequency band)) for Standard Positioning Service and Restricted Service is being developed by SAMEER Mumbai in collaboration with IIT Mumbai, IIT Madras, IIT Jodhpur and IIST Thiruvananthapuram.



NavIC Receiver



Constellation of 7 Satellites

## 5.5.5.2 Development and Field Testing of Panic Switch Based Safety Device for Cars for aiding women's safety.

The design and development of panic switch with facilities like tamper proof operation, driver authentication systems, audio/video recording, shout facility, AIS 140 ITS standard based design has been completed. This is a safety switch for the passengers (women) travelling through public transport like Cabs, Taxis and buses etc. The developed system has been extensively field tested on Delhi roads in real life situations. System performance has been satisfactory. The developed technology is being transferred to the companies for commercialization.

## 5.5.5.3 Open Source Computer Aided Design (CAD) Tools for Weaving of Banarasi Sarees

"DigiBunai", an open source Computer Aided Design (CAD) tool has been developed, demonstrated and deployed at five locations viz. Weavers Service Centre (WSC) and 4 Common Facilitation Centres of WSC in Varanasi for designing and weaving of Banarasi Sarees. A user workshop held at Amity School of Fashion Technology, Noida on Jan 31, 2019 for awareness building on CAD tool was attended by 30 participants (10 faculty members and 20 students). The first phase of project has been completed successfully. Further, on suggestions of the Working Group and Ministry of Textile, the capabilities of the tool are being enhanced for designing/weaving of other garments, better user interface, along with multi layered cloth, extra warp, electronic jacquard support and other weaving techniques.



DigiBunai™ 0.9.3 Alpha: Digital India Copration Open Source CAD Tool for Weaving

## 5.5.5.4 Development of Intelligent Transportation Systems (ITS) for Pedestrian Safety Enhancement and Emergency Vehicle Priority at Signalized Traffic Junctions.

The technology development, laboratory testing, prototype development of Pedestrian Safety Enhancement Controller (PeSCo) and Emergency Vehicle Priority system (EmSerV) have been completed and these were field tested on road junctions in Thiruvananthapuram. The technology on implementation may provide safer road crossing to Divyangs and will provide highest priority to the Emergency Service Vehicles like Ambulance, Fire services vehicles, Police etc. The technology is being transferred to companies for commercialization. The project has been completed.



Pedestrian Safety Enhancement (PeSCo) for Divyangs

## 5.5.5.5 Automated Machine Vision System for Leather Surface Quality Discriminant Function Analysis

The project has been initiated with an aim to develop an integrated online machine vision based inspection system for detection and classification of defects in finished leather. This may have features/components like colour variation analysis, Inspection table, scanner, illumination source, control and GUI software etc. System design and development of algorithms for pre-processing of the proposed automation are in progress.

### 5.5.5.6 Design and development of "Anti-Eve Teasing Device for Women Safety"

The project has been initiated with the objectives to design and development of a wearable women safety device to provide safety instantly. The proposed development is unique in nature as it could provide safety to women in case of distress without needing the physical help from others. Designing and development of prototype model of Anti-Eve Teasing Device are in progress.

### 5.5.6 Early Detection and Screening of Breast Cancer

Earlier high precision, reliable and fast response nano NTC powder based chip-in-glass thermal sensors were developed under EMCD. These sensors are now being used for development of a system for Early Detection and Screening of Breast Cancer by C-MET which can be used for a low cost initial screening for breast cancer in women by health service sector and only the suspected cases can be referred for further medical investigations, such as, costly MRI. The uniqueness of this technology is that the mass screening for breast cancer is possible at an affordable rate plus early detection of breast cancer has the potential to achieve 100% cure of the disease. Cost of the developed device is around ₹1.5 lakh which is only 1 by 100th cost of the current digital mammogram machines. No trained manpower is required for the operation of the device. The technology has now gone through clinical trials. The technology has been highly appreciated and awarded National Award on Outstanding Efforts for Women's Development through Application of Science and Technology (DST, 2018) and "Nari Shakti Puraskar" (Women Power Award) by President of India in Rastrapati Bhavan on 08-03-2019.
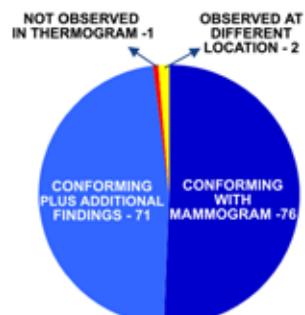


CMET breast cancer project
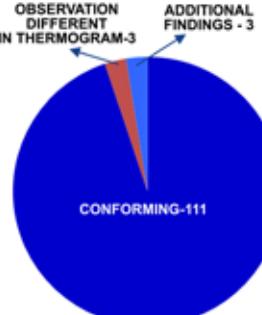


Awards received by project CI

## 5.5.7 Information Technology Research Academy (ITRA)

ITRA is an enabling programme initiated by Ministry of Electronics and Information Technology (MeitY), Government of India, to help build a national resource for advancing the quality and quantity of R&D in Information and Communications Technologies and Electronics and its applications in IT and related institutions across India. ITRA is operating as a division of Digital India Corporation.

ITRA has so far taken up projects in three focus areas, viz. (i) "Mobile Computing, Networking and Applications (**ITRA-Mobile**)"; (ii) "IT based Innovations in Water Resources Sustainability (**ITRA-Water**)"; and, (iii) "IT based Transformations in Indian Agriculture and Food (**ITRA-Ag&Food**)

**ITRA–Mobile:**

ITRA in the research area ITRA-Mobile targets applications of IT in Healthcare, Transport and Disaster Management. ITRA-Mobile projects are running in 31 institutions, involving 64 faculties and 98 Ph.D. students.

During FY 2018-19, ITRA-Mobile research community has published 12 research papers which has contributed to 383 till date in conferences and journals of international repute; number of courses were developed/modified and several workshops were conducted at associated institutions. ITRA-Mobile teams are working on 11 proof of concept (PoC) prototypes and technologies having potential for commercialization (start-ups or ToT). PoC teams were invited at various venues to showcase their technology to domestic and international investors and other potential stakeholders where these technologies were highly appreciated. Three startup companies have been registered out of the 17 technology prototypes viz. "SALCIT Technologies Pvt. Ltd.", "Formative Resilience Know-How Private Limited (ForkIT)" and "NexConnect" .

A showcase workshop is planned during the first quarter of financial year 2019-20 for technologies of ITRA-Mobile where potential stakeholders would be invited who would assess and help commercialize the technologies.

**ITRA-Water:**

ITRA in the research area ITRA-Water is focusing on the multifaceted challenge of sustainable access to water for all sectors. ITRA-Water projects are running in 23 institutions, involving 33 faculties and 38 Ph.D. students.

During FY 2018-19, ITRA-Water research community has contributed to research publications in conference/journal of international repute a number of courses were developed/modified and several workshops were conducted at associated institutions. A monsoon school was conducted at IISc Bangalore during July 2017, where eminent experts from India and abroad, along with other participants from SAARC countries participated. ITRA-Water teams are working on five proof of concept (PoC) prototypes and technologies having potential for commercialization (start-ups or ToT). PoC teams were invited at various venues to showcase their technology to domestic and international investors and other potential stakeholders where these technologies were highly appreciated. A weather/rainfall forecasting technology developed by IIT Gandhinagar under ITRA-Water Project M2M is being successfully used by IMD (India Meteorological Department) Government of India and has been launched on their website.

A showcase workshop is planned during the first quarter of financial year 2019-20 for technologies of ITRA-Water their commercialization. It would include potential stakeholders who would assess and help commercialize the technologies.

**ITRA-Ag & Food:**

ITRA in its third research area ITRA-Ag&Food aims to create collaborative, multi-institutional, inter-disciplinary teams to catapult the state of agriculture and food in India using IT, into a new orbit of

productivity. Two R&D team projects on various aspects of pigs and goats in North East India, were initiated at 14 institutions comprising 45 researchers. Amongst multiple achievements of the ITRA-Ag&Food projects, some technologies to name a few are: (i) An android application named **SwineApp** covering all the aspects of pig husbandry practice was developed and launched at Google Play Store, (ii) A multi-purpose restraining tool for goats and pigs has been developed and a patent has been applied for the same (iii) A low cost retinal imaging system has been developed for capturing retinal image of goats, (iv) Breed identification was successfully carried out for both pigs and goats by using Tensor Flow Neural Network for large dataset, (v) Income generation for the goat farmers has been initiated by UBKV West Bengal through formation of Goat Farmers' Federation in Cooch Behar District.

## Digitally Inclusive and Smart Community (DISC) project in R&D in IT Group

### Agriculture Quality Assessment Solutions

As part of "Digitally Inclusive and Smart Community (DISC)", C-DAC developed and deployed its various Agriculture Quality Assessment solutions, such as, Annadarpan - Smart for Quality Analysis of Raw and Parboiled Rice, Annadarpan - Dynamic for Quality Analysis of Pulses (e.g. Tur, Moong, Bengal Gram, Chana etc.), CT-VIEU for Quality Analysis of Dry Red Chilly and eQuality-VEG for Quality Assaying of different vegetables (like Potato, Tomato, Capsicum etc.). Thirty five units of Annadarpan System have been deployed in India including thirty FCI locations in Punjab, Haryana, Andhra Pradesh, Odisha, West Bengal, Chhattisgarh and Uttar Pradesh. Ten CT-VIEU systems are operational at different APMCs in Andhra Pradesh, Karnataka and Tamil Nadu. Annadarpan Dynamic and eQuality VEG system are operational at APMC, Hubli and Tapashi Mallik Krishak Bazar, Singur, West Bengal respectively. More than 250 personnel of FCI and 40 personnel of APMCs and AMCs have been trained to operate the systems.

## Deployment and Proliferation of BOSS

- BOSS 7.0: The current version of BOSS 7.0 is code named Drishti (Vision). It is coupled with GNOME Desktop Environment 3.22 version with wide Indian language support and packages relevant to the Government domain. This release aims at enhancing user experience in desktops and laptops.

- BOSS Mail Server: A Customized and secured BOSS mail server has been developed and deployed in Central University of Tamil Nadu, Thiruvarur. The mail server is integrated with LDAP server and is enabled for high availability requirements. The whole setup is installed on Meghdoot Cloud server in CUTN.

- Secure Terminal: Secured BOSS OS has been developed by C-DAC for the Secure Terminals. The secure OS is enabled with Hardware Root of trust and is designed to have full encrypted OS.

### eBasta

It is a framework to make the school books accessible in digital form as e-books. During the year, 68 new eBooks have been published on eBasta Portal and 1,151 teachers from 258 schools have been oriented in using eBasta technologies. 2,848 books have been published on the portal from 14 State Boards, NCERT, CBSE and a few private publishers and 5,183 teachers from 1,835 schools have been oriented in technologies including eBasta.

## Assessment and Monitoring Framework (AMF)

Assessment and Monitoring Framework developed by C-DAC helps teachers to manage the complex assessment activities in schools. From April 2018 till date, around 488 teachers from 102 schools have been oriented in using technologies including AMF. Talks are in final stages for deployment of AMF in 400 schools of Rayat Shikshan Sanstha. 4,987 teachers from 1,766 schools have been oriented in technologies including AMF.

### 5.5.8 E-waste Recycling

- **Recovery of precious metals from electronic waste from PCBs:**

  The printed circuit boards, which constitute 3-5% of e-waste, are considered as rich source of precious metals, such as, gold, silver and palladium and base metal copper. However, in addition to precious metals, it contains toxic substances, such as, lead, mercury, bromine, cadmium and chromium. Hence,

proper processing is essential to ensure that these materials are not released into the environment. C-MET Hyderabad is jointly executing a project with M/s E-Parisaraa, Bangalore financially supported by Ministry of Electronics and Information Technology and Karnataka Institute of Biotechnology and Information Technology for the development of process technology for the recovery of valuable metals from PCBs using environment friendly methods.



E-Waste Demo Plant at C-MET Hyderabad

Electro-Refining unit (5kg/day Deposition rate)          Anode Mud Leaching Unit

## Demonstration of the prototype for PCBs recycling facility at C-MET, Hyderabad

Prototype systems for the depopulation, shredding, pyrolysis, calcinations, smelting and electro refining are developed and successfully demonstrated up to 100 kg of e-waste per day (3.5 MT per shift) capacity. This technology is ready for transfer to interested industries. A full scale pilot plant is being established along with industry partner M/s E- Parisaraa, Bangalore for a capacity of 1 tonne printed circuit boards per day. C-MET technology involves a combination of pyrometallury and hydrometallurgical operations wherein quantity of liquid effluents has been made minimal. Unique flux combination has been arrived at for effective separation of metal and slag. Entire process is environmentally sound as the evolved gases are thermally processed for the complete destruction as per the CPCB norms.

A demonstration plant is being established at CMET Hyderabad in which 100kg PCBs can be processed per day and recover copper, gold and silver. Interested parties can bring their e-waste/PCBs and avail the services on chargeable basis. This shall encourage small entrepreneurs and informal sectors for adapting recycling practices and create better ecosystem for e-waste recycling economy.



## C-MET Hyderabad E-waste recycling Process and Extracted metal from spent PCBs

A demonstration plant is being established at E-Parisaraa, Bangalore in which 1,000 kg PCBs/per shift (i.e.35MT of e-waste) can be processed and recover copper, gold and silver. Indigenously designed and fabricated low cost furnace has been used for this and successfully smelted to recover Black Copper. Indigenously designed and fabricated low cost "Gas Cleaning System" for the furnace has been used.

Refining of Black Copper to anode grade copper has been successfully done with suitable fluxes. Scaled up electro refining process using anode grade copper to 99.9% pure copper along with the collection of anode slime rich in precious metals is being demonstrated. Anode slime processing for the recovery of precious metals has been successfully demonstrated. Further scale up with continuous running of the smelter, refining of Black Copper, multi stage electro refining are being planned next with the support from C-MET.

Scaled up Electrolysis of Anode Copper to 99.9% pure copper, collection of precious metals rich anode slime.



Indigenously designed and fabricated low cost furnace for smelting of PCBs.

**Electronic waste Awareness programme:** Lack of awareness amongst the citizens about the ill-effect of e-waste recycling in informal sector is one of the serious challenges to our society. An "Awareness Programme on Environmental Hazards of Electronic Waste" has been initiated since March 2015 under the aegis of Software Technology Parks of India (STPI), New Delhi to create awareness among the public about the hazards of e-waste recycling by the unorganised sector and to educate them about alternate methods of disposing their e-waste. The programme stresses the need for adopting environment friendly e-waste recycling practices. The programme is in Phase –II and till March, 2019, 1,230 GreenE Champions have been trained under training of trainers, 9,02,890 participants took part in workshops and activities, 21.7 crore audience have been covered under cinema campaign

and 5,553 Government employees have been trained on various aspects of dealing e-waste under office environment. For collection of e-waste eco-bin deployment has been taken up. The progress of the programme is updated at regular interval on http://www.greene.gov.in/. The dedicated website and app containing resource materials, facebook, twitter page and youtube channel have been developed for wider dissemination information and promotional campaign. Attempts are now being made to develop course content for the SWAYAM digital platform. University Grants Commission (UGC) has accepted and recommended course content on e-waste developed under the programme to Ministry of Human Resource Development (MHRD) for integration of the contents in its courses.

# Internet Governance and Security of Cyber Space



## 6.1 Internet Governance

**Overview:**

Internet Governance, broadly defined, is the development and application by Governments, private sector and civil society, in their respective roles, of shared principles, norms, rules, decision making procedures and programmes that shape the evolution and use of the internet. It includes development and coordination of technical standards, operation of critical infrastructure and public policy issues.

Conceptually Internet Governance includes following layers

- Physical infrastructure layer
- Code or logical layer
- Content layer
- Security layer

Internet Governance involves Internet Protocol addressing, Domain Name System (DNS), Routing, Technical Innovation, Standardization, Security, Public Policy, Privacy, Legal Issues, Cyber Norms and issues pertaining to intellectual properties and taxation.

### 6.1.1 Achievements:

Some of the significant achievements of MeitY include representation of India's Public Policy concerns on

global platforms, creating awareness on Internet Governance, encouraging greater participation in Internet Engineering Task Force (IETF) working groups, engagement with Internet Society (ISOC) and promotion of multistakeholder model of Internet Governance in India.

### 6.1.1.1 Engagement in International Forums/ Meetings:

**Engagement with ICANN:** MeitY is actively involved with the activity of ICANN and participates in its proceedings through GAC (Governmental Advisory Committee) and other public engagement fora. GAC's key role is to advise ICANN on issues of public policy, especially where there may be an interaction between ICANN's activities or policies and national laws or international agreements. The comments of various international fora/discussion can be accessed at www. indiaig.in

- **Internet Governance Forum (IGF):** This forum serves to bring people together from various stakeholder groups as equals, in discussion on public policy issues relating to the internet. India's concerns on the issues of public policy of the internet and its governance are appropriately voiced in meetings of the IGF through regular participation and multi-lateral and bi-lateral meetings. With the renewal of its mandate by the United Nations in December 2015, the IGF consolidated itself as a platform to bring together various stakeholder groups as equals. While there are no negotiated outcomes, the IGF informs and inspires those with policy making power in both the public and private sectors. At their annual meetings, delegates discuss, exchange information and share good practices with each other. The IGF facilitates a common understanding on how to maximize internet opportunities and address risks and challenges that may arise. IGF 2017 meeting was held from December 17-21, 2017 at

Geneva, Switzerland. MeitY was represented in IGF 2017.

2. **Multistakeholder consultations:** India supports the multistakeholder model of Internet Governance, which involves all stakeholders and helps to preserve the character of the internet as unified, dynamic engine for innovation and encourages equity and inclusion.

### 6.1.1.2 Research, Development and Awareness Agenda

a) **An Ecosystem for Active Participation in Internet Standard Organisations implemented by Centre for Development of Advanced Computing(C-DAC), Bangalore**

The primary objective is to get involved in the process of Internet Standard development by developing internal competencies in order to propose and contribute to select areas of internet security, create and foster focus groups to work on specific technical issues of interest concerning Internet Standards, propose new standards and contribute to ongoing drafts in areas related to internet security, encouraging direct participation in the meetings of the Internet Organisations, engage with academic community (students and faculty), industry and civil society in order to promote their participation in Internet Organisations and awarding scholarships and fellowships to deserving candidates in order to encourage participation in IETF activities and to prepare for hosting IETF or similar meetings, in India, in future. Implementing agency is contributing on ongoing drafts - tls, uta, tokbind, ace, oauth, secevent and initiating new draft - Digital Tokens. Awareness programmes have been conducted, expert meetings were organised and IIREF (Indian Internet Research and Engineering Forum) established. Fellowships have been awarded to attend IETF meetings.

**b) Internet Research and Policy Hub- Centre for Communication Governance at National Law University, Delhi**

The Centre for Communication Governance (CCG) aims to direct its research expertise at filling the knowledge gaps in internet policy clusters identified by the 2014 UN Commission on Science and Technology for Development (CSTD) mapping report, with a view to build capacity and inform policymaking among Indian stakeholders.

**c) Activities related to India Internet Governance Forum (IIGF) carried out by the National Internet Exchange of India(NIXI)**

The major objectives include:

i. To provide a space for multi-stakeholder dialogue between Governments, the private sector, the technical community, academia and civil society organisations on the issues related to Internet and Internet based services/ applications;

ii. To inform stakeholders on the issues and trends observed in the debates and discussions at the global IGF meetings;

iii. To consolidate India's views and initiatives on the issues of concern for internet proliferation and its governance that could be highlighted in the Internet Governance Forum meetings;

iv. To arrive at national strategies and action plan for proliferation and governance of Internet and Internet based services in the country;

v. To deliberate on policy areas vis-à-vis internet for governance and inclusive development.

Multistakeholder consultations are being conducted on various issues like IETF capacity building, CCWG accountability, new gTLD Programme, WHOIS, 3 letter country

and territory name etc. Studies have been conducted for providing inputs/comments on various technical and public policy issues at global fora like WGEC, IGF and GAC/ ICANN. Efforts are being made in the areas of internationalised domain names and universal acceptance.

**d) MeitY Chair for Internet Policy: Value, Security and Governance implemented by Indian Council for Research on International Economic Relations (ICRIER).**

The objective is to provide MeitY with evidence based research that will build capacity for India's participation in multiple international fora, while strengthening domestic policy. The research and related activities will be conducted under three broad themes that are as follows:

a. Assessing the value generated by the internet
b. Enabling a secure and open internet
c. Developing a framework for internet governance

A research paper on India's Domain Name Market, Data Flows and Data Localization: An Economic Analysis and a policy brief on .in ccTLD are being prepared.

Apart of the above projects, MeitY is monitoring and reviewing the following projects that are funded by National Internet Exchange of India:

**I. Development and Deployment support of C-DAC software APIs for 8 languages implemented by CDAC Pune.**

IDN policy framework is implemented in the form of software APIs. APIs for 15 scheduled languages of India have been integrated in the .Bharat domain names registration framework. Now development and deployment of software APIs for 8 languages, namely, Assamese, Kannada, Kashmiri, Malayalam, Odia (Oriya), Sanskrit, Santali and Sindhi are in progress through this project.

**II. ICANN Research and Multistakeholder Engagement Assistance Programme" by Indian Council for Research on International Economic Relations (ICRIER).**

The Programme has two main components, viz., GAC Research Support and ICANN Multistakeholder Engagement. The key deliverables include Stakeholder Maps, Position Notes for GAC Issues, Policy Issues and Options Papers for GAC, Research Papers and Pre-Meeting Briefing Sessions, Mailing List.

**III. Centre of Excellence in DNS Security implemented by C-DAC Bangalore**

The objective of the project is to set up a model centre and provide thought leadership in DNS and DNS security related technologies, conduct high-end research in DNS security, build internal competencies in DNS security by offering advanced training programmes, and establish a DNS test-bed for research and training. Project will offer advanced training programmes with knowledge dissemination.

## 6.2 National Internet Exchange of India (NIXI)

NIXI is a not for profit organisation set up under section 25 of the Companies Act, 1956 (now section 8 under Companies Act, 2013) for peering of ISPs amongst themselves and routing the domestic traffic within the country, with seed funding from Ministry of Electronics and Information Technology. NIXI is performing the following three activities.

- Internet Exchange
- .IN Registry and Internationalised Domain Names (IDNs)
- National Internet Registry (NIR)

**Internet Exchange:** Eight Internet Exchange Nodes are functional at Delhi (Noida), Mumbai, Chennai, Kolkata, Bengaluru, Hyderabad, Ahmedabad and Guwahati.

The Internet Exchange nodes have been successful in ensuring peering of ISPs amongst themselves for the purpose of routing the domestic traffic within the country, instead of taking abroad, thereby resulting in better quality of service (reduced latency) and reduced bandwidth charges for ISPs (by saving on international bandwidth). The maximum volume of Internet traffic being handled by NIXI at present is 142.9 Gbps.

All functional NIXI nodes are IPv6 ready. NIXI also undertakes training and workshops for network managers and other technical engineers in co-operation with Asia Pacific Network Information Centre (APNIC).

**.IN Registry and Internationalised Domain Names (IDNs):** Since 2005, NIXI also manages the .IN Registry (www.registry.in ). At present, 128 registrars have been accredited to offer .IN domain name registrations worldwide to customers. This has helped proliferation of web hosting in the country and promotion of Indian language content on the Internet. Over 2.02 million .IN domain names have been registered till March 2019.

IDN's in Hindi, Bodo, Dogri, Konkani, Maithili, Marathi, Nepali, Sindhi, Bengali, Gujarati, Manipuri, Punjabi, Tamil, Telugu and Urdu languages were launched during the year 2014-15 and 10,000 IDNs domain names have been registered till date. NIXI has recently got delegation of all remaining languages (Assamese, Kannada, Malayalam, Oriya, Sanskrit, and Santali in Devanagari Script and Kashmiri and Sindhi in Perso-Arabic Script) from ICANN.

**National Internet Registry (NIR):** Since March, 2012 NIXI is also running the National Internet Registry (NIR) for India named as Indian Registry for Internet Names and Numbers (IRINN). IRINN is responsible for allocation of IP addresses and AS numbers within the country. As on March 2019 over 2,700 affiliates have joined IRINN. Out of these 496 affiliates have taken IPv6 as well as IPv4.

## 6.3 Security of Cyber Space

Cyber space is a complex environment of people, software, hardware and services on the internet. Cyberspace today is the common platform used by citizens, civil society, businesses and Governments for communication and dissemination of information. Cyberspace has distinct and unique characteristics as compared to physical space. The cyberspace is virtual, borderless and offers complete anonymity. As a result, attacks can be launched from anywhere in the world with limited possibility of trace back and positive attribution.

Cyberspace has been facing many security challenges due to emerging cyber threats and widespread use of cyberspace for social media and for digital payment. Government of India has taken several legal, technical and administrative policy measures for addressing cyber security. This includes National Cyber Security Policy (2013), Framework for enhancing Cyber Security (2013), enactment of Information Technology (IT) Act, 2000, setting up of Indian Computer Emergency Response Team (CERT-In) for 24x7 cyber incident response and National Critical Information Infrastructure Protection Centre (NCIIPC) for protection of critical information infrastructure under the IT Act, 2000, research and development (R&D) in cyber security and capacity building in cyber security.

### 6.3.1 Cyber Law

Comprehensive legal framework in terms of IT Act 2000 and its amendment provides for:

- Collection and sharing of information related to cyber incidents (sections 69B and 70B) for effective proactive/reactive actions by CERT-In and investigative actions by law enforcement agencies

- Prescription and implementation of security best practices and guidelines to prevent occurrence

and recurrence of security incidents (section 43A and 70B)

- Protection of critical information infrastructure (section 70A)

- Effective deterrence provisions (sections 43, 43A, 66, 66B, 66C, 66D, 66E, 66F, 67, 67A, 67B, 72 and 72A) in terms of compensation/penalty and punishment to deal with cyber crimes, such as, damage to computer system, computer related offences, sensitive personal data leak, identity theft, cheating by personation, violation of privacy, cyber terrorism, online pornography including child pornography, breach of confidentially and privacy, breach of lawful contract etc.

### 6.3.2 National Cyber Security Policy

National Cyber Security Policy was released for public use in July 2013. The policy caters to the cyber security requirements of Government and non-Government entities as well as large, medium and small enterprises and home users. The policy recognises the need for objectives and strategies that need to be adopted both at the national level as well as international level. The policy aims at facilitating creation of secure computing environment and enabling adequate trust and confidence in electronic transactions and also guiding stakeholders' actions for protection of cyber space.

### 6.3.3 Indian Computer Emergency Response Team (CERT-In)

**Indian Computer Emergency Response Team (CERT-In)**

The Indian Computer Emergency Response Team (CERT-In) is a statutory organisation under Ministry of Electronics and Information Technology, Government of India. CERT-In has been designated under section 70B of the Information Technology Act, 2000 to serve as the national agency to perform the following functions in the area of cyber security:

- Collection, analysis and dissemination of information on cyber security incidents

- Forecast and alerts of cyber security incidents

- Emergency measures for handling cyber security incidents

- Coordination of cyber security incident response activities

- Issue guidelines, advisories, vulnerability notes and white papers relating to information security practices, procedures, prevention, response and reporting of cyber incidents

- Such other functions relating to cyber security as may be prescribed.

CERT-In creates awareness on security issues through dissemination of information on its website (http://www.cert-in.org.in) and operates 24x7 incidence response Help Desk. CERT-In provides incident prevention and response services as well as security quality management services. The activities carried out by CERT-In during April 2018 - March 2019 comprised the following:

| Activities | Numbers (April 2018 to March 2019) |
|---|---|
| Incidents handled | 2,74,465 |
| Vulnerability Notes | 273 |
| Indian Website Defacement | 23,282 |
| Advisories | 48 |
| Security Alerts | 235 |
| Security Drills | 4 |
| Trainings | 26 |

**Cyber Security Assurance**

Under Security Assurance Framework, Indian Computer Emergency Response Team (CERT-In) has created a panel of 'IT security auditing organisations' for auditing, including vulnerability assessment and penetration testing of computer systems, networks

and applications of various organizations of the Government, critical infrastructure organizations and those in other sectors of Indian economy. CERT-In has empanelled 76 auditors, after periodic review, to carry out information security audit, including vulnerability assessment and penetration test of the networked infrastructure of government and critical sector organizations. Government and critical sector organizations are implementing the security best practices in accordance with ISO 27001 standard and as per the advice issued by CERT-In. Services of CERT-In empanelled IT security auditors are being used to verify compliance.

**Cyber Crisis Management Plan**



CERT-In, MeitY has formulated latest version of a Cyber Crisis Management Plan (CCMP)-2019 for countering cyber attacks and cyber terrorism for implementation by all Ministries/Departments of Central Government, State Governments/UTs and organizations under their administrative control. Along with the CCMP-2019, CERT-In has developed "Guidance Framework for CCMP" which will enable various entities including Central Government Ministries/Departments/States/ UTs and entities under their administrative control to prepare and implement their own CCMP. "Cyber Crisis Management Plan -2019" and "Guidance Framework for CCMP" were released by Hon'ble Minister for Electronics &IT, Law & Justice on 22nd February 2019. CCMP outlines a framework for dealing with cyber related incidents for a coordinated, multi-disciplinary and broad based approach for rapid identification, information exchange, swift response and remedial actions to mitigate and recover from malicious cyber

incidents. CERT-In has conducted eight workshops since April- 2018 to appraise various organizations under the Central Ministries/States/UTs about the CCMP implementation and assistance is being provided to them with regard to implementation of CCMP. Tilll date, 68 CCMP enabling workshops have been conducted.

**Indian Cyber Crisis Exercises (ICCE)**

Indian Cyber Crisis Exercises (ICCE) are being conducted by the Government to help the organisations to assess their preparedness to withstand cyber-attacks. These exercises have helped tremendously in improving the cyber security posture of the information infrastructure and training of manpower to handle cyber incidents, besides increasing the cyber security awareness among the key sector organizations. Till date CERT-In has conducted 41 cyber security exercises of different complexities, including table top exercises, with participation from more than 300 organizations covering various sectors of Indian economy from Government/Public/Private i.e. defence, paramilitary forces, space, atomic energy, telecommunications (ISPs), finance, power, oil & natural gas, transportation (Railways & Civil Aviation), IT/ ITeS/BPO sectors and State Data Centres. 12 cyber security exercises including table top exercises have been conducted by CERT-In during the period April-2018 to March-2019 to enhance the preparedness of participants in handling cyber security threats. CERT-In conducted a joint cyber security exercise along with RBI on July 12, July 30 and November 16, 2018 for various commercial banks to enable them to assess their emergency incident response preparedness. CERT-In also conducted a joint workshop and table top exercise on cyber vectors of hybrid influencing and countering hybrid influencing on 16th & 17th August 2018 with the European Centre of Excellence for Countering Hybrid Threats (Hybrid COE). CERT-In carried out a table top exercise (CCTTX) for Board Members of Banks on 14th November 2018 and 1st February, 2019 respectively. It also carried out CCTTX for State Government officials of Andhra Pradesh on 18th March 2019.

CERT-In participated in Asia Pacific CERT(APCERT) drill which was conducted on 7th March 2018 to test the response capability of leading Computer Security Incident Response Teams (CSIRT) from the Asia Pacific economies. The theme of the APCERT drill 2018 was "Data Breach via Malware on IoT". 27 CSIRT teams from 20 economies (Australia, Bangladesh, Brunei Darussalam, People's Republic of China, Chinese Taipei, Hong Kong, India, Indonesia, Japan, Korea, Lao People's Democratic Republic, Macao, Malaysia, Mongolia, Myanmar, New Zealand, Singapore, Sri Lanka, Thailand and Vietnam) of the APCERT participated in the drill.

CERT-In participated in ASEAN CERTs Incident Response Drill (ACID), 2018 which was conducted on 5th September 2018, with the objectives of strengthening cyber security preparedness of ASEAN member states and dialogue partners in handling cyber incidents and reinforce regional coordination drills to test incident response capabilities. This year the theme of the drill was "System Vulnerabilities and Cryptocurrency Mining".

CERT-In participated in the Organization of Islamic Cooperation – Computer Emergency Response Teams (OIC-CERT) drill on 18th September 2018. This year, theme of the exercise was "Crypto-currencies Risks and Emerging Threats".

Two cyber crisis table top exercises were exclusively planned and executed by CERT-In for the North East States. Table top exercise involving participants from different State Government departments were held in Gangtok, Sikkim on 23rd June 2018 and in Agartala, Tripura on 7th July 2018. Exercises were attended by more than 110 officials. Scenario of exercises were focussed on responding to cyber threats and enabling States to draft cyber crisis management plan.

CERT-In was given CISO MAG award on 26th March 2019 for special recognition in cyber security due to its contribution in cyber security exercises and Cyber Swachhta Kendra.

## Cyber Swachhta Kendra (Botnet Cleaning and Malware Analysis Centre)

"Cyber Swachhta Kendra" is operated by Indian Computer Emergency Response Team (CERT-In) as part of the Government of India's Digital India initiative under the Ministry of Electronics and Information Technology (MeitY). The Cyber Swachhta Kendra (CSK) has been launched on 21 February 2017.

Cyber Swachhta Kendra is a citizen centric service provided by CERT-In, which extends the Hon'ble Prime Minister's vision of Swachh Bharat to the cyber space. Its goal is to create a secure cyber space by detecting botnet infections in India and to notify, enable cleaning and securing systems of end users so as to prevent further infections. By providing free tools and security best practices for citizens, the Cyber Swachhta Kendra helps users to securely carry out digital payments, secure their personal computers, broadband routers, mobile phones, etc. thereby enhancing citizens' trust in ICT while ensuring a cleaner and safer digital India. At present, CSK is covering 90% of the subscriber base for notifications on botnet/malware infection systems.

Currently, 203 organizations from multiple sectors like telecom (ISPs), finance and insurance, stocks, transport, power, academia and Government are also collaborating and being benefited by using CSK services.

During the year 2018-19, 385 types of botnet/malware were tracked and reported to collaborating ISPs/organizations. Malware/Botnet infections include Bots affecting desktop systems, IoT bots, ransomware, cryptocurrency miners, information stealing trojans, banking trojans etc.

Free Bot Removal Tool (FBRT) is being regularly updated with signatures/detections for recent botnet/malware observed to enable cleaning of infected systems 8.97 lakh downloads of Free Bot Removal Tool (FBRT) had taken place till 31 March, 2019. Further, systems with vulnerable services were tracked and reported to organizations alongwith remedial measures.

"Cyber Swachhta Kendra" was awarded as one of 51 "Gems of Digital India 2018" in June 2018. "Cyber Swachhta Kendra" also awarded "SKOCH Order-of-Merit and Gold Award" for Cost Effective Cyber Security Model in December 2018. Recently, CSK CERT-In was the winner for Special Recognition in Cyber Security at CISO MAG Awards India 2019.

## Cyber Forensics

Cyber Forensics Lab at CERT-In is equipped with the equipment and tools to carry out processing and analysis of the raw data extracted from the digital data storage and mobile devices using digital forensic techniques. Cyber Forensics Lab is being utilised in investigation of the cases of cyber security incidents and cyber crimes, submitted by Central and State Government Ministries/Departments, Public Sector Organisations, Law Enforcement Agencies, etc. Scientists at Cyber Forensic Lab impart training through training workshops organised by CERT-In on computer forensics and mobile device forensics through lectures, demonstrations and hands on practical sessions, which covers seizing, preservation, processing and analysis of the raw data extracted from the digital items. CERT-In also supports other institutes in imparting trainings on various aspects of cyber forensics by delivering lectures along with demonstrations.

## Security awareness, skill development and training

In order to create security awareness within the Government, public and critical sector organizations, CERT-In regularly conducts trainings/workshops to train officials of Government, critical sector, public sector industry, financial & banking sector on various contemporary and focused topics of cyber security. During 2018-19, CERT-In has conducted 26 trainings till 31 March, 2019 (including a separate training programme for women IT officers) on various specialized topics of cyber security. 925 officers

including system/network administrators, database administrators, Application developers, IT managers, Chief Information Security Officers (CISOs)/Chief information officers (CIOs), and IT security professional have been trained. Workshop on Secure Coding for Android Application Developers was conducted in Delhi and Bengaluru in collaboration with experts from JPCERT (Japan CERT).

CERT-In conducted a session on 'Cyber Security Attack Types & Mechanisms" at the Election Commission of India's regional Cyber Security Workshop at Chandigarh, Punjab on 13th June 2018, and at Ranchi, Jharkhand on 31st August 2018 for the States of north and central zone respectively. This one-day workshop was organised by the Chief Electoral Officer, to safeguard and secure voters' information data and to make its officials aware about security measures. The workshop was attended by the Chief Electoral Officers of the eight northern States and five central States along with about 500 participants.

### National Cyber Coordination Centre (NCCC)

Continuously evolving cyber threat landscape and its impact on well being of information technology, national economy, and cyber security necessitates the need for near-real time situational awareness and rapid response to cyber security incidents. Realizing the need, Government has taken steps to set up the National Cyber Coordination Centre (NCCC) to generate macroscopic views of the cyber security breaches and cyber security threats in the country. The centre will scan the cyberspace in the country at meta data level and will generate near real time situational awareness. NCCC is a multi-stakeholder body and is being implemented by Indian Computer Emergency Response Team (CERT-In). The centre will facilitate various organizations and entities in the country to mitigate cyber attacks and cyber incidents on near real time basis. Phase-1 of NCCC has been operationalised in July, 2017. Steps have been taken for the implementation of the next phase of NCCC.

### Up gradation of Infrastructure

The web servers have been upgraded to enhance the response time of the web site. Additional security measures have been put into place in order to provide protection from potential hacking attempts. Redundant machines have been added in clusters at the main and disaster recovery sites to provide zero downtime for mail availability. Firmware of web application firewalls has been updated in order to thwart attempts of intrusions and handle zero day attacks. Infrastructure at the disaster recovery operations has been upgraded with deployment of state of art DDoS security solution, deployment of enhanced bandwidth and behaviour based attack protection.

### Proactive Threat Intelligence Sharing Platform

Collection, analysis and timely exchange of threat intelligence and information enables proactive actions by all stakeholders to detect and prevent cyber attacks. Towards this, CERT-In is establishing a Cyber Threat Intelligence Sharing Platform to collect, correlate, enrich, contextualize, analyze, integrate, and share threat intelligence and information with partner entities in real time. The shared data will enable recipients to automate workflows that streamline the threat detection, management, analysis, and defensive process and track it through to completion. The platform leverages latest global standards to share the threat intelligence data.

### Cooperation and Collaboration

Strengthening cooperation with all stakeholders to effectively deal with cyber security issues has been one of the main focus areas of the Government. This aspect is being dealt with by way of security cooperation arrangements in the form of Memorandum of Understanding (MoU) between Indian Computer Emergency Response Team (CERT-In) and its overseas counterpart agencies that are willing to work together and share information in a timely manner for preventing cyber attacks as well as collaborating for providing

swift response to such incidents. At present such MoUs have been signed with counterpart agencies/CERTs of United States of America (USA), United Kingdom, Japan, South Korea, Australia, Malaysia, Singapore, Canada, Vietnam, Uzbekistan, Bangladesh, Seychelles and Kingdom of Morocco and Finland.

CERT-In is regularly coordinating with leading service providers and product vendors within and outside the country to obtain advance information on latest cyber threats and attack trends and devise appropriate proactive and preventive measures.

CERT-In is a member of Steering the Committee of Asia Pacific CERT ( APCERT). CERT-In is the convener of two working groups across APCERT, namely, "IoT Security Working Group" and "Secure Digital Payments Working Group" to address security threats and evolve best practices to secure these domains.

CERT-In is a member of Forum of Incident Response and Security Teams (FIRST).

**International Event Participation by CERT-In**

1) The Second Security, Stability, and Resiliency (SSR2) of the Domain Name System (DNS) Review is mandated by Internet Corporation for Assigned Names and Numbers (ICANN)Bylaws Section 4.6(c) to examine how effectively ICANN is meeting its commitment to enhance the operational stability, reliability, resiliency, security and global interoperability of the systems/processes (internal/external) that affect the Internet's unique identifiers. The SSR Review Team is reviewing the extent to which ICANN has successfully implemented its security efforts, the effectiveness of the security efforts to deal with actual and potential challenges and threats to the security and stability of the DNS, and the extent to which the security efforts are sufficiently robust to meet future challenges and threats to the security, stability, and resiliency of the DNS, consistent with ICANN's Mission. The SSR Review Team also reviews the extent

to which prior SSR Review recommendations have been implemented and the extent to which implementation of such recommendations has resulted in the intended effect. CERT-In is a contributing member of this review group.

2) The Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies (WA) has been established in order to contribute to regional and international security and stability, by promoting transparency and greater responsibility in transfers of conventional arms and dual-use goods and technologies, thus preventing destabilising accumulations. Participating States seek, through their national policies, to ensure that transfers of these items do not contribute to the development or enhancement of military capabilities which undermine these goals, and are not diverted to support such capabilities.

India joined Wassenaar Arrangement (WA) on 8th December, 2017 as its 42nd Partcipatng State (PS).

CERT-In is participating in areas pertaining to Internet of Things, Connected Devices and Post Quantum Cryptography.

3) APCERT Annual General Meeting (AGM) & Conference 2018 from 21st October 2018 to 24th October 2018 was hosted by National CERT of China (CNCERT/CC) in Shanghai, China.

Technical paper on Indian Cyber Exercises was presented by CERT-In, in the APCERT 2018 conference. CERT-In shared the journey, experiences and lesson learned from conducting cyber security exercises in India and provided a comparative analysis of the Indian Cyber Crisis Exercise (ICCE) with regional & international exercises.

4) CERT-In interacted with various countries' CERT's/ Security Teams at an event in Helsinki, Finland regarding sharing of cyber threat intelligence and handling of cyber security situations/abuse

during 10-12 September 2018. All participating organizations shared their respective case studies related to the action performed for cyber threat intelligence exchange in their respective countries.

5) CERT-In participated in the 3rd edition of cyber security summer boot camp 2018 training from 17 to 28 July 2018 at León, Spain. the training was focused on learning cyber threat intelligence, intelligence research, mobile threat research, digital forensics, incident response and malware research.

6) CERT-In was an observer at the NATO "Cooperative Cyber Defense Centre of Excellence" organised cyber defense exercise "Locked Shields 2018". Locked shields is the world's largest and most complex international technical cyber defense exercise involving around 4,000 virtualised systems and more than 2,500 attacks altogether. Focus of the exercise was to enhance communication and coordination between technical team and strategic decision makers during cyber attacks/crisis.

7) CERT-In is a participating and contributing task force member in the Cyber Incident Management and Critical Information Protection Working Group of the Global Forum for Cyber Expertise (GFCE), a global platform for countries, international organisation and private companies to exchange best practices and expertise on cyber capacity building by indentifying successful policies, practices and ideas so as to multiply these on a global level.

### 6.3.4 Cyber Surakshit Bharat

The "Cyber Surakshit Bharat" (CSB) programme was initiated in partnership with industry consortium with the objective to educate and enable the Chief Information Security Officers (CISOs) and broader IT community of Central/State Governments, Banks and PSUs, to address the challenges of cyber security. The technical content of the training was developed after intense discussion with Industry consortium. The training is being conducted in 6 cities to train and enable around 1,200 officials. As on 31 December 2018, nine batches of training covering 345 CISOs/officials have already been organised in different cities and calendar for 3 more batches up to June, 2019 have been announced.



### 6.3.5 Grand Challenge for Start-ups

Grand Challenge for Startup in the area of the cyber security has been conceptualized with the objective to promote innovation and entrepreneurship culture in the country to give an opportunity for entrepreneurs and researchers to work on a real big problem of cyber security and come out with a world class product. While solving the problem Government will facilitate them with the mentorship as well as monetary support during the product development life cycle. Over all execution of Grand Challenge will be done in multiple stages which include identification of a problem statements, constitution of expert committee and jury panel, launch of the event, invitation of proposals from start-ups, evaluation of proposals by jury and identification of 12 start-ups to develop the solution. The proposal has been approved and Data Security Council of India (DSCI) is acting as partner.

## 6.3.6 Notification for Preferential Market Access for Cyber Security Products

In furtherance of the Public Procurement (Preference to Make in India) Order 2017 notified by Department of Industrial Policy and Promotion (DIPP) vide notification No. P-45021/2/2017-B.E.-II dated 15.06.2017 and partially modified order no No.P-45021/2/2017-PP(BE-II) dated 28.05.2018, to encourage 'Make in India' and to promote manufacturing and production of goods and services in India with a view to enhancing income and employment, Ministry of Electronics and Information Technology (MeitY) notified an order on 2nd July 2018 for promoting indigenous cyber security products. As per the notification cyber security being a strategic area, preference shall be provided by all procuring entities of Central Governments to domestically manufactured/ produced cyber security products. The nominations have been invited from the Indian companies for their products to prepare a categories of the products which can be brought under the purview of this notification.

### 6.3.7 R&D Projects under NCCC

**National Cyber Coordination Centre (NCCC)** is being implemented by Indian Computer Emergency Response Team (CERT-In) with the aim to generate near real-time situational awareness, pro-active threat detection and rapid response at national level. NCCC aggregates cyber threat related information from various identified sources in the country for near real time threat assessment that will help in analysis and generation of timely actionable alerts on different aspects of threats affecting national security. The centre will help in securing the cyber space and strengthening the cyber security posture in the country. To generate situational awareness and pro-active threat detection, imported commercial tools are being used. Since cyber security is a strategic area, two R&D projects for development of indigenous tools to be used in NCCC, have been funded under NCCC as described below:

**(i) Scalable Attack data capturing and analysis framework for Cyber Threat Intelligence**- The objective of the project is creation of scalable framework for attack capturing and analysis. This will result in the nation-wide deployment of honey-pot sensor and creation of adaptive framework for attack modeling and generation of cyber threat intelligence. So far threat capturing honey-pot sensors have been -deployed in 22 locations. Framework for attack modeling and generation of cyber threat intelligence has been developed and its integration with NCCC central location is being tested.

**(ii) Development of Big Data based indigenous Security Information and Event Management (SIEM) and integrated Security Analytics for detection of Security Attacks** - The objective of the project is to create an indigenous Security Information and Event Management (SIEM) system with integrated big data analytics to derive situational awareness in Indian cyber space. The system will also integrate with indigenously developed Traffic Flow Analytics, DNS Analysis and BGP attack detection systems. The system (SIEM) is now ready to be installed at central location of NCCC and at other locations/organisations identified by CERT-In.

### 6.3.8 National Critical Information Infrastructure Protection Centre (NCIIPC)

**National Critical Information Infrastructure Protection Centre (NCIIPC)** has been has been set up to serve as national agency in respect of Critical Information Infrastructure Protection as per the provisions of section 70A of the Information Technology Act, to enhance the protection and resilience of nation's critical information infrastructure by operating a 24x7 and mandating security practices related to the design, acquisition, development, use and operation of information resources.

## 6.4. Initiatives towards Security in Digital Payments

i.  The Indian Computer Emergency Response Team (CERT-In) issues alerts and advisories regarding latest cyber threats and countermeasures on regular basis to ensure safe usage of digital technologies. Regarding securing digital payments, 28 advisories have been issued for users and institutions.

ii. All authorised entities/banks issuing PPIs in the country have been advised by CERT-In through Reserve bank of India to carry out special audit by empanelled auditors of CERT-In on a priority basis and to take immediate steps thereafter to comply with the finding of the audit report and ensure implementation of security best practices.

iii. Government has issued guidelines for Chief Information Security Officers (CISOs) regarding their key roles and responsibilities for securing applications/infrastructure and compliance.

v.  All organisations providing digital services have been mandated to report cyber security incidents to CERT-In expeditiously.

## 7.1 Skill India

Activities of MeitY are targeted to support availability of trained human resources for the manufacturing and service sectors of electronics and IT industry. Initiatives include identifying gaps emerging from the formal sector and planning programmes in non-formal and formal sectors for meeting these gaps. This includes skill development in the domain of electronics and IT and related areas. In the succeeding sections, various ongoing initiatives, including skill development and an indicative list of major schemes/projects are presented.

The skill development activities of the Ministry are primarily being taken up by its two autonomous societies viz. National Institute of Electronics and Information Technology (NIELIT, previously known as DOEACC) and Centre for Development of Advanced Computing (C-DAC). In addition, the various

organizations/attached offices under the Department viz. ERNET India, Digital India Corporation, CSC E-Governance Services India Limited, STQC, NIC etc. are also engaged in training of various stakeholders in small numbers. In the FY 2018-19, a total of 9,11,559 candidates have been trained and certified till March 2019 by these agencies.

### 7.1.1 Post Graduate and Doctorate Level

**Visvesvaraya PhD Scheme for Electronic System Design and Manufacturing [ESDM] and IT/IT Enabled Services [IT/ITeS]**

MeitY initiated "Visvesvaraya PhD Scheme for Electronics and IT" to (i) enhance the number of PhDs in Electronics System Design and Manufacturing (ESDM) and IT/IT Enabled Services (IT/ITeS) sectors in the country (ii) give thrust to Research and Development

(iii) create an innovative ecosystem and enhance India's competitiveness in these knowledge intensive sectors.

The scheme supports full-time and part-time candidates in ESDM and IT/ITeS sectors. The scheme also targets to support 200 Young Faculty Research Fellowships (YFRF) in the areas of ESDM and IT/ITeS with the objective to retain and attract bright young faculty members in these sectors. It also provides for infrastructural grant of ₹5 lakh per full-time candidate to the academic institutions for creation/up-gradation of laboratories. Part-time PhD candidates also get one time incentive on completion of the PhD. The scheme was initiated in 2014 for a period of nine years with a total estimated cost of ₹466 crore.

Under the scheme (as on 31st March, 2019) 949 full -time and 219 part-time PhD scholars are pursuing PhD at 91 academic institutions (Central Universities/ Institutions and Colleges/Institutions of National importance/State Universities/Deemed Universities/ Institutions) across the country. The scheme is also supporting 155 "Young Faculty Research Fellows" to encourage and recognize young faculties involved in research and technology development.

Periodical research workshops are organised to mprove the quality of research being pursued by the PhD scholars and young faculty research fellowship (YFRFs) and to assess their research work. In these workshops, selected scholars and YFRFs present their research work to the Academic Committee and other research experts. Experts review and evaluate research work of PhD Scholars/YFRFs and also provide critical comments and suggestions to improve their research work. The 2nd YFRF Workshop was held at IISc, Bengaluru from 28th to 29th May, 2018. It was attended by 89 YFRFs and formed 8 groups as per their areas of research. 4th Research Workshop for PhD Scholars was held at MNIT, Jaipur from 13th to 15th September, 2018 where 17 PhD scholars and 50 YFRFs presented

their research work for review and evaluation by the Academic Committee.

### 7.1.2 Graduate level

**Scheme of Financial Assistance for setting up of Electronics and ICT Academies**

The objective of the scheme is to set up seven Electronics and ICT Academies as a unit in IITs, IIITs, NITs, etc., for faculty/mentor development/upgradation to improve the employability of the graduates/diploma holders in various streams, through active collaboration of States/UTs with financial assistance from the Central Government. Electronics and ICT Academies are aimed at providing specialized training to the faculties of the engineering, arts, commerce and science colleges, polytechnics etc, by developing state-of-art set up facilities. The seven academies have been set up at IIT Kanpur (Uttar Pradesh), IIT Guwahati (Assam), NIT, Patna (Bihar), NIT, Warangal (Telangana), IIITDandM, Jabalpur (Madhya Pradesh), IIT, Roorkee (Uttarakhand) and MNIT, Jaipur (Rajasthan). These academies are conducting various faculty development programmes in Electronics and ICT.

During the financial year, academies signed various MoUs viz (i) MoUs with industries for joint training programmes and joint certification for students and faculty in emerging IT related areas, (ii) MoUs with academic institute for nomination of their faculty under the FDPs conducted by the academies; and, (iii) MoUs with professional/other societies for offering lectures by the faculty of these bodies, offering joint certification courses in emerging areas of IT for students/faculty etc.

During the period, academies have also conducted various courses pertaining to use/application of ICT tools and techniques in the teaching/learning process leading to enhanced learning for various other streams including agriculture, medical science etc besides streams of arts, commerce and science for faculty at undergraduate level.

Academies also addressed topics/courses pertaining to pedagogy and soft skills, Open Educational Resources (OER), Content Development, MOOCS and MOODLE, Outcome Based Education & Accreditation, business communication for corporate culture, bio-medical applications, computational methods and GUI development for scientist and engineers, research methodology etc under various faculty development programmes.

As on 31st March 2019, 719 Faculty Development Programmes (FDPs) have been conducted benefitting 31,356 participants (Faculty: 25,318; Students/others 6,038).

### 7.1.3 Vocational Skill Development Level

**(i) Two Schemes on Skill Development in ESDM sector are under implementation:**

**(a) Scheme for financial assistance to select States/UTs for Skill Development in ESDM sector**

The scheme has been approved with a target of skilling 90,000 candidates (at 5 levels). The scheme is under implementation in following States viz. Andhra Pradesh (50% target) Telangana (50% target), Jammu & Kashmir, Karnataka, Punjab, Uttarakhand (for two levels only) and Uttar Pradesh.

**(b) Scheme for 'Skill Development in ESDM for Digital India'**

This expanded scheme has been approved with a target of skilling 3.28 lakh candidates for implementation in 32 States/UTs.

Under the above two schemes, training is imparted in 59 NSQF aligned courses through 2,069 training partners duly registered with NIELIT/ESSC/TSSC. As on March 2019, under

both the above schemes, a total of 2.88 lakh candidates have been enrolled for training in various States/UTs, out of which 1.95 lakh candidates have been certified.

**(ii) Efforts to generate greater participation of Industry through Sector Skill Councils - Electronics, Telecom, IT/ITeS**

MeitY is actively associating and supporting the various skill development activities of the following Sector Skill Councils (SSCs) concerning the domains addressed by this Ministry:

i.   Electronics Sector Skill Council of India (ESSCI)
ii.  Telecom Sector Skill Council (TSSC)
iii. NASSCOM IT-ITeS Sector Skill Council

The above Sector Skill Councils have taken up various courses for skilling of candidates in their respective domains. Ministry has also supported development of new job roles/NOSs with ESSCI & NASSCOM IT/ITeS Sector Skill Council.

### 7.1.4 Capacity Building in Niche Areas

**i.   Information Security Education and Awareness (ISEA) Project Phase-II**

Under the ISEA Project Phase-II, 1.14 lakh persons are proposed to be trained under formal and non-formal courses and faculty training. In addition, about 400 paper publications are expected. The project also aims to provide training to more than 13,000 Government officials and creating mass information security awareness targeted towards academic users, Government users and general users (approximately 3 crore internet users through direct and indirect mode). 52 institutions have been identified for the implementation of academic activities under the project. As in March 2019, 42,024 candidates were under-going training/

trained in various formal/non-formal programs, 7,349 Government officials have been trained and 836 awareness workshops conducted covering 95,161 participants. Under the awareness component, 836 awareness workshops have been organized covering 95,161 participants in direct mode. Besides this, multilingual awareness material on information security has been designed and disseminated through these workshops, print/electronic/digital mode and multilingual portal. So far, 9 cyber security awareness weeks were organized in collaboration with State/district police departments; cyber security curriculum designed for 3rd to 12th standard and submitted to CBSE/NCERT for adoption, and 1,473 school teachers trained as master trainers; 17 editions of bi-monthly newsletters published; 40 programs broadcasted through Doordarshan/All India Radio on various cyber security related topics; for more details, kindly visit www.isea.gov.in.

## ii. Capacity building in the areas of Electronic Product Design and Production Technology

This is an ongoing project for development of human resource at various levels including Certificate, Diploma, Post Graduate and Research Professionals with adequate competence levels with a target of training 11,515 candidates in five years. The project further aims at upgrading the competence of working professional in Indian industries and knowledge/skills of faculty of technical institutions. The project is being implemented by NIELIT Centres at Aurangabad and Chennai and by CDAC, Hyderabad. Under this project, NIELIT Aurangabad has launched M.Tech(part time) in electronic product design and B.Tech(full time), both in affiliation with Dr. B.A.M. University, Aurangabad with a vision to bridge the gap between academia and Industry. The implementing agencies have launched 6 week modular courses in Electronic Product Design,

Embedded System Design, Electronic Packaging, Wireless Embedded System. Further, a 6 month (full time) Post Graduate Diploma in Electronic Product Design has been launched.

So far, 10,154 candidates have been trained/under-going training in various formal/non-formal programmes in the area of Electronics Product Design and Production Technology at CDAC-Hyderabad and NEILIT Centres at Aurangabad and Chennai.

## iii. Special Manpower Development Programme for Chips to System Design (SMDP-C2SD)

An umbrella programme has been initiated under 'Digital India Programme' in December 2014 for a duration of 5 years with an outlay of Rs. 99.72 crore at 60 academic/research & development institutions spread across the country including IITs, NITs, IISc, IIITs and other Engineering Colleges. The broad objectives of the programme are to broaden the VLSI Design base in the country by generating 50,000 specialized manpower over a period of 5 years in the area of VLSI design, inculcating the culture of System-on-Chip/System Level Design at Bachelor, Master and Research level, generating Intellectual Property Cores, publication of papers, broadening the base of quality research in the country by supporting 'Networked PhD programme' etc. Under the program:

(i) 28,000 students have been trained at B.Tech, M.Tech & PhD level in VLSI/System design.

(ii) 15 projects are in progress for development of working prototype of Systems/Sub-systems/SoCs along with the development of 70 Application Specific Integrated Circuits (ASICs) and 30 Field Programmable Gate Array (FPGA) based board level design projects.

(iii) VLSI design labs equipped with State-of-art EDA Tools & Hardware Equipment have

been setup at 60 participating institutes for implementing VLSI/System design projects.

(iv) 30 Chips have been fabricated till date at SCL Mohali and other foundries and 29 designs have been sent for fabrication at SCL Mohali in September 2018.

(v) 9 Instruction Enhancement Programmes (IEP) have been organized to train the faculty members of institutes participating under SMDP-C2SD in the area of VLSI/System design.

(vi) M.Tech programme in VLSI/embedded system design has been initiated at 16 SMDP-C2SD was institutions that did not have these courses earlier.

(vii) Website for SMDP-C2SD was developed (www.smdpc2sd.gov.in) for dissemination of educational material, web based project administration for all the institutions participating in the program and maintaining repository of reusable IPs/IEPs/Video Lectures etc.

(viii) 11 Patents (national/international) were filed and about 1,000 research papers published in conference proceedings/ journal publications in first 3 years by 60 participating institutions.

(ix) To make available industry-ready specialized manpower in VLSI/System design area, about 100 students from SMDP-C2SD institutions were sent to Intel for internship. Out of these, 15 students were provided job offer by Intel.

**(iv) Indian Nanoelectronics Users Program (INUP)**

Based on the grand success of project "Indian Nanoelectronics Users Programme (INUP)-Phase I"- a joint project between IISc, Bangalore and IIT

Bombay, a major project "Indian Nanoelectronics Users Programme (INUP)-Phase II"- a joint project at IISc, Bangalore and IIT Bombay has been initiated to train large number of researchers in the area of nanoeletronics across the country by organising the hands on workshops as well as by undertaking the R&D projects on different aspects of nanelectronics. The approach adopted under this project is to make available large research facilities created at nanoelectronics centres at IISc and IIT Bombay to the researchers across the country.

INUP Phase II program initiated in March 2014 continued to facilitate and support the generation of expertise and knowledge in nanoelectronics through participation by external users in INUP and their utilization of the facilities established at the Centres of Excellence in Nanoelectronics (CEN) at IISc, Bangalore and IITB.

Following are the achievements of program so far:

**IISc**

- 2,430 persons (Level 1-1,442, Level 2-569, Level 3- 419) have been trained exceeding the target of 2,000.

- 168 journal/conference publications (target: 175) have been made and 16 patents (target: 12) filed. 245 theses (target: 100) have been supported under the program.

- 259 short term (target: 200) projects and 160 medium term (target: 100) projects have been supported.

- Familiarization workshops conducted by IISc, Bangalore are 19 (target 15).

**IITB**

- 2,778 persons (Level 1- 1,757, Level 2-600, Level 3- 421) have been trained under the project, exceeding the target of 2,000.

- 245 journal/conference publications (target: 175) have been made and 14 patents (target: 12) filed. 183 theses (target: 100) have been supported.

- 235 short term (target: 200) projects and 98 medium term (target: 100) projects have been supported.

- Familiarization workshops conducted by IITB are 13 (target: 15).

### 7.1.5 Grass Root Level

**"Pradhan Mantri Gramin Digital Saksharta Abhiyan" (PMGDISHA)**

The Government has approved a scheme, titled "Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA)", to usher in digital literacy in rural India by covering 6 crore rural households (one person per household) by 31st March, 2019. This is in line with the announcement made by Honble Finance Minister in the Union Budget 2016-17. To ensure equitable geographical reach, each of the 2,50,000 Gram Panchayats would be expected to register an average of 200-300 candidates.

A special focus of the scheme is on training the beneficiaries on use of electronic payment system. The outcome measurement criteria includes undertaking at least 5 electronic payments transactions by each beneficiary using UPI (including BHIM app), USSD, PoS, AEPS, Cards, Internet Banking.

The PMGDISHA is being implemented as a Central Sector Scheme by the Ministry of Electronics and Information Technology through an implementing agency, namely, CSC e-Governance Services India Limited, with active collaboration of all the State Governments and UT Administrations.

To create awareness about the scheme, the implementing agency has conducted 85 State level workshops and 856 district level workshops across the country. They have empanelled 1,69,999 Training Centres so far for conducting the training of the beneficiaries.

As on March, 2019, 2.16 crore candidates have been enrolled, out of which 2.14 crore candidates trained and more than 1.20 crore candidates certified by duly recognised 3rd party assessment/certification agencies.

### 7.1.6 Create skill development facilities in deprived areas through strengthening of National Institute of Electronics and Information Technology (NIELIT)

The project is being implemented through NIELIT at 7 NE States with budget outlay of ₹366.78 crore. The project objectives are to upgrade six existing NIELIT centres located at Imphal, Aizawl, Guwahati, Shillong, Gangtok, Itanagar; setting up of ten new Extension Centres at Senapati and Churachandpur in Manipur; Dibrugarh, Silchar, Jorhat and Kokrajhar in Assam; Lunglei in Mizoram; Tura in Meghalaya; Tez and Pasighat in Arunachal Pradesh; and upgradation of two existing Extension Centres located at Chuchuyimlang in Nagaland and Tezpur in Assam to increase the training capacity from 3,080 per year to 14,400 per year from the 5th year onward. All 18 NIELIT Centres/Extension Centres are conducting skill training programmes in Electronics and ICT domain and more than 1.34 lakh candidates have been trained in various Electronics and ICT courses as on 31st March, 2019.

### 7.1.7 IT for Masses Programme

**Development of Weaker Sections**

The objectives of IT for Masses Programme are to provide training, infrastructure creation and entrepreneurship for empowering women and development of SC/ST communities.

Ministry is earmarking funds for Scheduled Caste Component (SCC) & Scheduled Tribe Components (STC). The following projects were initiated/on-going:

- IT infrastructure creation and capacity building in IT tools of Scheduled Tribes (ST) candidates - Madhya Pradesh

- Empowering underprivileged ST of four backward districts of Nagaland through ICT skills training – Nagaland

- Empowerment of SC/ST Youth & Women on Enhancement of Livelihood activities using IT & Tool and PMU for IT for Masses- West Bengal

- Development of IT solution (Mobile/web App) in Hindi Language on self-employment schemes for empowerment of SCs, STs and women in Himachal Pradesh – Himachal Pradesh

- Skill Development Training of Unemployed SC & ST youth of Tripura towards enabling entrepreneurship & sustainable development- Tripura

- Training of Visually Impaired Persons in Manipur on "Course on Computer Concepts (CCC)" of NIELIT-Manipur.

### Gender Empowerment

Gender Empowerment through ICT has been one of the major initiatives of the Government. The objective of this initiative is to empower women through capacity building in ICT and IT training so as to enhance their employability. Accordingly, MeitY has been implementing ICT training/capacity building projects for empowerment of women in different States/UTs. The following projects were initiated/on-going:

- IT oriented Handloom Sector Development Program for creative design, development & deployment by Artisians/Weavers of Jharkhand & Odisha State – Jharkhand, Odisha

- ICT based integrated development program for women empowerment in Lallapura craft cluster of Varanasi – Uttar Pradesh

- Skill-Enhancement & Health Awareness via Knowledge Transformation using ICTs for Women Empowerment in Bithoor Cluster of Kanpur – Uttar Pradesh

- Development of IT solution (mobile/web app) in Hindi Language on self-employment schemes for empowerment of SCs, STs and women in Himachal Pradesh – Himachal Pradesh

- ICT Intervention for Development & Livelihood Enhancement through Self Help Groups (SHGs) in Majhwa block of Mirzapur (a backward district)- Uttar Pradesh.

### Fee-reimbursement Programme

NIELIT is implementing the SCC and STC Plan since 2007-08. NIELIT Centres are implementing the scheme with financial support of MeitY. Under this scheme, NIELIT Centres do not charge fees from the SC or ST candidates for undergoing courses offered by NIELIT. Further, there is no exclusive batch/schedule of training under this scheme and the beneficiaries are trained as per general training schedule of the respective NIELIT Centre.

### 7.1.8 Re-skilling/up-skilling of IT professionals

The job scenario in IT-BPM Industry is undergoing a transformation due to adoption of automation and emergence of newer technologies (including disruptive technologies). New job roles requiring different skill-sets are appearing and earlier jobs based on older skill-sets are losing their relevance. Hence, the Government, IT Industry and the academia need to join together to create an eco-system for re-skilling/up-skilling of the employees of IT Industry so as to retain the edge that India has in the IT sector through its young and dynamic workforce. To cater to all these requirements, a 're-skilling/up-skilling Framework' that is technology enabled for the employees of IT sector is being evolved in active consultation with NASCCOM, industry and academia, with Government acting as a enabler/facilitator.

## Chapter 8
# Statutory Organisations

### 8.1 Authentication framework under the IT Act, 2000 - CCA

The Information Technology Act, 2000 facilitates acceptance of electronic records and electronic signatures through a legal framework for establishing trust in e-commerce and e-governance. For authentication of electronic transactions using electronic signatures, the Controller of Certifying Authorities (CCA) licenses Certifying Authorities to issue Electronic Signature Certificates under the IT Act 2000. Currently, nine Certifying Authorities (CA) are operational. The total number of Electronic Signature Certificates (ESC) issued in the country grew to more than 9.5 crore (out of which 7 crore ESCs are for eSign) by 31st March, 2019.

Annual Compliance Audits of Certifying Authorities were conducted as per the requirements of the Information Technology Act, 2000. In addition to the regular Annual Compliance Audits, Special Audits were also carried out for ensuring compliance to the Identity Verification Guidelines (IVG) to be followed in the Digital Signature Certificate (DSC) issuance process.

Two CAs licence were renewed during 2018-19 and four applications from prospective Organisations have been received to become licensed CA/eSign Service Providers (ESP). Their applications are under examination and processing for grant of licence.

### 8.1.1 eSign - Online Electronic Signature Service for Aadhaar Holders

Five licensed CAs that are empanelled ESPs (viz.

eMudhra, (n)Code, CDAC, NSDL and Capricorn) are providing eSign service in the country. Total number of eSign Electronic Signatures reached 7 crore by 31st March, 2019. Initiatives are being taken in this respect through coordinated interactions between the e-Governance/e-commerce application service providers and these ESPs (CA) to facilitate the maximum use of eSign.

## Technical Infrastructure

The Root Certifying Authority of India (RCAI), set up by the CCA, is at the root of trust for authentication through digital signatures. Repository containing certificates issued by CCA to the licensed CAs and the certificates issued by the licensed CAs to subscribers has been established and is being operated by the office of CCA, for checking compliance with the Interoperability Guidelines and for statistical purposes. The disaster recovery site for the RCAI continues to be operational.

## Enhancing trust

CCA's Root certificate(s) and special purpose certificates have been installed in Microsoft IE Browser and in Adobe products.

To further enhance the level of trust in digital signatures, and to know the status of CA certificate issued by Root CA in real time, the office of CCA has set up an Online Certificate Status Protocol (OCSP) service. OCSP service of Root CA is one of the mandatory baseline requirements of the CA Browser (CAB) forum/ community. The OCSP service has been released for citizens and stakeholders. Further steps for inclusion of Root CA certificate in Mozilla, Firefox, Java store etc. will now be taken up since this pre-requisite of CAB Forum has been met.

## Digital Locker Authority (DLA)

Under the Digital India Programme, the Government of India has planned to provide shareable private space on a public cloud and to digitize all documents and records of the citizens and make them available to the citizens on a real-time basis. These mechanism of 'e-Document repositories' and 'Digital Lockers' will enhance citizens' convenience and usher in paperless transactions across the entire ecosystem of public services. The framework for the Digital Locker ecosystem has been set up by the Controller of Certifying Authorities (CCA), who has been given additional charge to function as 'Controller of Digital Locker Authority (CDLA)'.

The office of DLA has designed, registered and launched the website (http://dla.gov.in). The necessary rules, regulations and guidelines, along with application form, eligibility criteria, technical specifications, practice statement, undertakings and other documents related to Digital Locker Service Providers (DLSPs) and Repository Providers (RPs) are available on DLA website.

Two workshops for prospective DLSPs and Repository Providers (Issuers) were organised by the DLA at Delhi and Bengaluru to facilitate and discuss with the prospective stakeholders/business entities to become licensed DLSP or Certified Repository. One application for DLSP licence has been received by the DLA and is being processed.

## Training/Awareness Generation and Promotion of Digital Signatures

**PKI Body of Knowledge**: Development and dissemination programmes on digital signatures, PKI and eSign have been conducted at Guwahati, Bengaluru, Hyderabad, Vijayawada and Patna and interactions with other States for organising such workshops have been initiated. Also, relevant content is made available on social media channels like YouTube, Facebook and Twitter.

The India PKI Symposium & International Asia PKI Consortium SSC Meeting 2018 on Public Key Infrastructure - Global adoption and emerging

trends was co-hosted by India PKI Forum during June 14-15, 2018 at New Delhi.

The International Symposium 2018 and Asia PKI Consortium (APKIC) General Assembly & Steering Committee (GA/SC) Meeting on "Global Digital Transformation Role PKI" was co-hosted by APKIC &

Thailand PKI Association during December 3-4, 2018 at Phuket, Thailand.

Newspaper advertisements for generating awareness about use of electronic signatures have been published.



Asia PKI Consortium at New Delhi, 15 June 2018

## 8.2 Unique Identification Authority of India (UIDAI)

### 8.2.1 Introduction

The Unique Identification Authority of India (UIDAI) is a statutory authority established under the provisions of the Aadhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Act, 2016 (referred as "Aadhaar Act, 2016") on 12th July, 2016 by the Government of India, under the Ministry of Electronics and Information Technology (MeitY).

Prior to its establishment as a statutory authority, UIDAI was functioning as an attached office of the then Planning Commission (now NITI Aayog) vide its gazette notification no. A-43011/02/2009-Admn.I dated 28th January, 2009. Later, on 12th September, 2015, the Government revised the Allocation of Business Rules to attach the UIDAI to the Department of Electronics and Information Technology (DeitY) of the then Ministry of Communications and Information Technology.

**The Aadhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Act, 2016**

The Aadhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Act, 2016 was published in the Official Gazette of India, Extraordinary, Part-II, Section 1, dated 26th March, 2016 (Act No. 18 of 2016; referred to as "Aadhaar Act, 2016"). Different provisions of the Aadhaar Act, 2016 came into force on 12.07.2016 and 12.09.2016.

The Aadhaar Act, 2016 provides for good governance, efficient, transparent and targeted delivery of subsidies, benefits and services, the expenditure for which is incurred from the Consolidated Fund of India, to individuals residing in India through assigning of unique identity numbers (called Aadhaar numbers) to such individuals and for matters connected therewith or incidental thereto.

Further, the following regulations are notified under the said Aadhaar Act, 2016:

• Unique Identification Authority of India (Transaction of Business at Meetings of the Authority) Regulations, 2016 (No. 1 of 2016)

• Aadhaar (Enrolment and Update) Regulations, 2016 (No. 2 of 2016)

• Aadhaar (Authentication) Regulations, 2016 (No. 3 of 2016)

• Aadhaar (Data Security) Regulations, 2016 (No. 4 of 2016)

• Aadhaar (Sharing of Information) Regulations, 2016 (No. 5 of 2016)

• Aadhaar (Enrolment and Update) (First Amendment) Regulations, 2017 (No. 1 of 2017)

• Aadhaar (Enrolment and Update) (Second Amendment) Regulations, 2017 (No. 2 of 2017)

• Aadhaar (Enrolment and Update) (Third Amendment) Regulations, 2017 (No. 3 of 2017).

• Aadhaar (Enrolment and Update) (Fourth Amendment) Regulations, 2017 (No. 5 of 2017).

• Aadhaar (Enrolment and Update) (Fifth Amendment) Regulations, 2018 (No. 1 of 2018).

• Aadhaar (Enrolment and Update) (Sixth Amendment) Regulations, 2018 (No. 2 of 2018).

A number of writ petitions were filed before various High Courts and the Supreme Court, inter-alia, challenging the validity of Aadhaar; both prior to and after the notification of Aadhaar Act, 2016. All these writ petitions were tagged by the Supreme Court with the main writ, J. K.S. Puttaswamy and Others vs Union of India, W.P. No.(Civil) 494/2012. The final judgment in W.P. No.(Civil) No.494/2012 was pronounced on 26 September, 2018 by a 5 Judge Constitution Bench of the Supreme Court, upholding the constitutional validity of Aadhaar with few restrictions and changes.

Accordingly, the Aadhaar Act, 2016 was amended vide Aadhaar and Other Laws (Amendment) Ordinance, 2019 (No.9 of 2019), which was promulgated by the President on 02 March, 2019 and came into force at once, to give effect to the directions of the Hon'ble Supreme Court issued vide their judgment dated 26 September, 2018.

### 8.2.2 Value Proposition of Aadhaar Uniqueness

Any individual, irrespective of age and gender, who is a resident in India and satisfies the verification process laid down by the UIDAI, can enroll for Aadhaar. An individual is required to enroll only once; the process is free of cost. In case, the resident enrolls more than once, only one Aadhaar shall be generated, as the uniqueness is achieved through biometric de-duplication.

**Authentication**

One of the challenges the resident frequently faced

was to establish his/her identity. The problem gets further complicated owing to the fact of using proxy documents and circulation of counterfeit documents in the country, which leads to lack of trust between service providers and the resident. However, Aadhaar's property of authentication enables an Aadhaar holder to authenticate with a service provider anytime, anywhere in the country to prove his/her identity. To facilitate this, UIDAI has established an ecosystem based on best global practices to ensure data privacy and reliability of authentication, with UIDAI being agnostic to the purpose of authentication.

### 8.2.3 Approach and Strategy: Enrolment Ecosystem

The first Aadhaar of a resident was made in September, 2010. So far, UIDAI has covered 90.4% of the projected population as shown below:

| AGE BAND | POPULATION (PROJECTED 2018) | LIVE - AADHAAR GENERATED | AADHAAR SATURATION |
|---|---|---|---|
| OVERALL | 133.5 crore | 120.75 crore | 90.4% |
| Population 5 to 18 years | 36.6 crore | 28.17 crore | 76.9% |
| Population 0 to 5 years | 12.5 crore | 3.45 crore | 27.6% |

As most of the adult (population) has already enrolled for Aadhaar, UIDAI has now shifted its focus on Aadhaar update. UIDAI is providing assistance of Aadhaar enrolment and update through its Permanent Enrolment Centers (PECs) opened by Scheduled Banks, India Post and at Government office locations.

The aforementioned PECs are providing both enrolment as well as update facilities to residents. Aadhar update has become a major activity at such PEC's.

The following categories of residents require to update their biometrics:-

a. Aadhaar mandated biometrics update

i. Children attaining the age of 5 years
ii. Children on attaining the age of 15 years
iii. Residents with difficulties in authentication

b. Individual need driven update requests:

i. Changes in life events such as marriage, migration to a new location, etc.
ii. Changes to add mobile number to CIDR etc.
iii. Demographic updates due to incorrect data capture during the enrolment

### 8.2.4 Aadhaar Letter Printing and Delivery

- Once the Aadhaar is generated, it has to be ensured that the same is printed and delivered to the resident within permissible time limits.

- Each Aadhaar letter comprises of a printed, laminated document with a photograph, date of birth, demographic information of the resident, the Aadhaar number and 3 Secure Quick Response (QR) Codes, where two big QR Codes contain photograph and demographic details and one small QR Code contains demographics only.

- For the printing of Aadhaar letters, UIDAI has on-boarded three printers at various locations. Currently, the installed printing capacity is 7 lakh letters per day in 13 different regional languages.

- The Department of Post is the partner for delivery of the Aadhaar letters to the residents at the address they have provided at the time of enrolment.

- UIDAI sends Aadhaar letters for new enrolments as well as for updates. Since inception and till 31st March 2019, more than 122 crore Aadhaar letters have been printed and dispatched to the residents through India Post as First Class Digitally Franked articles. Since inception and till 31st March 2019, 17.95 crore Aadhaar letters

have been updated and dispatched to the residents.

**e- Aadhaar:**

UIDAI has launched the e-Aadhaar portal for downloading the Aadhaar letter in PDF format from the website of UIDAI (www.uidai.gov.in).

- An Aadhaar number, in physical or electronic form subject to offline verification and other conditions, as may be specified by regulations, may be accepted as proof of identity of the Aadhaar number holder for any purpose. As such the e-Aadhaar, which is digitally signed, is a valid and secure electronic document, treated at par with the printed Aadhaar letter. E-Aadhaar also prints with three Secure Quick Response (QR) Codes where two big QR Codes contain photograph and demographic details and one small QR Code contains demographics only. In the Aadhaar system, the resident's details can be verified through an established online authentication process. Therefore, the e-Aadhaar is acceptable as a valid proof of identity. The relevant circulars have been posted on the website of UIDAI. The total e-Aadhaar downloads till 31st March 2019 were about 92 crore.

- Order Aadhaar Reprint:

  UIDAI has started "Order Aadhaar Reprint" service since 01 December, 2018 on pilot basis on its website www.uidai.gov.in to facilitate residents to get their Aadhaar letter reprinted and delivered through the Speed Post service of India Post by paying a nominal charge of Rs. 50.00.

**Aadhaar Support Services**

UIDAI has set up an Aadhaar Sampark Kendra (Contact Centre) which facilitate in resolving residents queries and grievances related to Aadhaar life cycle and related services. The main objectives of Aadhaar Sampark Kendra are as follows:

a) To provide a pan India accessible toll free number and email, using which the residents can contact Aadhaar Sampark Kendra.

b) To provide support in multiple regional languages to cater to complaints and queries from all parts of India.

c) To provide an Interactive Voice Response (IVR) System for the residents calling the Aadhaar Sampark Kendra.

d) To provide residents to interact with Aadhaar Sampark Kendra executive in case they wish to do the same.

e) The residents can also log the complaints through Resident Portal of UIDAI.

f) To create and maintain a common Customer Relationship Management (CRM) application to support residents in addressing their queries and complaints.

**Infrastructure and Technology of Aadhaar Sampark Kendra**

Currently Aadhaar Sampark Kendra consists of:

a) **Toll-free-number 1947**: Toll Free Number is accessible from whole of India. The short code '1947' is a Category –I toll free number allotted by DoT to UIDAI. DoT has also approved to use the Short Code 1947 for inbound and outbound SMS services to residents.

b) **Contact Centre Infrastructure:** Contact Centre Infrastructure comprises Trunk lines, PBX solution, IVR system, Automatic Call distributor (for call distribution across Call Centre Facilitators, Computer telephony integration unit and Voice logger system (10% calls are recorded for technical quality

evaluation). The IVRS interacts with the callers in duplex mode through synthesized recorded voice in Hindi/English/Regional languages depending on the State from where call is placed to service their enquiries. Hindi, English, Gujarati, Kannada, Marathi, Telugu, Bengali, Punjabi, Odia, Tamil, Assamese and Malayalam languages are currently supported in IVRS.

Following features are currently available in IVRS:

- Frequently Asked Questions.

- Aadhaar enrollment status based on 14 digit EID search.

- Aadhaar update status with 14 digit URN number.

- Intelligent selection of language options on IVRS based on caller's area.

- Status of already logged complaints.

- Know your Aadhaar number.

- Route calls to Aadhaar Sampark Kendra executive, if desired by the caller.

### 8.2.5 Authentication Eco System

**Aadhaar Authentication**

Aadhaar authentication means the process by which the Aadhaar number, alongwith demographic information or biometric information of an individual is submitted to the Central Identities Data Repository (CIDR) for its verification and such Repository verifies the correctness, or the lack thereof, on the basis of information available with it.

**Authentication implementation Model**

UIDAI provides authentication and e-KYC services through agencies called as Authentication User Agency

(AUA), e-KYC User Agency (KUA) and Authentication Service Agency (ASA), which are appointed as per Regulation 12 of Aadhaar (Authentication) Regulations, 2016.

**Authentication Service Agency (ASA)**

ASA is the agency that has secured leased line connectivity with CIDR. ASAs transmit authentication requests of AUAs to the CIDR. They play the role of enabling intermediaries through secure connection established with the CIDR. ASAs receive CIDR's response and transmit back the same to the AUAs. As on 31st March, 2019, 27 ASAs are active in UIDAI ecosystem.

**Authentication User Agency (AUA)**

AUA is any Government/public/private legal agency registered in India that uses Aadhaar authentication for providing its services to the residents/customers. An AUA is connected to the UIDAI data centre/Central Identity Data Repository (CIDR) through an ASA (either by becoming ASA on its own or taking services of an existing ASA) using a secured protocol. As on 31st March 2018, 204 such entities are live in UIDAI ecosystem as AUAs and 2896.57 crore authentication transactions have been performed since inception.

**KYC User Agency (KUA)**

KUAs are extension of AUAs that use e-KYC Services of UIDAI. As on 31st March 2018, 187 KUA entities are active on Aadhaar platform and 707.97 crore e-KYC transactions have been performed.

### 8.2.6 Training, Testing and Certification Ecosystem

For success of any programme, especially of the scale, such as, that of UIDAI, it is imperative that there is sufficient emphasis given to quality of data

collected during enrolment. Additionally, it is equally important that the people who are responsible for capturing and using the Aadhaar data are adequately trained. To ensure this, UIDAI has worked diligently to create a training, testing and certification ecosystem. This ecosystem consists of (1) Content Development Agency and (2) Testing and Certification Agency.

To maintain the quality of data collected at the time of aadhaar enrolment or update, UIDAI only engages Certified Operators, Supervisors and Child Enrolment Lite Client (CELC) Operators. For adequate and effective training of all the stakeholders involved in Aadhaar enrolment/update various training methodologies, including mega training and certification camps and refresher/orientation training program are adopted by UIDAI. This has led to well-organised enrolment and close to 100% enrolment in most of the States. Also, to increase the usage of Aadhaar across various Government organisations in delivery of services, master training on Aadhaar seeding, authentication and e-KYC were organised for Government officials.

- **Master Training on Seeding, Authentication and e-KYC**: The training content covers all the major processes involved in Aadhaar seeding, authentication and e-KYC. A total of 31 Master Training Sessions on Aadhaar seeding and authentication had been conducted from 1st January 2018 to 31st March 2019 in which 1127 Government officials were trained.

- **Mega Training and Certification Camps**: UIDAI undertakes an exercise through mega training and certification camps to create a large pool of certified operators/supervisors to ensure no disruption of momentum in enrolments. A total of 81 Mega Training and Certification Camps on Aadhaar Enrolment have been conducted between 1st January 2018 to 31st March 2019 in which 4,771 individuals were trained and certified.

- **Orientation Programme**: Orientation programmes are being carried out for newly appointed enrolment staff to make them well versed with the enrolment process. From 1st January 2018 to 31st March 2019, 616 Orientation programmes had been conducted in which 23086 candidates were imparted training.

- **Refresher Programme**: To make certified enrolment staff understand the changes involved in Aadhaar processes, many refresher programmes and training of trainer programme were conducted. A total of 302 programmes were organised between 1st January 2018 to 31st March 2019 in which 19,921 candidates were trained.

As of 31st March, 2019, UIDAI in partnership with the Testing and Certification agencies has certified 8,25,951 Enrolment Operators, Supervisors and CELC Operators. The candidates certified from 1st January 2018 to 31st March 2019 were 1,39,843 which includes 32,713 from Private/PSU Banks, 14,192 from Dept. of Post, 1,480 from Education Department, 534 of WCD and Health Department and 8,315 of other Govt. Departments.

### 8.2.7 Intranet and Knowledge Management Portal

'Intranet and Knowledge Management Portal' (KM Portal) is an online community based platform established by UIDAI to promote internal communications, better information exchange and increased teamwork amongst UIDAI staff. KM Portal has KM Dashboard where latest office orders, circulars, tenders, other UIDAI related documents, etc., are uploaded by various divisions and Regional Offices and Managed Service Provider. In addition, it hosts various portals/modules developed for use by different Divisions like:-

- Human Resource Management System Application
- Asset Management System
- Office Management (e-office)
- VIP File Sharing System
- Travel Management System
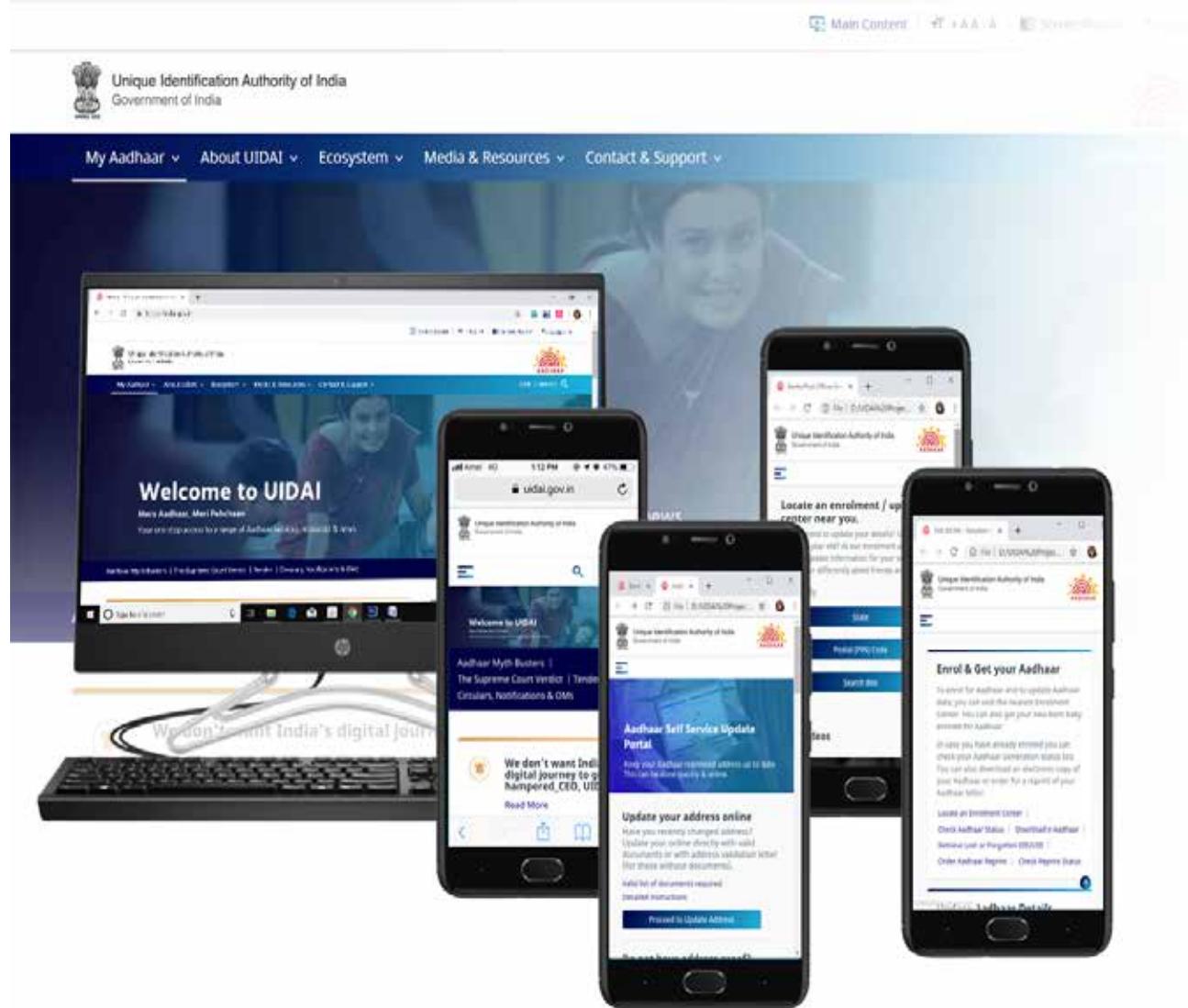
### 8.2.8 UIDAI Website

The UIDAI website (https://www.uidai.gov.in) is the single click Aadhaar online service window for residents of India, as well as the primary web information centre for various ecosystem partners and the public at large.

Bulk of residents in India seek Aadhaar services and related information via mobile. In order to reach out to those mobile users and to ensure the accessibility of the Aadhaar services is improved exponentially, the UIDAI website and Aadhaar service portals are recently been revamped and made multi device friendly. In addition the information is available in English, Hindi and 11 Indian regional languages for vastly diverse demographics of the country. The home page of the website and other service portals are shown below:-

UIDAI website has the following features:-

- The responsive UX to ensure mobile users have better user experience while accessing the Aadhaar services and information.

- Instead of placing the most sought after Aadhaar services deep within the website the UIDAI website provides direct access to Aadhaar Online Services up front. Crisper information architecture, seamless two step navigation, universally understandable labels and search feature assist the residents get access to the right information at the right time.

- Informative documents on Aadhaar enrolment, authentication technologies, UIDAI ecosystem that facilitates the education and promotion about Aadhaar services and related business processes are available on the website.

- Regular updates of latest news, press releases, videos, events, workshops and campaigns, FAQs, etc.

- The contact section in the website provides details of various divisions and functionaries at the Headquarters as well as at the Regional Offices and Tech Centres.

- The website is integrated with Rapid Assessment System (RAS) of the Government of India, which provides the user a portal to share their feedback on the website and other available Aadhaar online services. The FAQs section on Aadhaar services is contextually linked to specific Aadhaar services to provide helpful guides to the residents. FAQs on various topics are provided in 13 Indian languages, viz., – English, Hindi, Assamese, Bangla, Gujarati, Kannada, Malayalam, Marathi, Odia, Punjabi, Tamil, Telugu, and Urdu. The website displays analytics relating to the total numbers of Aadhaar generated and authentication done across country.The website is certified for CSS and

HTML by W3C and is currently undergoing audit by STQC for GIGW compliance. Social media section provides residents to view the latest updates and participate on the UIDAI Facebook and Twitter pages.

**UIDAI Website as Common Repository**

The UIDAI website functions as a common repository of the following:

- Policies, guidelines, checklists and other on-boarding documents that are critical for ecosystem partners. The same is available in the resources section.

- The Aadhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Act, 2016, and associated Rules, Regulations, Notifications and Circulars are prominently placed under legal section.

- MoUs with State and non-State Registrars, tenders and related documents for business users are available under enrolment documents and UIDAI documents in the resources section.

- News, press releases, Aadhaar related campaigns, videos and FAQs, in downloadable format are available under media section.

**Single-point access to Online Aadhaar Services and other Portals**

The UIDAI website also provides a direct link to the following services, analytics and business specific portals:-

- Locate Enrolment & Update Centres
- Check Aadhaar Status
- Download Aadhaar
- Retrieve Lost UID/EID
- Update at Enrolment Centre
- Check Status - Update done at Enrolment Centre/ ECMP
- Address Update Request (Online)

- Check Update Status
- Check status of Address Validation Letter
- Aadhaar Update History
- Verify Aadhaar Number
- Verify Email/Mobile Number
- Lock/Unlock Biometrics
- Lock/Unlock Aadhaar
- Check Aadhaar & Bank Account Linking Status
- Aadhaar Authentication History
- Aadhaar Paperless Local e-KYC
- Virtual ID (VID) Generator
- Order Aadhaar Reprint
- Check status of Aadhaar Reprint

**Aadhaar Dashboard:** The analytic dashboard displays the big data for Aadhaar enrolment, update, authentication and e-KYC services.

### Future Plans

Following are the future plans for UIDAI website:-

**Unified Mobile App**: UIDAI strives to ensure that no resident of India must be left out from availing Aadhaar services. To achieve this goal the Authority is in the process of developing a Unified Mobile Application with both online and offline facilities to access Aadhaar Web Services. The App will be developed for both android and IOS mobile platforms.

### 8.2.9 Data Security and Privacy

### Privacy and Security of Aadhaar data is of utmost importance to Government

UIDAI has a well-designed, multi-layered approach robust security system in place and the same is being constantly upgraded to maintain highest level of data security and integrity. The architecture of Aadhaar ecosystem has been designed to ensure data security and privacy, which is an integral part of the system from the initial design to the final stage. For further strengthening of security and privacy of data, security audits are conducted on regular basis, and all possible steps are taken to make the data safer and protected.

So far as privacy of Aadhaar data is concerned, the Government is committed to accord it the utmost priority which is evident from the following fundamental binding principles on which Aadhaar has been designed and which have been further reinforced through the various provisions of the Aadhaar Act and the Regulations framed thereunder. Section 29 of the Aadhaar Act prohibits sharing or disclosure of core biometric for any purpose, violation of which is punishable under Section 37 and 38 of the Act with imprisonment upto three years.

Regulations under the Aadhaar Act have been promulgated to ensure that enrolment, authentication and other associated activities are carried out strictly in accordance with law. Aadhaar (Enrolment and Update) Regulations, 2016 ensure that enrolment are done under a secure and legal process wherein responsibility and accountability of all the agencies involved in the process are clearly defined. Further, the Aadhaar (Authentication) Regulations 2016 have been framed to ensure that authentications are done in secure conditions.

### Privacy and Security by Design

Security and privacy of personal data have been fundamental in design of Aadhaar system without sacrificing utility of the identity system. At the time of creating an identity system of this scale, privacy and security of personal data were embedded in the design strategy of the system from day one. Aadhaar system addresses these issues at its core. One of the key considerations is to keep the Aadhaar system purely focused on identity. The Aadhaar system only collects minimal data just enough to provide unique identity, issue the Aadhaar number after biometric de-duplication, manage lifecycle changes of that identity record, and provide an Application Programming Interface (API) for verifying the identity (online authentication) for various applications requiring identity verification. Designing the Aadhaar system as pure identity platform allowed clear separation of duties and leaves usage of identity to other partners, and their various applications which

may be built on top of the Aadhaar platform. Aadhaar number is a random number with no built-in intelligence or profiling information. A 12-digit number was chosen based on the identification needs of the population in the next couple of centuries.

### Aadhaar enrolment through a secure process

UIDAI has set up a nationwide infrastructure for Aadhaar enrolment of residents of India through a network of registrars and its accredited enrolment agencies. The registrars are largely the Government departments, agencies and public sector banks. Enrolment agencies are selected through rigorous selection criteria. A resident is enrolled by a UIDAI certified operator through UIDAI software under a highly robust, controlled, non-repudiable and secure process. Every day around one lakh people are enrolled for Aadhaar across the entire country through more than 30,000 certified operators, who are selected on the basis of a rigorous examination and test process. The operator also has to obtain his own Aadhaar number first and then sign each and every enrolment through his own finger-prints and Aadhaar number. In this manner, a complete account is maintained as to which operator enrolled whom, where and when so that in case of any default accountability of the enrolment operator and agency can be immediately fixed. Then, the biometric data of people, who are enrolled, are matched against the entire data base of the existing Aadhaar holders, which are presently more than 122 crore and only when no match is found, Aadhaar numbers are generated. Biometric matching of this scale is done in a time span of 24 hours. All enrolment data including biometrics are encrypted by 2048 bit.

Encryption key at the time of enrolment and thereafter is not accessible to any agency, except UIDAI, which can access these data only through a secure decryption key available to UIDAI only. It is worth mentioning that it may take the fastest computer on the earth billions of years to break this encryption key by brute force. So far, not a single incident has come to the notice wherein core biometrics of a resident enrolled for Aadhaar has been leaked.

### Minimal Data with No Linkage

Since Aadhaar system has data of all Aadhaar holders of the country in a central repository, it was designed to capture minimum data so as to provide identity related functions (issuance and authentication). This design philosophy is derived directly from the fact that UIDAI respects privacy of the residents and does not hold non-essential data within its systems. In addition to having minimal data (4 attributes – name, address, gender, and date of birth - plus 2 optional data – mobile, email), this central database does not have any linkage to existing systems/applications that use Aadhaar. This essentially creates a set of data islands containing resident data across various applications/systems (a federated model for resident data) rather than a centralized model eliminating the risk of a single system having complete knowledge of resident and his/her transaction history.

### No Pooling of Data

Aadhaar system is not designed to collate and pool various data and hence does not become a single central data repository having all knowledge about residents. It has no linkage information (such as PAN number, Driver's License Number, PDS card number, EPIC number, etc.) to any other system. This design allowed transaction data to reside in specific systems in a federated model. This approach allowed resident information to stay in distributed fashion across many systems owned by different agencies.

### Authentication

Aadhaar authentication responds only with yes/no answer. Aadhaar authentication allows applications to verify the identity claim by the resident while servicing them while still protecting their data privacy.

A balance between 'privacy and purpose' is critical to ensure convenience as well as protection of resident's identity data. External user agencies do not have access to the Aadhaar database. Aadhaar e-KYC service allows resident to authorize UIDAI to share

electronic version of their Aadhaar letter. For every Aadhaar e-KYC request, only after successful resident authentication, demographic and photo data is shared in electronic format.

## Optimal Ignorance

Authentication is designed in such a way that neither the "purpose" of authentication nor any other transaction context is known to Aadhaar system. This design was precisely to create a "zero-knowledge" system to protect privacy. Authentication of an Aadhaar number holder by an agency does not entitle Aadhaar system to know the objective for which authentication is carried out.

## No Location Awareness

UIDAI authentication system does not have location awareness i.e. Aadhaar authentication is oblivious to the location from where the Authentication request is sent thereby eliminating the risk of a resident being tracked.

## Federated Data Model and One Way Linkage

By its very design, it eliminates the Aadhaar database having all domain specific transaction data and hence the resident's specific transactional data remains federated across many user agencies' databases rather than centralized into a common database. It is also important to note that the various systems may have made reference to the UIDAI (through the use of the Aadhaar number), but the UIDAI does not maintain a reverse links to any of these systems. Aadhaar seeding is, therefore, strictly a one-way linkage wherein the Aadhaar number is incorporated into the beneficiary database without pooling any data from the said database into the UID database.

## Security of Aadhaar Data

UIDAI uses one of world's most advanced encryption technologies in transmission and storage of data. Aadhaar based authentication is robust and secure as compared to any other contemporary systems. Aadhaar system has the capability to inquire into any

instance of misuse of Aadhaar biometrics and initiate action.

## UIDAI certified as ISO 27001

UIDAI has established the Information Security Management System and obtained the ISO 27001:2013 certification from STQC.

## Declaration of CIDR Infrastructure as "Protected System"

Security of UIDAI-CIDR information is of paramount importance for safeguarding resident data. Confidentiality, integrity and availability of the information is maintained at all times through controls that are commensurate to the criticality of the information assets, so as to protect the information systems from all types of threats (cyber related, virtual Logical Cross-border of CIDR Interface, national or international interests, internal or external, deliberate or accidental). UIDAI-CIDR has also been declared as "**Protected System**" by National Critical Information Infrastructure Protection Centre (NCIIPC) adding another layer of IT security assurance.

## Governance Risk Compliance and Performance Service Provider (GRCP-SP) On-boarded

The vision of GRCP framework is to facilitate creation of a robust, comprehensive and secure environment for UIDAI to operate. To achieve the goals, the GRCP-SP provides UIDAI management with oversight of UIDAI and partner ecosystem in terms of visibility, effectiveness and control.

## Information Security Assessment of External ecosystem partners

UIDAI security has been enhanced further through regular information security assessment of various ecosystem partners.

## Fraud Management System at UIDAI

UIDAI has a well-designed, multi-layer approach and robust fraud management system in place. With the

establishment of forensic lab, the fraud investigation capacity of UIDAI has increased manifolds.

### 8.2.10 Aadhaar - A Tool for Governance Reform

I. Aadhaar and Financial Inclusion:

Aadhaar is a unique digital identity for every Aadhaar holder and does not change over the lifecycle of an individual. This property of Aadhaar being unique, it is also being used as a financial address to accomplish the country's goal of financial inclusion. The 12-digit Aadhaar is sufficient to transfer any payments to an individual.

Till recently, in order to transfer money to a beneficiary, the Governments needed to know the bank account, IFSC Code, and bank branch details etc, which are prone to changes. However, Aadhaar offers the possibility of sending money by just using the 12-digit number for life without being affected by any changes in the bank account of the individuals. Different types of payment system specific to our country's requirement which use Aadhaar number are:

A. Aadhaar Payment Bridge (APB)

A payment can be made to a person's bank account via his/her Aadhaar number, provided it is linked to his/her Aadhaar number. Currently, some of the schemes with largest number of beneficiary count viz. DBTL, MGNREGS, NSAP, Scholarship Schemes and F&PDS are transferring the cash benefits and subsidies directly to the beneficiaries' bank account through APB.

As on 31st March 2019, over 65.16 crore Aadhaar holders have linked their Aadhaar with multiple bank accounts across 972 banks including all nationalized banks, RRBs and many cooperative banks. An amount of ₹1,91,292 crore has been remitted so far through over 467.80 crore successful transactions.

B. Aadhaar Enabled Payment System (AEPS)

AEPS is the platform using which an Aadhaar holder, who has linked his Aadhaar in the bank account can do basic banking transactions, including cash withdrawal, cash deposit, balance enquiry, fund transfer etc in an interoperable fashion from any Bank's MicroATMs (Point of Sale devices carried by Bank Mitras).

AEPS has transformed the way the marginalized customers were dealt with by the banks. It has empowered the customer to do an interoperable transaction on their account from any microATM in the neighbourhood, hence making the market customer driven and resulting in competition among all banks. As on 31st March 2019, over 310.38 crore successful transactions done on this platform across nearly 6.87 lakh microATMs.

II. Aadhaar and DBT:

To achieve targeted delivery of welfare services in a more transparent and efficient manner, the Government of India had launched Direct Benefit Transfer (DBT) through Aadhaar Payment Bridge (APB) and other channels in January 2013. DBT was implemented in phases for all Central Sector Schemes and Centrally Sponsored Schemes. So far, several DBT schemes are leveraging on APB to transfer cash benefits to the Aadhaar linked bank accounts of the beneficiaries. As on 31st March 2019, multiple schemes including PAHAL had paid over ₹1,91,292 crore across 467.80 crore successful transactions. It has been made possible by linking Aadhaar with the bank accounts of the beneficiaries.

III. Notifications issued for DBT Schemes

Using Aadhaar for any scheme under Direct Benefit Transfer from the Consolidated Fund of India, it is mandatory that the concerned Department/Ministry administering the scheme issues a notification,

under Section 7 of the Aadhaar Act 2016, notifying the need of Aadhaar as an identification document. UIDAI has been mandated to facilitate drafting and issuance of such notifications in compliance with the Aadhaar Act 2016, with due vetting by the Ministry of Law and Justice. Accordingly, till 31st March 2019, UIDAI (DBT Cell) has coordinated with more than 36 Ministries/Departments to issue 153 notifications under Section 7 of Aadhaar Act covering a total of 261 schemes (centrally sponsored or central sector).

IV. Issuance of Clarifications on Exception Management and for NRIs/PIOs/OCIs

The Aadhaar Act, 2016 and all notifications/ circulars issued by various Ministries/Departments of the Government of India under this Act have clearly underlined that Aadhaar is not mandatory for delivery of any service, subsidy or benefit. However, in order to provide categorical clarification on non-denial of services/benefits/ subsidies for the want of Aadhaar with respect to specific schemes, UIDAI has issued the following circulars (available on https://uidai.gov.in/legal-framework/acts/circulars.html).

• Exception handling in PDS and other welfare services, dated 24 October 2017.

• Applicability of Aadhaar as an identity document for Non-resident Indians (NRIs)/ Persons of Indian Origin (PIOs) and Overseas Citizens of India (OCIs), dated 17 November 2017.

### 8.2.11 Construction of UIDAI, HQ Building

The construction of UIDAI headquarter building at Bangla Sahib Road, New Delhi-110001 was completed on 20th September 2018.

The building is equipped with state-of-art technologies like (i) Fully Automated Shuttle Type Two Stacks Car Parking System (unique and only such system in Delhi NCR), (ii) 100 KWp Rooftop Solar PV Power Plant, (iii) Energy Efficient VRV System for air conditioning, (iv) Fire Fighting and Fire Alarm Systems, (v) Energy Efficient two layer glass façade system for best optimization of sunlight during day time, (vi) Access Control System, (vii) Automatic Intelligent Lighting Control System Zero Waste discharge by operating in-house Sewage Treatment Plant (STP) of 25 Kilo Litre per Day (KLD), (viii) Emergency evacuation and fire fighting training schedules on weekly basis, (ix) 24 x 7 CCTV Monitoring, (x) 24 x 7 Emergency Control Room, (xi) Daily Energy consumption monitoring round the clock (xii) Indoor Oxygen rich Plantation, (xiii) PM 2.5 Efficient AHU Systems, (xiv) In-House SBI ATM Banking Station and (xv) Drip Irrigation System for Green Wall and landscape areas. Also, after prescribed rounds of audit and review, the GRIHA Council had awarded the headquarter building with GRIHA 5 Star Rating Certificate.

During the "Swachhta Pakhwada" observed from 1st February to 15th February 2019, the Ministry of Electronics and IT had awarded "1st Position" to UIDAI headquarter building for best performance.

### 8.2.12 Implementation of Official Language Policy in UIDAI

UIDAI is implementing Official Language Policy of Government of India in its Head Quarter as well as its all 8 Regional Offices and ensuring the compliance of various provisions envisaged in the Official Languages Act and Official Languages (Use for Official Purposes of the Union) Rules, as well as orders of the Government of India, issued from time to time in this regard.

During the period from 1st January 2018 to 31st March 2019, 5 meetings of Departmental Official Language Implementation Committee were held at Headquarters in which, among other items, progressive use of Hindi was discussed and decisions had been taken

to increase the use of Hindi in official work. During the reporting period of 15 months, 4 Hindi workshop was organised for sensitizing the officials with the Official Language Policy. About 114 officers and staff participated in this workshop.

Progressive use of Hindi in Head quarter and all 8 Regional Offices of UIDAI was discussed and reviewed in Internal Review Meetings held on 23 May, 2018 and 20 August, 2018 under the Chairmanship of CEO, UIDAI and necessary guidelines were issued to the Regional Offices for promoting use of Hindi as per Government directions especially for original correspondence in Hindi to Region A, B and C as per targets prescribed in Annual Program 2018-19 of Department of Official Language, Ministry of Home Affairs.

'Hindi Pakhwara' was celebrated from 14th September, 2018 to 28th September, 2018 in UIDAI Headquarter. Four competitions were organised during this period. 140 Officers/employees of UIDAI, HQ actively participated in these competitions. Prize distribution function was organized on 17th October 2018 at UIDAI Headquarters and cash prizes and certificates were awarded to officers/employees of Headquarters.

As per the directives of Department of Official Language, Ministry of Home Affairs, the Hindi inspection of UIDAI Regional Offices at Lucknow and Bengaluru was conducted during the year to assess the status of compliance of Official Language Policies/ Rules.

To promote use of Official Language in official work, every year UIDAI carries out an incentive scheme for noting and drafting in Hindi at its HQ as well in all the Regional Offices independently. Last year, 04 officers of Headquarters had participated in the scheme and found eligible for awarding cash prizes. Winners of UIDAI Headquarters were awarded with cash prizes in Rajbhasha Prize Distribution Function.

## 8.2.13 Details of Budget & Expenditure during 2018-19

During 2018-19 (upto March, 2019), an expenditure of ₹1,182.08 crore has been incurred against Revised Estimate of Rs.1345.00 crore. Also, during the period from 01st January 2018 to 31st March 2018, the expenditure incurred was ₹452.66 crore. Thus, the total for the period from January 2018 to March 2019 (for last 15 months) works out to be ₹1,634.74 crore. Since inception, the total expenditure incurred is ₹11,125.36 crore.

## 8.3 Indian Computer Emergency Response Team (CERT-In)

The Indian Computer Emergency Response Team (CERT-In) isw a statutory organisation under Ministry of Electronics and Information Technology, Government of India. CERT-In has been designated under Section 70B of the Information Technology Act, 2000 to serve as the national agency to perform the following functions in the area of cyber security:

- Collection, analysis and dissemination of information on cyber security incidents
- Forecast and alerts of cyber security incidents
- Emergency measures for handling cyber security incidents
- Coordination of cyber security incident response activities
- Issue guidelines, advisories, vulnerability notes and white papers relating to information security practices, procedures, prevention, response and reporting of cyber incidents

Such other functions relating to cyber security as may be prescribed.

Further details are availble in Chapter 6, Section 6.3.3.

# Chapter 9
# Attached Offices and Societies



In order to operationalise the programmes of Ministry of Electronics and Information Technology (MeitY), there are two attached organisations and six autonomous bodies which take up projects in the field of electronics and IT including high end research and deployment of IT solutions in wide range of areas.

## 9.1 High-end Software Systems : Centre for Development of Advanced Computing (C-DAC)

Centre for Development of Advanced Computing (C-DAC) is a premier R&D organisation of the Ministry of Electronics and Information Technology (MeitY) for carrying out R&D in IT, electronics and associated

areas. In addition to carrying out research and development in high performance computing, the R&D of C-DAC has expanded to various other areas, such as, Grid and Cloud Computing, Multilingual Computing, Heritage Computing, Professional Electronics including VLSI and Embedded Systems, Cyber Security and Cyber Forensics, Health Informatics, Software Technologies and Education related to these technologies. C-DAC Advanced Computing Training School (ACTS) is a well-known brand in the area of high-end training in electronics and IT in the country.

During the year 2018-19, C-DAC made significant advancements in carrying out research and development in electronics and information technology, developing and deploying various solutions, collaborating with organisations of repute both at national and international level, and providing trainings and organizing events.

Key technological achievements of C-DAC during this year in each of its focus areas are outlined below.

### 9.1.1 High Performance Computing (HPC), Grid Computing and Cloud Computing

**National Supercomputing Mission:**

"National Supercomputing Mission (NSM) : Building Capacity and Capability" was approved by Cabinet Committee on Economic Affairs (CCEA) on April 9, 2015 to be implemented jointly by MeitY and DST with IISc Bangalore and C-DAC being the executing agencies. Under build approach, it is envisaged to design and manufacture the sub-systems of HPC system locally in India. C-DAC is entrusted with building systems indigenously in a phased manner (phase-I: Assembly in India, Phase-II: Manufacturing in India, Phase-III: Design and Manufacturing in India) with all the phases to start simultaneously. In phase-I, plan is to build two 650 TF systems and one 1.3 PF system which is to be installed at IIT Varanasi, IISER Pune and IIT Kharagpur respectively and build cumulative capacity of 10 PF in

Phase-II.

The first supercomputing system under NSM, PARAM SHIVAY is installed at IIT BHU, Varanasi with C-DAC's system software stack developed under NSM build approach. PARAM Shivay was inaugurated by Shri Narendra Modi, Hon'ble Prime Minister of India on February 19, 2019. The system has 212 CPU only nodes and 11 GPU nodes constituting more than one lakh twenty thousand computing cores (CPU and CUDA cores). The system has sustained compute power of 525 TF and peak computing power of 837 TF.

Under the plan to build four pilot systems of 100TF with different architectures/platforms for evaluating and deciding technology most appropriate for Phase-III design and for specific applications, first 100 TF system has been developed and is ready for deployment as per mission requirement. HPC Lab has been setup at C-DAC Pune for HPC System Design, Development and Integration. Setting up of System Software Lab for developing HPC System Software stack has also been completed at C-DAC Bangalore and it is being used for evaluating latest technologies and testing of software components. Development of a next generation HPC network "Trinetra" scalable to higher speeds offering world class performance for use in HPC systems is in progress. Development of critical system software components and tools is in progress along with use of available Open Source Software components with appropriate modification, customization and optimization. Various application development areas have been identified and proposals have been evolved in consortium mode involving C-DAC, academia and industry. Exascale research areas have been identified as System Architecture, Liquid Cooling Technology, System Software, Infrastructure Management and Scalable Algorithms/Libraries for future HPC systems.

The mission also includes building capacity in HPC-aware human resources at all levels for meeting the challenges of development of HPC applications and

managing, monitoring and running complex HPC systems. Short term (1-2 weeks) and medium term (6 months) training courses have been designed for faculty and industry professionals. A few batches have already been trained by C-DAC and IITs and HPC nodal centres are being identified across the nation for further proliferation. Introduction of HPC at higher education level has also been planned at UG and PG levels and curriculum for the same has been designed. The course is started at IIT Bombay and is being planned for other institutes.

## Deployments of PARAM Shavak

During the year, C-DAC continued to proliferate its PARAM Shavak at various academic and research institutions across the country to promote HPC literacy. PARAM Shavak DL GPU System helps academic institutions and research organisations employ deep learning techniques for GPU accelerated machine learning applications. PARAM Shavak Virtual Reality (VR) System is the latest variant, which enables collaborative VR experiences come alive. With this compact system, users can extend their reach beyond the traditional domains of design, manufacturing and entertainment in various areas including healthcare, advertising and education. C-DAC has deployed more than 70 PARAM Shavak systems across the country till date.
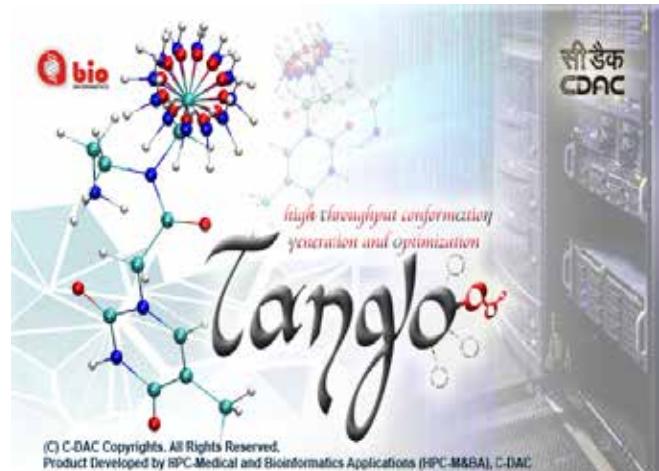
## PARAM Yuva-II System at C-DAC's National PARAM Supercomputing Facility (NPSF)

Since its inauguration in February 2013, NPSF has processed around 3,85,106 jobs. Utilization of NPSF has always remained above 95%. Usage of NPSF's HPC services has been acknowledged in 322 publications and 45 PhDs so far. More than 70 HPC applications from various science and engineering domains were ported and optimized for PARAM Yuva II.

## HPC Applications: Bioinformatics

Products developed under National Supercomputing Mission in the area of bioinformatics are described below:
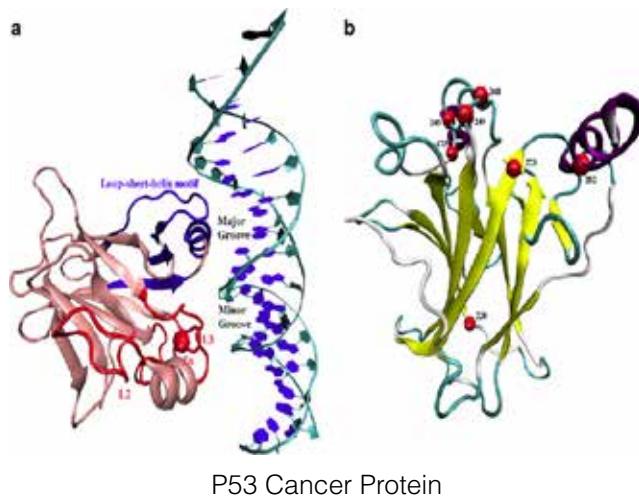
1.  Tango (high Throughput conformAtioN Generations and Optimization) is a conformation generation and optimization tool developed by C-DAC which uses semi-empirical energy calculations. The energy calculations are performed using MOPAC. A well-defined architecture handling the input and output generation has been employed. This was launched during the event named "Accelerating Biology 2019: Towards Thinking Machines" held at Pune during February 5-7, 2019.



Tango - high Throughput conformAtioN Generations and Optimization

2.  SUM (Supercomputing User Management): A portal application, which aids facility managers to manage users data and take appropriate decision based on data. SUM is enabled with decision support modules, such as, utilization report in terms of graph and pie chart, document management and automation etc. This was launched during the event named "Accelerating Biology 2019: Towards Thinking Machines" held at Pune during February 5-7, 2019.

3.  GenoVault: This initiative aims to develop a Cloud based repository for handling Next-Generation Sequencing (NGS) data. During the year, data types and formats of available public domain repositories, such as, Short Read Archive (SRA) at NCBI and European Nucleotide Archive at EBI were analysed by C-DAC. Huge genomics data storage and management is possible with this initiative.

4.  DBT-NE: This is a collaborative initiative between Tezpur University, Assam and C-DAC for carrying out R&D in the area of structural biology using bioinformatics means. During the year, C-DAC was engaged in carrying out quantum chemical calculations and molecular dynamics simulations of antisense molecules of industrial importance.

5.  NSM related HPC research and development was carried out in the area of Cancer Proteins, Drug Repurposing, Protein Folding/Misfolding, Antisense Drug Molecules, Mycobacterium Comparative Genomics and Human Genomics for Transcriptome Analysis during the year and the research activity led to IPR generation.



P53 Cancer Protein

6.  Bioinformatics Resources and Applications Facility (BRAF) facilitated more than 200 academic researchers in this year for their PhD and High End Computational Biology Research. BRAF also supported multiple national/international collaborations, such as, ACTREC, Mumbai, University of Pune, NCI, USA etc.
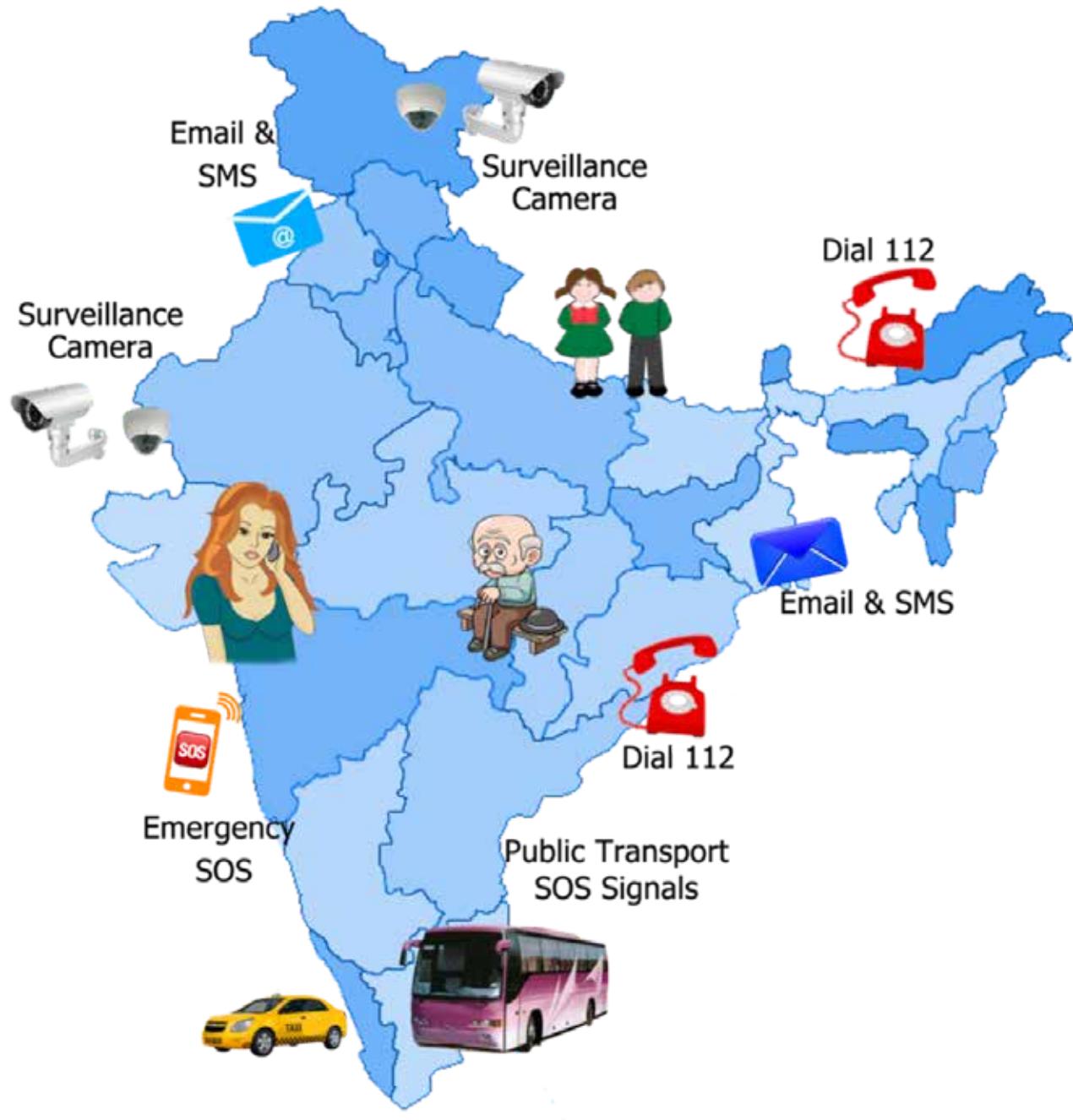
## 9.1.2 Professional Electronics, including VLSI and Embedded Systems

### Microprocessor Development Programme (MDP)

The initiative "Microprocessor Development Programme" has been approved by MeitY and is being executed by C-DAC over two phases. As part of Phase-I of the project, micro-architecture design of a 64-bit Quad core processor has been completed. In Phase-II of the project, design of 64-bit Quad core processor is planned to be completed and implemented on FPGA by March 2019.

### Emergency Response Support System (ERSS)

ERSS (erstwhile NERS) is an integrated system that provides a common platform to receive distress signals in the form of voice, message, email, panic signal etc. and to dispatch various services such as police, fire rescue and health. The common single number 112 is designated for this purpose. C-DAC has signed an MoU with Ministry of Home Affairs (MHA), Govt. of India for the development and deployment of this system across the country and work orders have been received from 25 States/UTs to implement this initiative. Implementation has been completed in Kerala, Andhra Pradesh, Nagaland, Uttarakhand, Punjab, Jammu & Kashmir, Dadra and Nagar Haveli, Daman and Diu, Andaman & Nicobar Islands and Himachal Pradesh. The ERSS/112 India App developed by C-DAC was launched on February 19, 2019 by Shri Rajnath Singh, Hon'ble Union Home Minister of India.
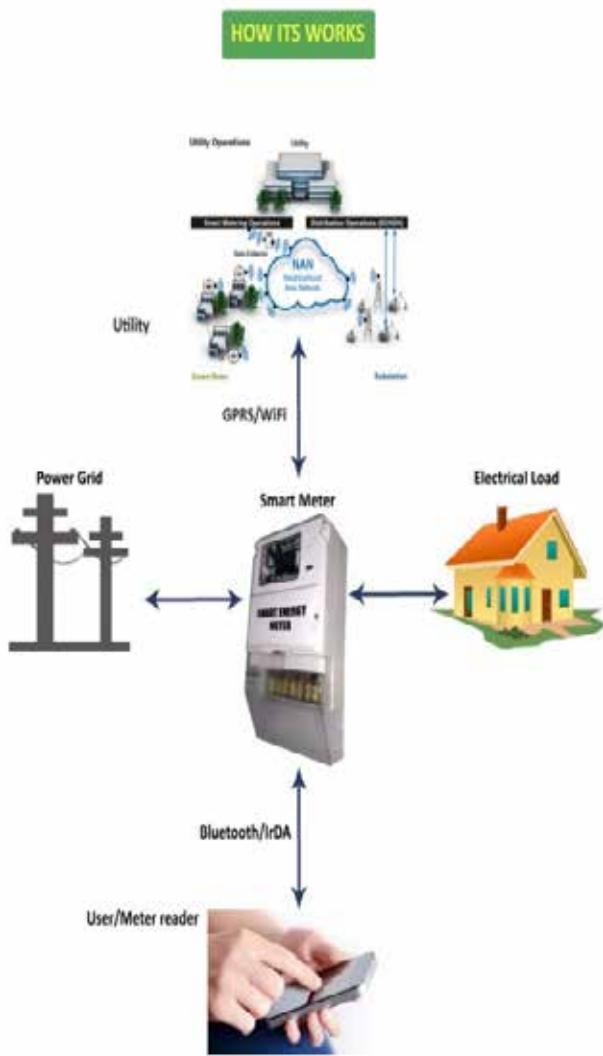
**Commercialization and Deployment of TARANG - Digital Programmable Hearing Aid**

C-DAC has developed TARANG - Digital Programmable Hearing Aid (DPHA). Industry partners have sold more than 70,000 units of Tarang through various channels. Government of Kerala has approved distribution of Tarang Hearing Aids under various schemes of local bodies in the State.

## Smart Energy Meter

Smart energy meter is designed for smart energy metering for indian power network. These energy meters are based on Indian standards and are compatible with Smart Grid Communication Technologies and support Distributed Generation (DG). Memorandum of Agreement (MoA) was signed on September 24, 2018 between C-DAC and M/s. Indriya Technologies Pvt. Ltd., Technopark, Thiruvananthapuram for Transfer of Technology of Single Phase/Three Phase Smart Energy Meters for Indian Power Network.





## Agriculture Quality Assessment Solutions

As part of "Digitally Inclusive and Smart Community (DISC)", C-DAC developed and deployed its various Agriculture Quality Assessment solutions, such as, Annadarpan - Smart for Quality Analysis of Raw and Parboiled Rice, Annadarpan - Dynamic for Quality Analysis of Pulses (e.g. Tur, Moong, Bengal Gram, Chana etc.), CT-VIEU for Quality Analysis of Dry Red Chilly and eQuality-VEG for Quality Assaying of different vegetables (like Potato, Tomato, Capsicum etc.). Thirty five units of Annadarpan System have been deployed in India including thirty FCI locations in Punjab, Haryana, Andhra Pradesh, Odisha, West Bengal, Chhattisgarh and Uttar Pradesh. Ten CT-VIEU systems are operational at different APMCs in Andhra Pradesh, Karnataka and Tamil Nadu. Annadarpan

Dynamic and eQuality VEG system are operational at APMC, Hubli and Tapashi Mallik Krishak Bazar, Singur, West Bengal respectively. More than 250 persons of FCI and 40 persons of APMCs and AMCs are trained to operate the systems.

## COPS – TARA

COPS-TARA (C-DAC Open Process Solution-Transmission of Aggregated data for Real time Access) is a compact GSM/GPRS modem specifically designed to transfer MODBUS compatible device data to remote location. COPS-TARA supports Standard Meter Communication Protocol (such as, MODBUS TCP/IP) for transmission of data over GSM/GPRS Network. COPS-TARA is deployed in the State Load Despatch Centres (SLDCs) of Meghalaya and Assam. Implementation across various North East states in 120 locations is under progress.

## Short Term Open Access (STOA)

Short Term Open Access (STOA) software is for the Load Despatch Centres based on the Central Electricity Regulatory Commission (CERC) guidelines. The major functionalities of the software include Online Filing of applications, Forwarding/Receiving Concurrence, Application Processing, Generation of Payment Schedule, scheduling for next day and Surrendering of applications. The STOA software v2.0 is deployed in WRLDC (Western Regional Load Despatch Centre) and SRLDC (Southern Regional Load Despatch Centre).

## Smart Card Identity Management System

C-DAC has developed Identity Management System which includes smart card, reader, backend web application and database system. The solution has been developed keeping in view the dynamics of various institutional policies and their geographically distributed nature. It is a secure design with two factor authentication which also includes Aadhaar-based authentication. This system has been deployed at all C-DAC Centres, Vidyasagar University, West Bengal and IIT, Bhilai and is currently being deployed for West Bengal Commercial Tax department.

## Indigenous Magnetic Resonance Imaging (IMRI) Software

MeitY, Government of India launched a National Mission programme in the area of Medical Imaging Equipment for indigenous technology development for a low cost, affordable and state-of-art 1.5 Tesla MRI Machine to meet the large requirements of such machines in the country. As a major partner in the national consortium (SAMEER, C-DAC, IUAC, DSI-MIRC) for the MRI scanner development, C-DAC is focusing on the research and development of the software components for the IMRI system which includes Pulse Sequence Design, MR Image Reconstruction, GUIs for the Operator Console and Imaging Workstation and Advanced Clinical MR Image Visualization. Modules under Diffusion Imaging, Perfusion Imaging, Segmentation and Denoising have been completed and validated by radiologists from five hospitals PAN India.

## IoT Labkits Deployments

C-DAC carried out deployments of its labkits at 16 educational institutions/Government organisations across India and conducted trainings on these labkits for academic institutes.

## Smart Post Box Kiosk

Smart Post Box Kiosk, designed and developed by C-DAC, enables the user to post a registered/speed post article round the clock and eliminates the requirement of visiting the post office during the office hours. Its features include round the clock service, time saving, optimization of clearance schedule and cashless transactions etc. It supports various payment methods including credit/debit cards, e-wallets, UPI etc. The number of articles registered at a kiosk is monitored periodically and updated in server. The

prototype version of the same is installed and is functional at GPO, Bangalore, Karnataka from October 2018.

### 9.1.3 Multilingual Computing and Heritage Computing

**World Hindi Samman (Award)**

The contribution of C-DAC in the field of Hindi language computing, its research and development, proliferation and various deployments for usage in Government and general public were acknowledged by a committee set up for 11th Vishwa Hindi Sammelan and it gave "विष्व हिंदी सम्मान दिवस" (Vishwa Hindi Samman)" to C-DAC. The award was received by Dr. Hemant Darbari, Director General, C-DAC on August 20, 2018 by the hands of Smt. Sushma Swaraj, Hon'ble Minister of External Affairs Government of India in the presence of dignitaries. An exhibition of the software tools, technologies, products and solutions developed by C-DAC for Hindi language was also organised, exhibited and demonstrated at the World Hindi Secretariat, Mauritius during August 21-24, 2018 for more than 600 students and teachers from various academic institutes.
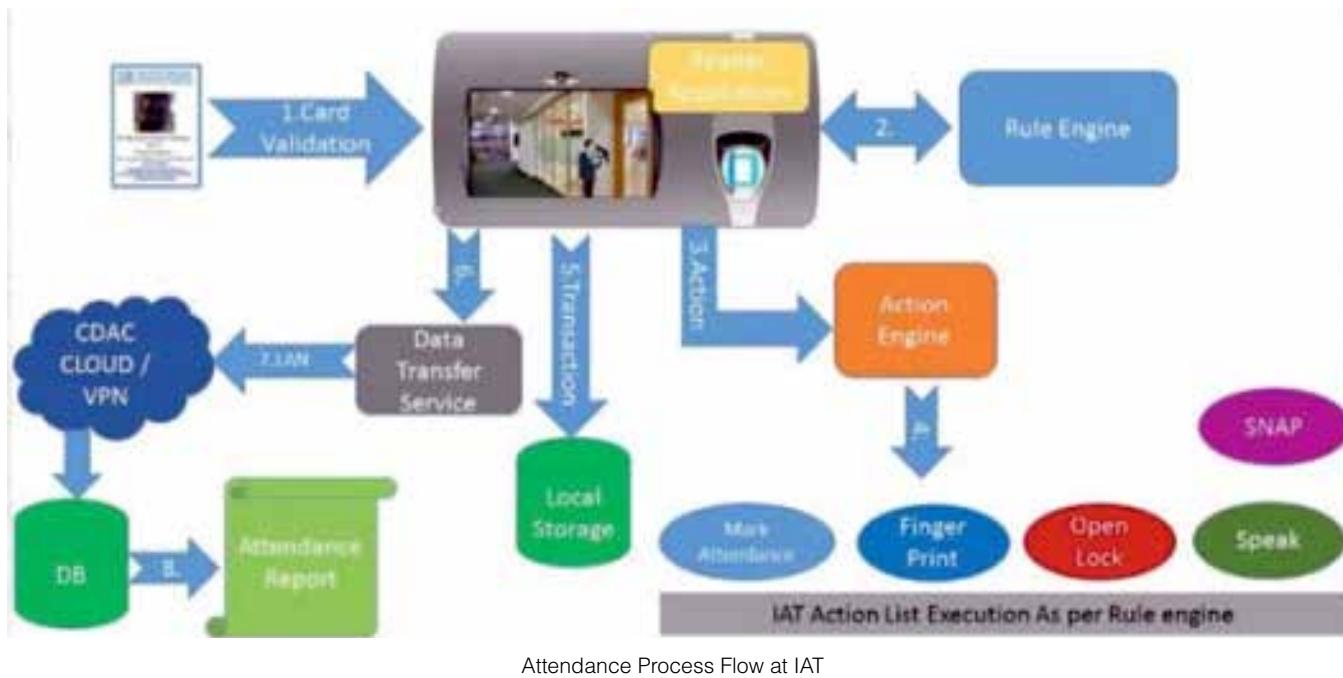


Awards world Hindi Samman

**Kanthasth – Rajbhasha कंठस्थ/Translation Memory (TM)**

Translation Memory based English to Hindi and vice-versa Translation System is a feature of computer-aided translation system. The main characteristic of "Kanthasth" is translation memory system that allows a translator to re-use the already translated segments while translating a new file, either through complete match or partial match. The system was launched by Shri Kiren Rijiju, Hon'ble Minister of State for Home Affairs, Government of India on August 18, 2018 in 11th World Hindi Conference (WHC) held at Mauritius during August 18-20, 2018 in the presence of various dignitaries/laureates from around the world.

Attendance Process Flow at IAT

## LILA Hindi Pravah

LILA Hindi Pravah is a web and mobile based intelligent self-tutoring system for learning Hindi. The coursewares of Hindi Prabodh, Hindi Praveen and Pravah are included in the package which is made available to all free of cost. English, Assamese, Bodo, Bangla, Gujarati, Kannada, Kashmiri, Malayalam, Manipuri, Marathi, Nepalese, Odia, Punjabi, Tamil and Telugu are the instructional media of languages. LILA Hindi Pravah was launched by Shri Venkaiah Naidu, Hon'ble Vice-President of India in the presence of Shri Rajnath Singh, Hon'ble Home Minister, Shri Hansraj Gangaram Ahir, Hon'ble MoS for Home Affairs, Shri Kiren Rijiju, Hon'ble MoS for Home Affairs and other dignitaries during the Hindi Divas Samaroh function on September 14, 2018 at Vigyan Bhavan, New Delhi.

## Localization of Government Portals

During the year, Integration of go-translate plugin was carried out to NVSP Home Pages, GeM Portal, MIB, MCG and C-MET etc. Modi-Lipi GoTranslate plugin was integrated in Government of Maharashtra websites. Localization Projects Management Framework (LPMF) was leveraged by various agencies including Board of Intermediate Education, Department of Women, children, disabled and senior citizens and school education portal etc. Foreign language support was added for Dzonka.

## JATAN: Virtual Museum Builder

JATAN (जतन): Virtual Museum Builder is a comprehensive software solution that helps in digital collection management of the heritage information resources and museum antiquities. C-DAC has carried out 24 deployments of JATAN across various national museums and is in the process of implementing the solution for 15 site museums of Archaeological Survey of India (ASI).

## National Virtual Library of India

The National Virtual Library of India is an initiative funded by Ministry of Culture and is being implemented jointly by C-DAC Pune, IIT Bombay and IGNOU. It is a

National Voters Services Portal

comprehensive data repertoire with search and retrieval functions in major Indian languages that presents the users huge digital data dissemination in an organised and user-friendly way. C-DAC has developed the entire National Virtual Library of India portal components and framework with all the thematic areas as envisaged. Limited User Version of NVLI was launched in 2018. Post the launch, C-DAC deployed the application in Mini Cloud at C-DAC and at IIT Bombay Cloud Infrastructure.

## Digital Library of The Bhandarkar Oriental Research Institute (BORI) using DIGITĀLAYA (डिजिटालय)

C-DAC has established a Digital Library of the Bhandarkar Oriental Research Institute (BORI), Pune using DIGIT LAYA (डिजिटालय). DIGIT LAYA (डिजिटालय) is an e-Library and Archival System developed by C-DAC. C-DAC provided training to the BORI officials and they have integrated and linked 4,000 plus digitized rare books and manuscripts out of their collection of 25,000, which are in several languages and scripts, such as, Sanskrit, Prakrit, Indian regional languages, Classical, Asian and European languages through the DIGIT LAYA (डिजिटालय).

### 9.1.4 Health Informatics

## Deployment of e-Aushadhi Drug Warehousing Solution

C-DAC's "e-Aushadhi" solution is a web based Supply Chain Management System for the distribution and supply of drugs and vaccines in the healthcare system of the country. As per the mandate for nation-wide rollout from the Ministry of Health and Family Welfare (MoHFW), Government of India (GoI), C-DAC's e-Aushadhi is currently operational in 17 States. The solution has also been implemented under 3 national programmes.

In 2018-19, C-DAC signed a MoU with the Government of Arunachal Pradesh and was also awarded the work order by Medical Stores Organisation, MoHFW for the development and implementation of DVDMS for respective clients.

Digital Library of The Bhandarkar Oriental Research Institute (BORI) using Digitalaya

## Deployment of e-Sushrut - Hospital Management and Information System

"e-Sushrut", C-DAC's Hospital Management Information System (HMIS) is a major step towards adapting technology to improve healthcare. The solution is operational in more than 80 Government hospitals and caters to more than 80,000 patients daily. During the year, C-DAC signed a MoU with the All India Institute of Medical Sciences (AIIMS), Patna and was also awarded work orders by Mahatma Gandhi Institute of Medical Sciences (MGIMS), Sevagram and All India Institute of Medical Sciences (AIIMS), Raebareli for the development and implementation of e-Sushrut

for respective institutes. Currently, the solution has State-wide presence in Rajasthan and pilot initiatives are underway in the States of Maharashtra, Andhra Pradesh, Telangana and Odisha.

## e-RaktKosh - Blood Bank Management System

e-RaktKosh solution streamlines the standard operating procedures, guidelines and workflow of blood banks in accordance to NACO and NABH guidelines. C-DAC carried out integration of e-RaktKosh with National Health Portal of India and UMANG Mobile App. Currently, more than 1,700 blood banks in the country have on-boarded the system. The portal reflects statistics on the total blood stock availability at blood

Aushadhi operational in States

banks and provides information on blood camps, blood components, nearest blood banks etc.

## Telemedicine Solutions

C-DAC's "Mercury™ Nimbus" Telemedicine solution is a cloud-enabled EMR/EHR centric tele-consultation solution that can scale from clinics to multi-hospital deployment scenarios. During the year, C-DAC carried out maintenance activity of "Mercury™ Nimbus" Telemedicine solution under Odisha Telemedicine Network and more than 12,000 remote consultations have been carried out in Odisha state. Mercury™

Nimbus solution is planned to be deployed at 5 hospitals of National Thermal Power Corporation (NTPC) Limited located across India to interconnect 2 specialty healthcare centres with 3 remote healthcare locations to facilitate the reach of expert care to remote areas.

C-DAC also continued to extend mobile telemedicine services as part of the initiative "Strengthening of Onconet India project in the State of Kerala" funded by Ministry of Health and Family Welfare, Government of India. Regional Cancer Centre (RCC) Trivandrum,

Malabar Cancer Care Society (MCCS), Kannur and four other early cancer detection centres are partners of this initiative. The unit contains laboratory with haematology and immunology analyzers, digital mammography unit and supportive power systems. Mobile Oncology System for Cancer Control activities in the State of Karnataka for identifying and treating diseases in the early stage itself and Mobile Telemedicine for Wayanad district in Kerala for the benefits of patients in tribal areas are also planned to be made operational during the year.
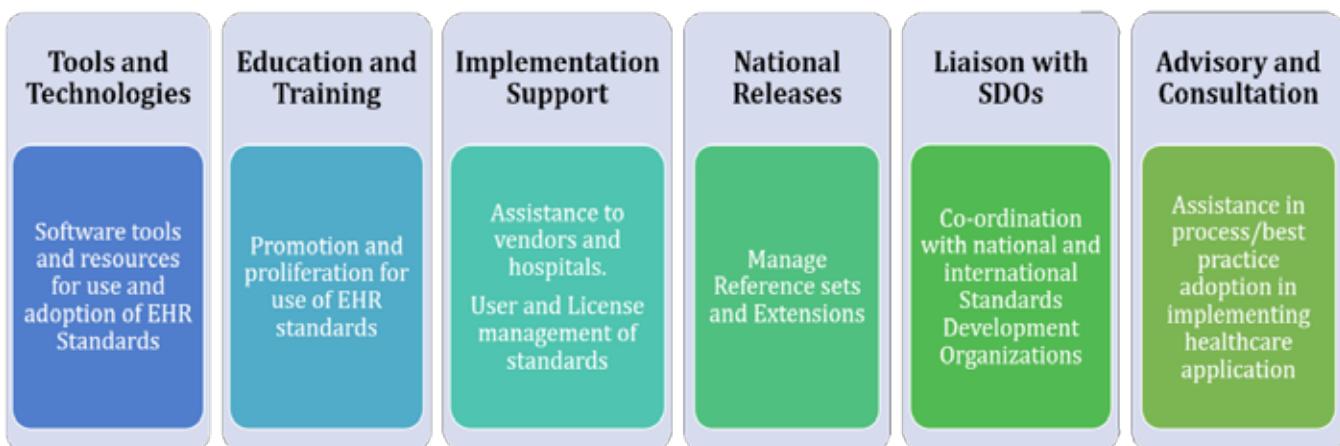


**Setting up of National Resource Centre for EHR Standards (NRCeS)**

Ministry of Health and Family Welfare (MoHFW),

Government of India has established a Centre of Excellence named as National Resource Centre for EHR Standards (NRCeS) at C-DAC Pune to accelerate and promote adoption of EHR standards in India. The six chosen functional areas under the initiative are: Training and Promotion, Tools Development, Implementation Support, National Releases and Extensions, Liaison with Standards Organisation and Advisory and Consultation. NRCeS has issued 107 Affiliate Licenses for use/incorporation of SNOMED CT healthcare terminology this year bringing the total to 360 for India. 694 people have been trained or sensitized for standards during the 5 workshops, 22 training programmes, 5 events and talks by C-DAC. In order to ease incorporation and usage of SNOMED CT terminology in software, 30 simple refsets covering common diseases under National Public Health Programmes and Medical Specialty/Department-wise refsets have been released.

## C-DAC's Medical Informatics Standards Software Development Kits

C-DAC's Medical Informatics Standards Software Development Kit is a suite of object-oriented API class libraries, sample tools, documentation and other related tools that provides medical standards compliance to the implementing applications/medical devices. The SDK toolkits include

| **Tools and Technologies** | **Education and Training** | **Implementation Support** | **National Releases** | **Liaison with SDOs** | **Advisory and Consultation** |
|---|---|---|---|---|---|
| Software tools and resources for use and adoption of EHR Standards | Promotion and proliferation for use of EHR standards | Assistance to vendors and hospitals. User and License management of standards | Manage Reference sets and Extensions | Co-ordination with national and international Standards Development Organizations | Assistance in process/best practice adoption in implementing healthcare application |

- C-DAC's Toolkit for SNOMED CT(CSNOtk) v4.0 released on January 07, 2018

- C-DAC's Medical Informatics DICOM (PS3.0-2015) SDK v3.1 released on February 9, 2018 and v3.5 is released on September 11, 2018

The toolkits are open-source, free-to-use and specially designed for easy access and integration in health care applications and devices.

### 9.1.5 Cyber Security and Cyber Forensics

**Enhancement of Endpoint Security Solutions**

C-DAC enhanced endpoint security solutions for desktop and mobile environments and extended support to users while downloading and using them.

- USB Pratirodh solution controls the usage of removable storage media, such as, pen drives. Total number of downloads of the USB Pratirodh software is 36,930.

- AppSamvid is an Application Whitelisting Software for Microsoft Windows and there are 24,273 downloads.

- Browser JSGuard is a security add-on to the Mozilla Firefox and Google Chrome Browsers which protects from JavaScript based attacks. Total number of downloads are 30,191.

- M-Kavach is a comprehensive Mobile Device Security Solution for Android devices addressing various threats related to mobile phones. There are 3.67 lakh downloads.

It is planned to continue efforts in enhancing solutions for new versions of operating system and extending support to users.

**Information Security Education and Awareness (ISEA) Phase- II**

Activities carried out as part of Information Security Education and Awareness (ISEA) Phase- II are as listed below:

- 39,867 candidates have been trained/under-going training in various formal and non-formal courses through 52 institutions of ISEA Project Phase-II. During the year 1,592 candidates have been trained/undergoing training in various formal/non-formal courses through 52 institutions

- 6,052 Government officials have been trained in the area of information security through centres of C-DAC, NIELIT and ERNET India and 858 Government officials have been trained through TeL (Technology Enhanced Learning) (e-Learning) Mode. During the year 1,721 Government officials have been trained in the area of information security through centres of C-DAC, NIELIT and ERNET India and 488 Government officials have been trained through TeL Mode.

- 699 papers on information security have been published in association with 52 participating institutes of ISEA project and during the year there were 41 paper publications.

- 124 Information Security Awareness workshops covering 22,772 participants and 16 Master Trainer's Training workshops covering 726 Master Trainers including KV/CBSE Teachers have been conducted as part of National Awareness Initiative.

- 18 All India Radio programs on Cyber Security, Secure Mobile Usage, Social Media Security and Online Gaming Security etc. and 5 one hour programs on Doordarshan TV covering more than 44 lakh users in national network (Delhi), Bihar, Rajasthan and Goa have been conducted.

- Cyber Security Handbook for Digital Financial Transactions and Information Security Awareness Handbook for Women have been developed.

Cyber Threat Management System
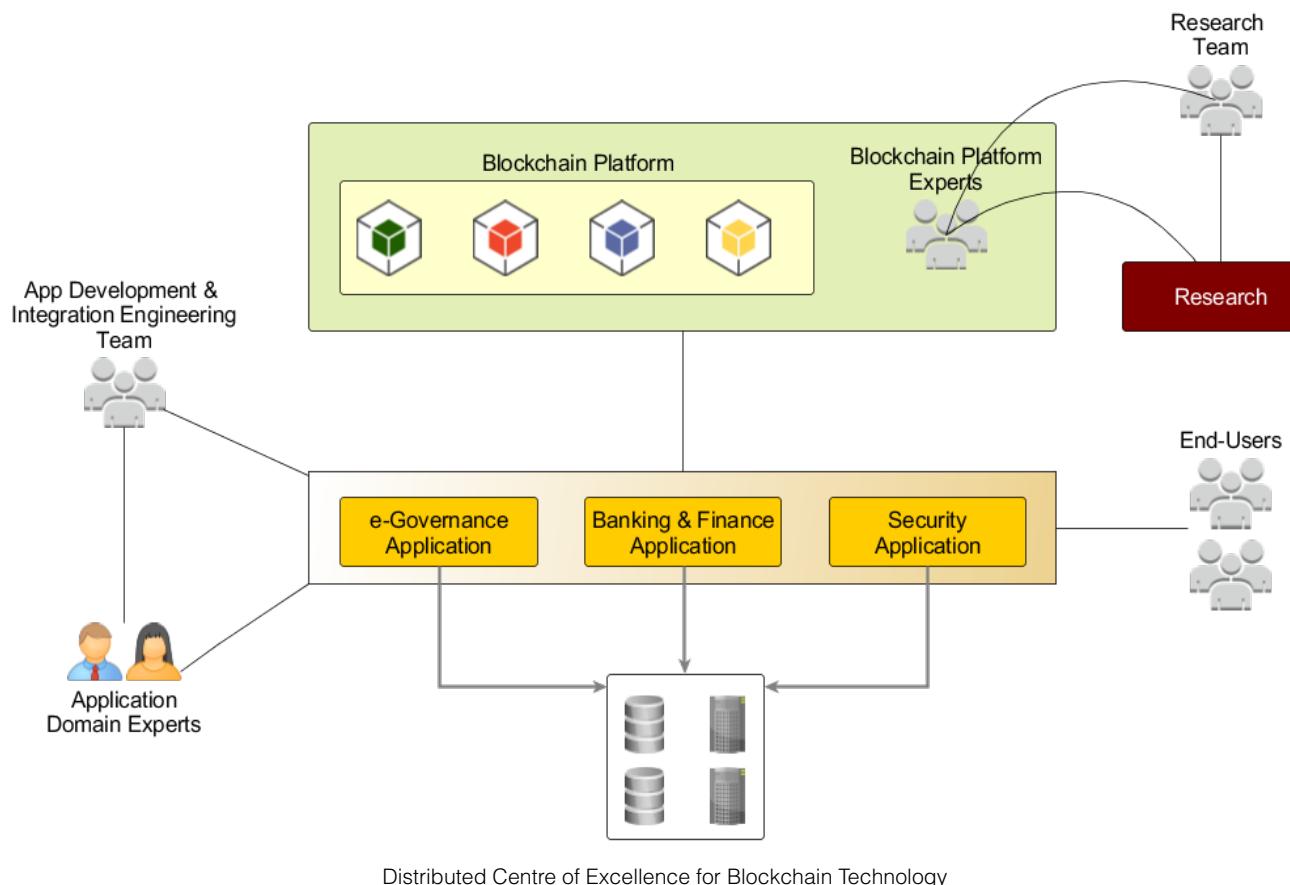
**CyberView - Cyber Threat Management System**

C-DAC has designed CyberView – Cyber Threat Management System that provides India specific cyber threat intelligence in the form of attack data feeds and datasets to researchers. The captured attack data is logged, stored on a central attack data repository for further analysis for effective cyber threat dissemination. C-DAC is deploying 50 threat monitoring and attack data capturing sensors across the country in different regions. C-DAC has deployed threat capturing sensors at 22 locations that include Govt Engg. College, Shimla, Himachal Pradesh, State Data Centre- Hartron, Haryana, IIIT Guwahati, Tezpur University, NIT Trichy, Pantnagar University (CSE Department), GAIL India, BEL, IRCTC etc.

**Distributed Centre of Excellence for Blockchain Technology**

C-DAC has initiated efforts towards establishment of Distributed Centre of Excellence for Blockchain Technology. Under this initiative, Blockchain Technology based Property Registration Management System is designed and implemented. Efforts are being made towards integration with existing application and pilot deployment of Property Registration Management System at Telangana Government. C-DAC signed MoU with Telangana State Government to explore and build PoC in Blockchain and work as Knowledge Partner to State Government of Telangana.

Distributed Centre of Excellence for Blockchain Technology

## Cyber Forensics Lab Setup for Law Enforcement Agencies

C-DAC setup various Cyber Forensics analysis and training labs incorporating C-DAC's indigenously developed Cyber Forensics hardware and software tools. C-DAC has also supplied nearly 113 copies of its Cyber Forensics tools including CyberCheck Suite, MobileCheck, WinLift, Advik CDR Analyser, NetForce Suite and Hardware tools, such as, True Imager, SIMXtractor, True Traveller and Portable Forensic Workstation. C-DAC setup Cyber Forensics labs at various locations for Law Enforcement Agencies (LEAs) and conducted training sessions.

## 9.1.6 Software Technologies including FOSS

### Deployment and Proliferation of BOSS

- BOSS 7.0: The current version of BOSS 7.0 is codenamed Drishti (Vision). It is coupled with GNOME Desktop Environment 3.22 version with wide Indian language support and packages relevant to the Government domain. It aims at enhancing user experience in desktops and laptops.

- BOSS Mail Server: A customized and secured BOSS Mail server has been developed and deployed in Central University of Tamil Nadu, Thiruvarur. The Mail server is integrated with LDAP server and

is enabled for high availability requirements. The whole setup is installed on Meghdoot Cloud server in CUTN.

- Secure Terminal: Secured BOSS OS has been developed by C-DAC for the Secure Terminals. The secure OS is enabled with hardware root of trust and is designed to have full encrypted OS.

### e-Pramaan

e-Pramaan is a uniform standard based national e-authentication service developed by C-DAC to authenticate users of various Government services in a safe and secure manner for accessing services through desktop as well as mobile. About 230 departments have been integrated and around 8.61 crore transactions have been completed.

### e-Hastakshar

C-DAC's eSign service facilitates instant signing of documents online by citizens in a legally acceptable form. Using this, an Aadhaar holder can electronically sign a form/document anytime, anywhere, using any device using OTP or biometric based authentication methods. During the year, C-DAC carried out integration with various Government and private agencies for leveraging eSign service at production level and nearly 44 lakh signatures have been offered.

### Mobile Seva

Mobile Seva initiative of C-DAC enables the integration of the mobile platform with the common e-Governance infrastructure consisting of SDCs, SWANs and SSDG/NSDG and facilitates delivery of public services over mobile devices using mobile based channels such as SMS, USSD, IVRS and m-Apps. 4,191 Government departments and agencies across the country have integrated their services with this mobile seva platform and 2,722 crore push SMS transactions, 111 lakh IVRS transactions and 17 lakh USSD transactions have been made.

### Vikaspedia - Collaborative Knowledge Sharing Portal

Vikaspedia is a multilingual, collaborative knowledge sharing platform which has been deployed as part of ongoing state/national programs. The portal attracts about 130 million hits per month. A citizen centric mobile app on 'Siddha' in collaboration with National Institute of Siddha, Chennai, a mobile app on citizen services of Navsari district in Gujarati with support from Navsari District administration and a cloud based framework for delivery of mobile based personalized alerts to beneficiaries of various government schemes have been developed. 300 outreach workshops to build capacities of about 14,500 first level service providers on digital content access and sharing in Indian languages were organized across 17 states/UTs covering 30 aspirational districts. Various ICT modes were used to promote government programmes and schemes among 80 lakh citizens across the country.

### eBasta

It is a framework to make the school books accessible in digital form as e-books. During the year, 68 new eBooks have been published on eBasta Portal and 2,490 teachers from 624 schools have been oriented in using eBasta technologies including eBasta. 2,848 books have been published on the portal from 14 State Boards, NCERT, CBSE and a few private publishers. 5,113 eBasta downloads and 122,603 eContent downloads have taken place. 5,611 teachers from 1,969 schools have been oriented in technologies including eBasta.

### Assessment and Monitoring Framework (AMF)

Assessment and Monitoring Framework (AMF) developed by C-DAC, helps teachers to manage the complex assessment activities in schools. During the year, 553 teachers from 71 schools have been oriented in using technologies including AMF. Talks are in final stages for deployment of AMF in 400 schools of Rayat

Shikshan Sanstha. 5,007 teachers from 1,766 schools have been oriented in technologies including AMF.

## Unified Portal for Employees' Provident Fund Organisation

The unified portal application has been designed and developed by C-DAC as part of IT reforms initiative by the Employees' Provident fund Organisation (EPFO) towards ease of delivery of services to their stakeholders viz. employers and members. Approximately 2,05,000 establishments have been registered, 3,91,000 fresh members have been registered and payment integration with 11 banks has been achieved through which over 5 lakh establishments file monthly provident fund remittances. The PMRPY portal, which implements the Government of India scheme aimed at incentivising establishments creating fresh opportunities rides on the unified portal system.

### 9.1.7 Education and Training

### Post Graduate Diploma in Advanced ICTE areas

C-DAC conducts 11 Post Graduate Diploma Courses (NSQF level 8 courses) through a network of over 30 C-DAC training centres and Authorized Training Centres located pan India. The post graduate programmes are as follows:

- PG Diploma in Advanced Computing (PG-DAC)

- PG Diploma in Mobile Computing (PG-DMC)

- PG Diploma in Embedded Systems Design (PG-DESD)

- PG Diploma in IT Infrastructure, Systems and Security (PG-DITISS)

- PG Diploma in System Software Development (PG-DSSD)

- PG Diploma in Big Data Analytics (PG-DBDA)

- PG Diploma in Internet of Things (PG-DIoT)

- PG Diploma in VLSI Design (PG-DVLSI)

- PG Diploma in HPC System Administration (PG-DHPCSA)

- PG Diploma in Biomedical Instrumentation and Health Informatics (PG-DBIHI)

- PG Diploma in Geoinformatics (PG-DGi)

C-DAC has completed 50[th] golden batch of its Post-Graduation Diploma Courses during the month of July 2018. C-DAC has inducted 3,331 students during August 2018 batch into the above mentioned Post Graduate Diploma courses.

C-DAC also offers Master Programmes in collaboration with leading universities in advanced areas of ICT.

## Pradhan Mantri Gramin Digital Saksharta Mission (PMGDISHA)
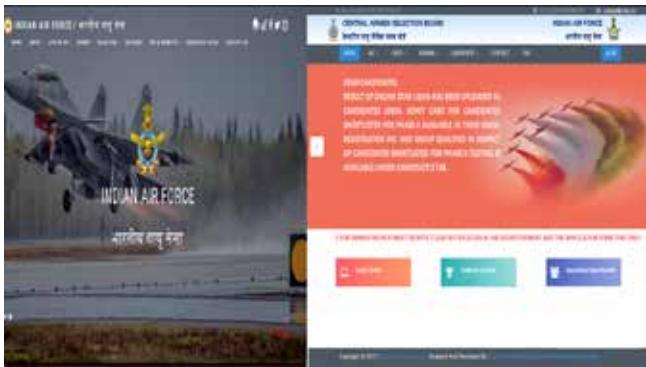
MoU has been signed between C-DAC centres and CSC e-Governance Services India Ltd. for jointly conducting online remote proctored examination for learners trained under the Pradhan Mantri Gramin Digital Saksharta Mission (PMGDISHA). C-DAC centres across India are participating as Assessment and Certifying Agency in PMGDISHA. C-DAC centres are conducting online remotely proctored examination in this scheme and issuing the certificates to successful candidates. C-DAC started this operation since November 2017 and has assessed more than 20 lakh citizens across the country. C-DAC presently offers assessment questions in all scheduled languages and also provides assessment services in Garo and Khasi languages additionally to encourage the participation of citizens from north-east India.

## Comprehensive Recruitment Solution for Indian Air Force (AFCAT and STAR Exam)

C-DAC has been entrusted by Indian Air Force (IAF) to automate their recruitment process for officers and

airmen inducted through Air Force Common Admission Test (AFCAT), Scheduled Test for Airmen Recruitment (STAR) examination and Sashastra Seema Bal (SSB) interviews stages. C-DAC is carrying out multitude of activities consisting of design, development and deployment of exam system, operations, standard operating procedures, deliverables, rights and responsibilities, time frame, guidelines, risks and mitigation plan monitoring and control of examination; conduct of AFCAT and STAR exams. C-DAC conducted IAF AFCAT February, 2018 during 18-19 August, 2018 and 22-23 September, 2018 for over 1.29 lakh candidates and IAF STAR February, 2018 during 13-16 September, 2018 for over 5.2 lakh candidates across India. C-DAC also conducted IAF AFCAT January, 2019 during 18-19 February, 2019 for over 1.29 lakh candidates and IAF STAR January, 2019 during 14-17 March, 2019 for over 4.51 lakh candidates across India.



### Information Technology Training for AYUSH professionals

C-DAC has initiated information technology training programme for AYUSH professionals starting from July 30, 2018, for a duration of three months. This programme has been organised in collaboration with Ministry of AYUSH. About 40 AYUSH doctors attended this training programme with focus on hands-on based learning. AYUSH doctors were introduced to computer fundamentals, software development life cycle, database, MS-Office, programming, mobile technology, internet of things, artificial intelligence, natural language processing, cloud computing, GIS, GPS, wearable gadgets, high performance computing, big data etc. This training programme also included sessions on topics, such as, Electronic Health Record, Hospital Information System, AYUSH Informatics, Bioinformatics, Health Informatics Standards, Telemedicine, Medical Imaging, Decision Support Systems, Public Health systems etc.

### Process Automation for Competitive Exams

C-DAC has designed and developed process automaton for competitive exams system that provides the automation of candidate registration, online application filling, application scrutiny, centre allocation, hall ticket issue, answer-key verification, answer-key challenge, result processing and analysis, score generation, choice filling and seat counseling. This has been used for GATE (past 6 years), JAM (past 5 years), AIIMS (1 year) and NBE (1 year). The system handles approximately 13 lakh applicants every year. During the year, this system is being used for automation of GATE/JAM 2019 for IITs and IISc, post-graduation, MBBS and nursing seat counselling for All India Institute of Medical Science (AIIMS) and DNB, Post MBBS, Post Diploma Centralized Merit Based Counseling for National Board of Examinations (NBE).

### Capacity building in Electronic Product Design and Production Technology
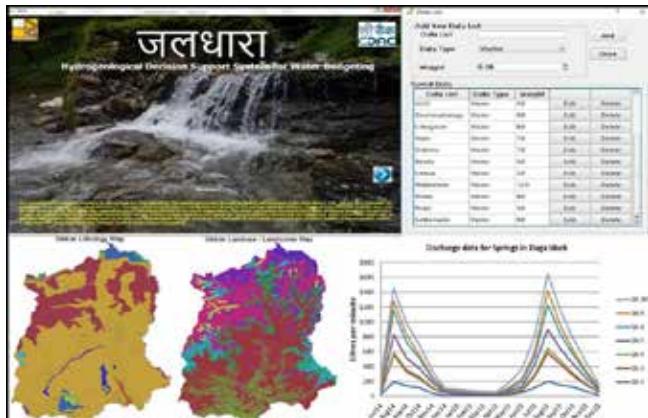
This initiative is aimed to create capacities in the Electronic System Design & Manufacturing (ESDM) sector to offer Short Term Certificate Courses, 6 months PG Diploma Programs, 1 Year PG Diploma Programs, MTech/MS level programs, PhD etc. This has also facilitated creation of R&D infrastructure in Electronic Product Design & Production Technology. The initiative is being jointly implemented by C-DAC in collaboration with NIELIT Aurangabad and NIELIT Chennai. During the year, a total of 227 (183 Short Term , 36 – 6 Months PG Diploma, 8- M.Tech) candidates were trained

till March 2019, 3,836 candidates were trained by C-DAC in various formal and non-formal Programs. As part of the initiative, more than 80 batches of training programs were conducted with participants involving engineering graduates, faculty of engineering colleges and ITI/polytechnic students.

### 9.1.8 North-East Initiatives

Significant activities carried out by C-DAC for NE regions during the year are listed below:

- C-DAC developed Jal Dhara for management of available water resources and water budgeting in Sikkim. The prime objective of the solution is to optimize the utilization of available water resources through water budgeting, replenishment and augmentation of water resources and revival of dying springs in Sikkim. C-DAC has installed automatic discharge measurement instruments at two critical spring sites in Duga (East Sikkim) and Namchi (South Sikkim) respectively for daily spring discharge data collection. The sensor records spring discharge values every hour, which is then stored in a data logger. Suchana Doot, a Mobile App for field data collection was developed on the special request of user agency - Rural Management and Development Department, Government of Sikkim. The user can download the spring discharge data through the USB port using the App and use directly in HDSS (Hydrogeological Decision Support Systems).



- C-DAC has developed e-Saadhya, an interactive e-Learning web based learning System for mild autistic and mild mentally retarded children and deployed in 10 schools across 5 NE states (Assam, Meghalaya, Nagaland, Manipur and Tripura).

- C-DAC completed implementation of automation system for Unit-I and its Integration with SCADA system at state owned Meyong Hydel Power Station in North Sikkim. This will facilitate reliable monitoring and control functionality of day-to-day plant operations to improve the production and energy efficiency of the unit.

- C-DAC has created speech based assistive tools in Bangla for visually impaired people of Tripura. Two computer labs have been setup one each at Institute of Visually Handicapped (IVH) Boys school and IVH Girls school in Tripura and the tools have been deployed in both the labs.

- C-DAC deployed mobile based integrated Surveillance System for Malaria (iMoSQUiT) in Tengakhat Primary Health Centre (PHC), Dibrugarh, Assam, on international borders of North East region in parts of i) Dhalai district of Tripura, ii) Baksa and Udalguri districts of Assam and iii) Changlang district of Arunachal Pradesh, in collaboration with Regional Medical Research Centre/Indian Council of Medical Research.

- C-DAC completed development of translation tools to translate content from English to Bengali and Kokborok. Translation workbench has been developed and system has been deployed at Women's College Tripura and ICFAI University, Tripura.

### 9.1.9 International Initiatives

Various activities carried out including setting up of centres of excellence and computer labs in various countries as listed below:

- A sustainable IT Infrastructure for Advanced IT

Training using conventional, virtual classroom and e-Learning Technologies in CLMV/ASEAN

- Inauguration of CEIT, Casablanca, Morocco on May 7, 2018 by H.E. Mr. M.J. Akbar, Hon'ble Minister of State for External Affairs, Government of India and H.E. Ms. Rakiya Eddarhem, Hon'ble Secretary of State to the Minister of Industry, Investment, Trade and the Digital Economy, in charge of Foreign Trade, Government of the Kingdom of Morocco

- Upgrading the existing IT Infrastructure and associated software at CARICOM Secretariat, Guyana and its associated offices in Barbados and Jamaica

- Centre of Excellence in IT in Papua New Guinea, Vanuatu, Georgetown, Suva, Apia, Yaren, Alofi Niue, Rarotonga, Cairo- Egypt, Morocco and Windhoek

- Extension of India Myanmar Centre for Enhancement of IT Skills (IMCEITS) at Yangon as Authorized Training Centre (ATC) of C-DAC for 3 years

- Capacity Building in Research, Development and Innovation in ICT and Electronics (ICTE) through India – Ghana Kofi Annan Centre of Excellence in IT (AITI KACE) in Accra - Ghana

- Supply of desktop computers and associated software to Government offices and schools in Sao Tome and Principe

- Special training under ITEC programme for the master trainers from CEITs setup by C-DAC

- Next Generation Centre of Excellence in Jordan

- International Authorized Training Centre at India Peru Centre of Excellence in IT in INICTEL- UNI, Lima

- International Authorized Training Centre of C-DAC at Jawaharlal Nehru India Uzbekistan Centre for IT

at Tashkent University of Information Technologies in Tashkent

## 9.2 Society for Applied Microwave Electronics Engineering and Research (SAMEER):

### 9.2.1 Laboratories and Core Competence

Society for Applied Microwave Electronics Engineering and Research (SAMEER) is an autonomous R&D institution under the Ministry of Electronics and Information Technology, Government of India. SAMEER has five centres located at Mumbai, Chennai, Kolkata, Visakhapatnam and Guwahati.

Mumbai Centre – Centre for Microwave Research (CMR) specialises in the areas of Medical Electronics, Radar Instrumentation, Atmospheric Instrumentation, Signal Processing, High Power Radio frequency and Microwave Components and Systems, and Photonics.

Chennai Centre – Centre for Electromagnetics (CEM) specializes in the areas of Antennas, Communications and Electromagnetic Interference/Compatibility (EMI/EMC). It is also involved in research and development in the areas of RF and Microwave communication, Digital Signal Processing, antennas and electronics packaging. As a new initiative, second campus of SAMEER-CEM at Perungudi, Chennai has been built to establish Electronics Design Centre (EDC).

The Centre at Kolkata – Centre for Millimeter Wave Technology specializes in the areas of antenna and millimeter wave technology. It is involved in the development of RF, Microwave and Millimeter-wave (MMW) components, sub-systems and systems for various users in the country. The centre has established a state-of-art millimeter wave laboratory with test, measurement, simulation, fabrication and assembly facilities and a Compact Antenna Test Range (CATR) facility for evaluation of antennas, radomes and scattering study with support of the MeitY at its second campus at Salt Lake, Kolkata.

NABL accredited EMC test and measurement facilities have been established at Mumbai, Chennai and Kolkata and offer comprehensive test, consultancy, training, engineering and research services to national agencies and electronics industries in India.

Centre for Electromagnetic Environmental Effects (E3), Visakhapatnam is being established at Visakhapatnam Dist, Andhra Pradesh in 13 acres of land allotted by Government of Andhra Pradesh. The E3 facility specializes in a variety of capabilities, ranging from box level to complete system level testing to cater to the increasing requirement from the strategic sectors.

Centre for High Power Microwave Tubes and Components Technology is also being established at the campus of Indian Institute of Technology, Guwahati for development of high power microwave tubes/ components as well as research and development activity for design and development of magnetrons and circulators at GHz.

### 9.2.2 Major R&D activities

**Train 18 Testing**

Indigenously-built under the 'Make-in-India' programme, India's first engine-less train  train 'T18' (Vande Bharat Express) designed to run at a maximum speed of 180 kms/hr start its commercial operation on 15th February, 2019. As a part of acceptance criteria, the Radiated Emissions (RE) measurements (in stationary as well as moving condition) were required to be carried out before the train could be put in to the service. It was required to measure the Radiated Emissions (RE) as a part of EM compliance of the train (Rolling stock) to ensure that the EM emissions from the rolling stock (Train) do not interfere with typical installations in the vicinity of the railway system. On the request of RDSO, Ministry of Railways, the tests were carried out in a record time by SAMEER EMI/EMC team during 08-11 December 2018 at Ramgunj mandi Rly station near Kota on Western Railways.

Looking at the complexity and urgency of work and the diligence put in by the SAMEER team, RDSO authorities were highly appreciative of the efforts put in by SAMEER team in carrying out the EMI/EMC tests at such a short time.



Testing of Train 18 in moving condition

**Ka Band Cloud Radar**

The development of Ka band Cloud Radar project sponsored by Ministry of Earth Sciences was taken up by SAMEER to establish radar technology for advanced study of clouds especially pre precipitation stage of cloud and its profile. The stated objective of technology establishment has been achieved and a scanning polarimetric radar in Ka Band with 2.2 kW transmitter is being developed. For external calibration, a tower has been erected with a standard tetrahedral corner reflector. The subsystems have been designed and made ready. The digital receiver is being tested and integrated testing will soon be completed. The photographs showing Cassegrainian antenna, trailer fitted with cabin, scissor lift, antenna positioner, diesel generator and calibration tower are shown below.

Trailer fitted with Cabin, Scissor lift with Antenna Az-El Steering pedestal and 30 kVA Diesel Generator for Ka band Cloud Radar



Calibration tower

## Design, Development and Installation of ST Radar at Guwahati University for North Eastern Region

The monostatic radar system to probe Stratosphere and troposphere (ST) layer of atmosphere, has been installed at University at Guwahati. The ST radar has been developed as an Active Aperture Distributed Circular Phased Array using Solid State TR Modules and Digital Signal Processing Techniques. Indigenous design and development of various sub-systems, such as, 576 Yagi-Uda Antennas with Transmit-Receive(T/R) Modules, CAN/SYNC Distribution Network, RF, Feeder Network, Digital Receiver and Radar Controller.

Cable network for RF, Supply and Control cables measuring more than 100km along with 3000+ MIL Grade interconnects has been completed. Phase calibration of ST Radar in transmit as well as receive mode has been completed successfully. Installation of all the hardware and software needed for operating the system has been completed. The radar is being operated for the past few months and data is being collected. Data validation and system optimization for performance are in progress.



ST Radar installed at Guwahati University- Bird's eye view



ST Radar Data indicating rain and melting layer

**Indigenous RADAR altimeter for RUSTOM II UAV:**

Rustom-II is a Medium Altitude Long Endurance Unmanned Air Vehicle (MALE UAV) used for reconnaissance, surveillance, artillery fire correction and Battlefield Damage Assessment. The Indigenous Radar Altimeter (R2RAM) designed and developed by Radar Division. This is a FMCW System and has the capability of detection and estimation of altitude, i.e. height over ground level for a pitch and roll of $\pm 25°$ and $\pm 45°$ of the aircraft (UAV) specifications. The radar altimeter (R2RAM) is a critical system for the new generation of UAV's for automatic takeoff and landing.



Indigenous RADAR Altimeter for RUSTOM II UAV
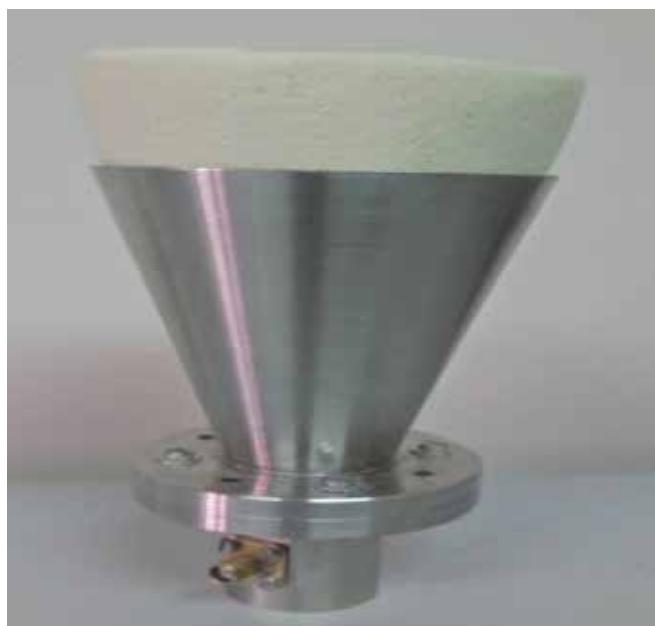
**RADAR Level probe**

The Radar Level Probe (RLP) for Liquid Sodium Level Measurement in sodium tank is an indigenously developed RF system for IGCAR and works on the FMCW radar principle for measuring the range (distance) over a level surface. RLP is designed to function in harsh industrial environment and can be withstand temperature in excess of 200 degrees Celsius. The RLP hardware has a full digital RF transceiver and Spartan-6 FPGA device from Xilinx stable is used for the programmable logic and DSP.



**RADAR Level probe system**
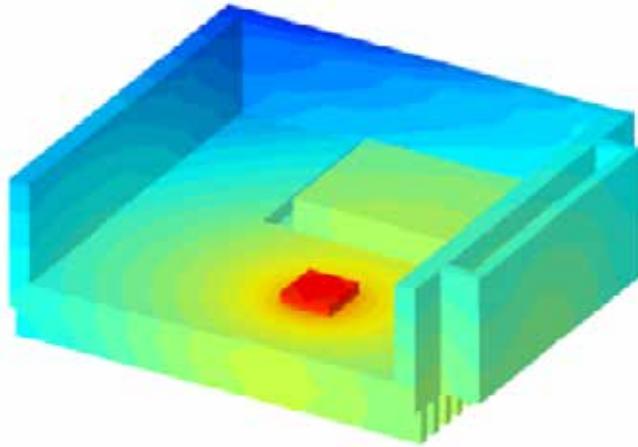
The level information is displayed as reading on LCD expressed in standard 4-20 mAmp as output data for the operator. The RS-422 RX lines are available on external connector and can be run by specified cable to the control room for viewing the liquid level reading in the control room.



**Antenna for RADAR Level probe**

**Thermal design of X-band Transceiver system**
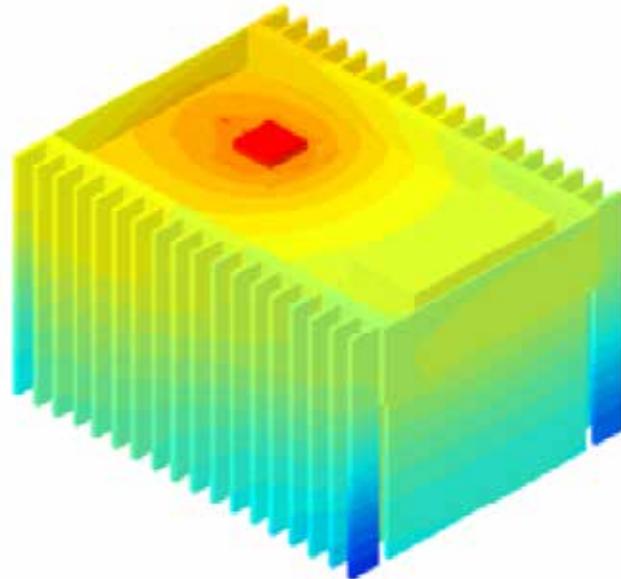
Thermal design of power amplifier for X-Band Transceiver system, being developed by SAMEER Kolkata is under progress. The system consists of power amplifier device, power supply modules and other driver electronics modules. Heat dissipation from the power amplifier is 31.6 Watts and the total heat dissipation from the system is 52 Watts. Transceiver system is exposed to 71°C ambient condition.



Thermal model of the system is developed using Computational Flow Dynamics software. Case temperature of each module is predicted and heat sink design has been carried out for optimum dissipation of the heat. Thermal simulation was carried out for the possible assembly options of transceiver unit with different types of mounting arrangement and corresponding reduction of the temperature of components analyzed for feasible implementation.

**Thermal design of Ka-band Power Amplifier**
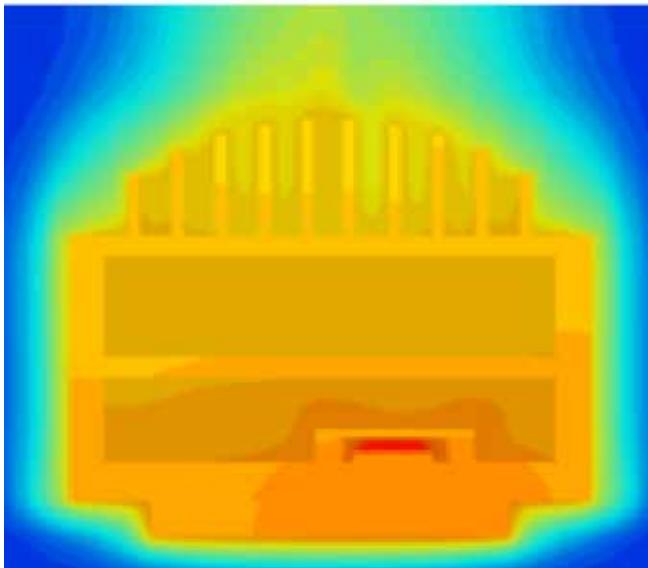
Thermal design of Power Amplifier of Ka-Band Transmitter Unit was carried out. The amplifier module consists of power amplifier devices, driver amplifiers and DC-DC converters. Total dissipation from the power amplifier module is about 50 Watts and this module is to be qualified for stable performance in 70°C ambient condition.



Thermal simulation of the amplifier is carried out using Computational Flow Dynamics software. The case temperature of power amplifier in the existing design was exceedingly high and was reduced by the use of high conductive epoxy paste for the device packaging. Also fin configuration was optimized to obtain reduced amplifier temperature. A thermally superior package with pure copper base was recommended to replace existing amplifier device to improve the amplifier operational reliability.

**Thermal design of X-band Transmitter and Receiver system**

SAMEER, Kolkata is developing communication system for strategic application. Transmitter and receiver module consists of power amplifier, OCXO, DC-DC power modules, EMI filter and other driver electronics. Total heat dissipation from the transmitter system is around 120 Watts and the power amplifier is the critical component which dissipates 92 Watts of heat. Total heat dissipation from the receiver system is around 5 Watts and OCXO is the critical component.

(a)

Thermal analysis of transmitter and receiver system is done for 85°C working ambient. Suitable heat sink was designed to spread the heat and fins were designed to dissipate heat from the enclosure to the ambient. Thermal simulations were carried out for the possible assembly options of transmitter and receiver unit on the metal rail and corresponding reduction of the temperature of components analyzed. Thermal analysis was also done for various package styles of power amplifier available and the better package style is recommended for implementation.

**Development of RPF Antennas at Ku-Band**

This project was sponsored by a Govt. R&D lab. The object was to design and develop a squinted beam slotted waveguide array based Rx and Tx antennas. The antennas have been designed, simulated and optimized at Ku-band frequency. Sixty-one antennas have been developed and delivered to the end user. The measured gain of antenna is 9.0 dBi with -17 dB side lobe levels and 50° beam squint from bore sight.



(b)
Ku-band RPF antennas, (a) Rx-antenna, and (b) Tx-antenna

## Design and Development of Data Link Antennas

This was a sponsored project from a Govt. R&D lab with an objective to design and develop four linearly polarized cavity backed slot antennas for data-link application at C-band air-borne communication system. Two of these antennas are for transmission, while the other two are for reception. Measured peak gain is higher than 5dBi with beamwidth of about 120 x 60°.



C-band data link Tx and Rx-Antennas, (a) for belly section, and (b) rear section
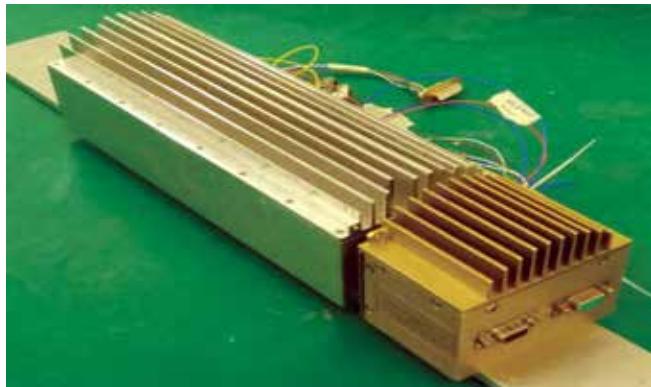
## Design and Development of High Gain Slotted Waveguide Array Antenna at X band

This project was sponsored by a Govt. R&D lab. The goal was to design and develop a high gain slotted waveguide array antenna (corporate fed) at X band for Sat-Com applications. The measured peak gain of antenna is 29.5dBi with beamwidth of 5° x 5° and SLL of 13dB down approximately. Two of these antennas have been developed, tested and successfully delivered to the end user.



X-band Slotted Waveguide array antenna, (a) top view, and (b) bottom view
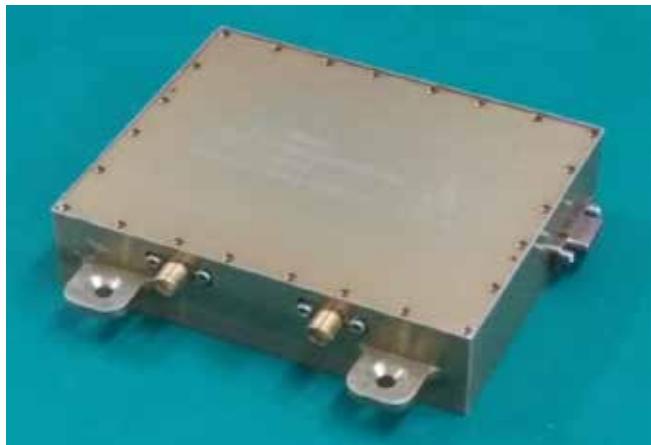
## X-Band Transmitter & Receiver for on-board Data Link

This project has been sponsored by a Govt. R&D Lab. The aim of this project is the design, development, and delivery of 10 units of X-band transmitters and 10 units of receivers for on-board data link application. The system provides secure data link, and anti-jam RF communication. The transmitter modulates (BPSK) the incoming data and up-converts into X band signal with maximum output CW power of 20W. The output frequency is programmable in steps of 5MHz. Two data link X-band receivers have been developed with a dynamic range of 55 dB with minimum detectable signal of -95 dBm, output power of +4 dBm, and noise figure of 3 dB. Employing 2-stage down conversion, it down converts the X-band signal to 70 MHz IF. The center frequency can be configured in 40 different frequencies within a bandwidth of ± 100 MHz. The system has also been thermally qualified over -20°C to +55°C. The first X-band transmitter unit has been realized with an output power of 41.7 ± 1.5dBm. Functional testing of the transmitter as well as the receiver has been carried out. Testing for environmental conditions and EMI/EMC is under progress. A four-pole coaxial cavity resonator type filter with SMA connectors as input and output has been designed and developed. It reveals insertion loss lower than 1dB over 200 MHz pass-band (at X-band). The compact design exhibits better than 70dB rejection at ±500 MHz offset from the band centre. Two modules have been fabricated and tested. Measured results are
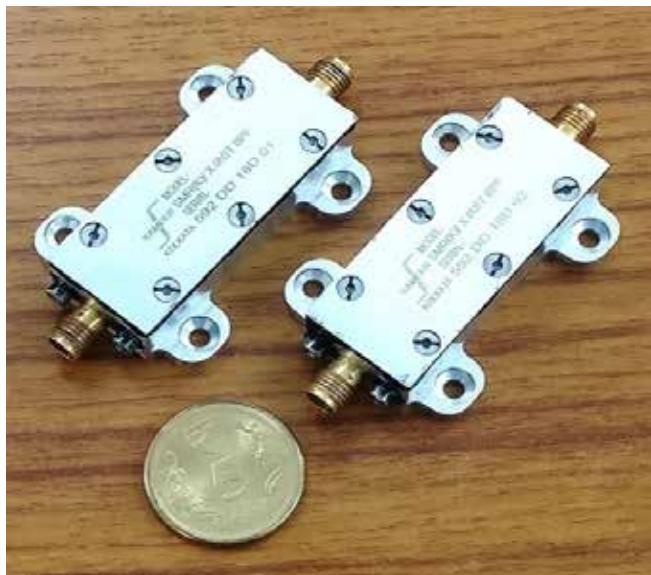
in close agreement with the simulation.



Photograph of the X-band transmitter



Photograph of a realized X-band receiver



Photograph of the compact X-band filters

## Ka-band Telemetry Transmitter
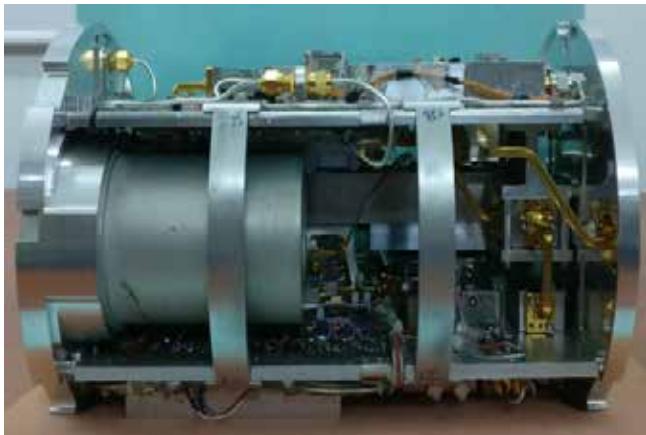
This project has been sponsored by a R&D Lab of Govt. of India. The purpose is to simultaneously generate Ka-band signals in four identical channels for onboard system. The design of the transmitter has been electrically and mechanically approved by the end user. As the product has airborne application, all fabrications have been performed with type approved aluminum. One prototype has been realized and the performance has been successfully demonstrated. The results show a stable signal generation of the desired frequency with phase change capability at each of the channels with a phase resolution of 11°. Along with the prototype, one deliverable unit has also been developed and demonstrated with satisfactory performance. Dimensional inspection and die-penetration test on the fabricated pieces have been successfully carried out in presence of R&QA team of the end-users. Assembly of the rest units is ongoing. A photograph of the prototype is shown in Fig. 11. Airborne performance has been verified by several helicopter sorties arranged by the end-user.



Photograph of the Ka-band telemetry transmitter

**Two-Channel W-band Coherent Transceiver Front-end**

This is a sponsored project from a R&D Lab of Govt. of India. The intention is to develop W-band coherent radar front-end for air-borne system. Indigenous development of the first unit of the total TR module has been completed. One unit has been integrated and tested. Higher than 25W output peak power at W-band has been achieved. Receiver gain of 55 dB with a noise figure lower than 11dB has been realized. Environmental qualification of the unit is under progress. Following associated modules are also developed.



The assembled W-band two channel coherent transmitter-receiver

(a) Exciter module

The 2nd deliverable unit of an exciter module has been developed to generate an L- and X-band signal of 10dBm peak power. It consists of a 100MHz master crystal oscillator, an L-band signal generation unit and an X-band signal generation unit. The L- and X-band units result in CW power considering the master oscillator as reference, the outputs of which are periodically chopped to produce pulsed outputs.
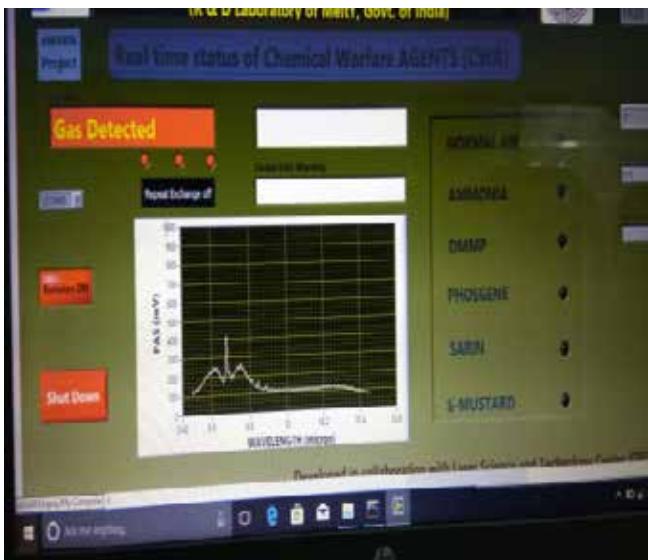


The 2nd deliverable unit of L/X-band exciter module

**Design and development of Trace multi-gas sensor system for the detection of Toxic chemicals**

A trace multigas sensor system has designed and developed, which can detect harmful chemical gases from the atmosphere at sub ppm level. A field trial was carried out at user's site from 21st to 23rd May 2018. Operating manual was handed over along with detailed training to the concerned scientists. Additional trace gases were tried and tested positively at the user's site.



Training at User's site

Picture showing detection of trace gas

## 6 MV Medical Linac for Cancer radiation therapy application

SAMEER team successfully carried out the Linac tube restoration work at Indian Institute of Head and Neck Oncology (IIHNO), Indore. The re-commissioning approval from Atomic Energy Regulatory Board (AERB) has been obtained in July 2018. Patient treatment started from 1st August 2018. 860 number patients have been treated till end November 2018.The machine uptime has been more than 95%.



Patient treatment preparation at IIHNO, Indore

## Dual energy Medical Linac integrated oncology system

The development of Dual Energy Medical Linac system project was sponsored by the Ministry of Electronics and Information technology (MeitY). The design and development of the major sub-systems has been completed. The testing of Linac system in integrated mode is in progress. The electron beam energy measurement at the straight port of the beam bending magnet has been completed.
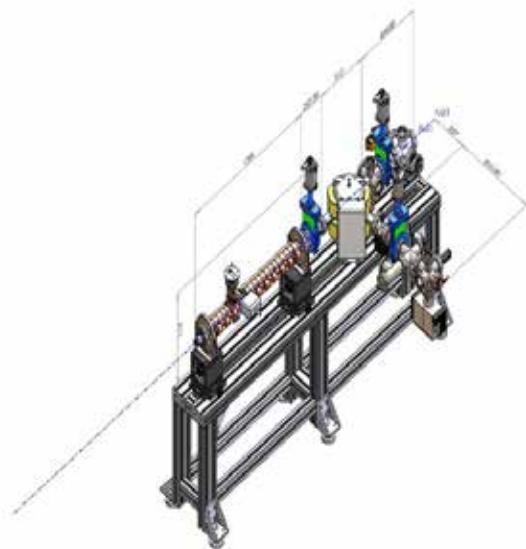


Dual energy Medical Linac at Navi Mumbai test facility

## Design and Development of NAVIC Receiver

MeitY has sponsored the indigenous design and development of Dual frequency L5 and S band NAVIC Receiver. This is a multi-institutional collaborative project involving SAMEER, IIT Bombay, IIT Madras, IIT Jodhpur and IIST, Thiruvanathapuram. SAMEER is responsible for development of RF ASIC and also the development of the Desktop NAVIC receiver, integration and testing of RF and Digital SOC on single motherboard. Desktop Receiver development is in final stages of completion. IIT, Bombay is responsible for the development of Digital ASIC and RF ASIC. IIT Madras is responsible for the development of the Digital ASIC, IIT Jodhpur is responsible for the development of the base band processing algorithm and IIST Thiruvananthapuram is responsible for the RTL code development for Digital ASIC and PVT algorithm development. SAMEER Mumbai is the nodal agency.

**High Energy Linac for Radio Isotope Generation**

The research work to establish 18 MeV Linac system is on-going and its major components have been developed in-house. The electron gun was assembled and tested and the experimental results of triode gun on test bench were confirmed. The communication protocol of the 20 kV power supply from M/s ETM were studied in detail. An assembly station for gun was also fabricated and it is used for storing gun in vacuum environment. The linac tube for Phase 1 is capable of handling high duty cycle of 0.002. Thermal issues are sorted out by increasing the water flow rate to about 20 LPM to maintain the desired temperatures for the accelerating structure with higher duty cycle. The Beryllium exit window is imported. The developmental, testing work of HV modulator with 0.002 duty cycle ongoing with many new features added. The system layout is frozen and is as shown below:



**Indigenous Magnetic Resonance Imaging system**

Ministry of Electronics and IT has sanctioned project titled "Indigenous Development of MRI scanner" on 25th December, 2014 under Digital India Programme of Govt. of India with an objective to design, develop & conduct clinical trials of 1.5 Tesla MRI scanner. SAMEER is the Nodal agency to execute this project

with collaborating partners i.e. CDAC, IUAC & MIRC. For amplifier sub module- 8kW power is achieved by combining two chains of 4kW. The 1.5T refurbished GE Magnet was installed in MRI lab for integrated testing. Images from SAMEER coils were obtained for various fruits like pomegranate, coconut, pineapple, banana, GE phantoms and dead animals like frog. The image reconstruction module was tested using the data obtained from SAMEER and GE coils. The images were compared with the recon images of the GE workstation.



Indigenously developed Head Birdcage being tested inside refurbished G.E MRI Machine



DQA Phantom images using indigenously developed Head Birdcage coil

**Application of EM Wave Based Technology for Disinfection of Grains, Pulse and Seeds for Safe Storage**

Indian Council of Agriculture Research has sponsored project titled "Application of EM Wave Based Technology for Disinfestations' of Grains, Pulse and Seeds for Safe Storage" with the objective of developing an innovative electronics and electromagnetic based disinfestations systems for safe management of grains, pulses and seeds. In electromagnetic (EM) Disinfestations' system, food grains are exposed to electromagnetic radiations in a closed system. It results in rapid killing of all the pests and larvae including the egg stage infestation. Because of this unique property of in-depth penetration of EM fields in the core of food grain, the infestation is eliminated from the core and prevented from re-emerging.

Figure: EM Disinfestation Systerm



Table top moisture meter



Online moisture meter

### Smart warehouses with Application of Frontier EM & Electronics based TechnologY (S.A.F.E2.T.Y.)

To ensure food safety and to provide transparency in food supply & storage chain MeitY, Govt. of India has sanctioned project titled "Smart warehouses with Application of Frontier EM & Electronics based TechnologY". Many new individual products have come out of this project. One such product is a revolutionary, novel and compact sized table top moisture meter using microwave technology. This instrument aids in precise and non-destructive measurement of moisture content of entities like grains, wood and other materials and to monitor the drying process after water damage. The table top moisture meter was calibrated at IIFPT Thanjavur for moong dal, rice and wheat. Calibration was done for different moisture levels for the rice (6% to 30%), wheat (6% to 25 %) and moong dal (5 to 25 %) with 1 % interval. Validation study was conducted for determining accuracy and repeatability of the moisture meter.
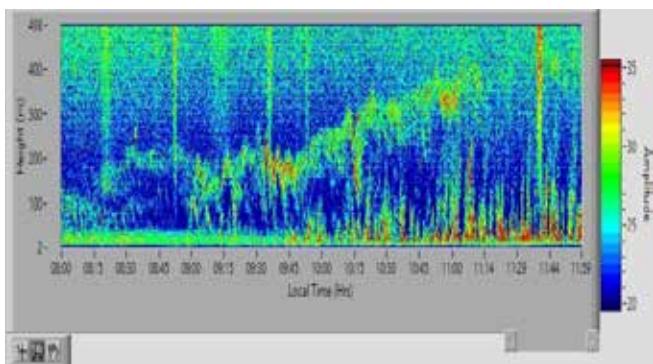
### Supply and Installation of Solar Powered Portable SODAR at GHAVP, NPCIL, Haryana

A fully solar powered, battery operated SODAR on a trolley is developed and installed at NPCIL, Gorakhpur Haryana, Anu Vidyut Pariyojana (GHAVP) site in October 2018. The system is also incorporated with other meteorological sensors for the measurement of wind speed, wind direction, humidity, temperature, solar radiation and rain fall at the surface level.



SODAR installed on a trolley at GHAVP Site



Sample SODAR echogram at GHAVP Site

## Development of end-to-end 5G Test Bed

In order to address the key challenges of the fast-growing Indian broadband market and to scale-up the Indian presence in the telecom products and manufacturing space, to build strong expertise, IPs and prototypes in the area of 5G technologies that can help in creating products that can be used in the 5G platform are needed. To support the above challenges, it is essential to develop and provide an extensive test bed covering all the areas of a 5G network solution to the R&D community in India. Hence it is proposed to develop an end to end test bed as a joint effort between DoT, IITM, IITD, IITK, IITH, IISc, CEWiT, SAMEER, Indian Operators, and Telecom vendors. At SAMEER, Chennai Massive MIMO for sub 6GHz, Phased array and Switched beam array antenna for mm-wave is being developed.



32T 32R Massive MIMO Antenna    Link establishment between Massive MIMO antennas

## Establishment of an Extension Centre of SAMEER Electromagnetic Environmental Effects (E3) Centre At Visakhapatnam, Andhra Pradesh To Cater Strategic Departments

The civil work of RF Shielded Chamber building is on-going, slab and floor works of laboratory building (to place RF Shielded Chamber) is completed. Assembling of Chamber is on-going. Assembling of support structure, control rooms and side panels of main chamber is completed.



RF Shielded Chamber building

## Centre for High Power Microwave Tube and Component Technology, SAMEER, Technology Complex, IIT, Guwahati, Assam

Centre for High Power Microwave Tube and Component Technology has been established at IIT, Guwahati, Assam for research in the area of high power microwave tube and component technology as per nation's requirement. This centre is dedicated for development of conventional high power microwave tubes/components as well as futuristic high power mm wave and THz sources. It will develop manpower working in the area of high power microwave tubes/components by proper training. The scientists of the centre along with M. Tech./Ph.D. students and faculty members of IITG are developing various facilities required for development of high power microwave tube and components.



Bell Jar furnace system at SAMEER, Guwahati

## 9.2.3 Major events & initiatives

SAMEER, Mumbai was honored to host Shri Ajay Kumar Sawhney, IAS, Secretary, MeitY, Govt. of India and Shri A.K. Balani, Scientist G & Group Coordinator on 22nd November 2018.



Dr. Sulabha Ranade, Director General, SAMEER had a meeting with Hon. Minister of State (E&IT) Shri. S. S. Ahluwalia on 22nd May 2018 and give a detailed presentation on SAMEER activities.



On 9th July 2018, Dr. Sulabha Ranade, Director General, SAMEER and other team members visited Satellite Application Centre (SAC), Ahmedabad and had meeting with Mr. Tapan Misra, Director, SAC, Ahmedabad.



Dr. Sulabha Ranade, Director General, SAMEER attended foundation stone laying ceremony of Bengal Silicon Valley Hub by Hon. Chief Minister Ms. Mamata Banerjee at Biswa Banga Sarani, Action Area II, New Town, Kolkata.

On 12th November 2018, Dr. Sulabha Ranade, Director General, SAMEER inaugurated "Electromagnetic Fields and Waves: Pedagogy and Computation" Continuing Education Programme (CEP) coursework at IIT, Bombay.

SAMEER, Mumbai celebrated "Hindi Diwas" on 14th September 2018. Dr. Sulabha Ranade, Director General, SAMEER inaugurated the programme and addressed the SAMEER staff present on the occasion.



Dr. Sulabha Ranade, Director General, SAMEER, Mumbai chaired Session 1A: Conducted Emissions and Immunity at INCEMIC 2018 conference held at NIMHANS Convention Centre, NIMHANS, Bangalore on 15th November 2018.

Mr. Kieran Murphy, Global Head & CEO, GE Healthcare & Dr. Sulabha Ranade, Director General, SAMEER signed MoU between GE Healthcare & SAMEER, MeitY, Govt. of India to boost medical electronics innovation and manufacturing in India on 7th of October 2018.



On 3rd January 2019, the MOU for Collaborative Research, signed by Mr. Vineet Gulati (Board Member-Air Navigation Services) and Dr. Sulabha Ranade, Director General, SAMEER in presence of Dr. Guruprasad Mohapatra (IAS), Chairman, Airport Authority of India(AAI), a Mini-Ratna PSE.



"Swachhata Pakhwada" kick-started with oath taking ceremony led by Director General, SAMEER Dr. Sulabha at SAMEER, Mumbai and Kharghar, Navi- Mumbai Campus simultaneously on 1st Feb 2019.



Additional Secretary & Financial Adviser, MeitY (Govt. of India) Smt. Kiran Soni Gupta visited SAMEER, Mumbai on 13th February 2019.

National Science Day, 2019 inaugurated by Dr D.P. Patkar, Director, Medical Services & Head, Dept. Of Imaging Radiology, Nanavati Hospital at SAMEER, Mumbai on 28th February, 2019.



## 9.3 Centre For Materials For Electronics Technology (C-MET)

Centre for Materials for Electronics Technology (C-MET) was set up as a registered Scientific Society in March 1990 under the Department of Electronics (now Ministry of Electronics and Information Technology) as a unique concept for development of viable technologies in the area of materials mainly for electronics with following the objectives:

- To establish technology up to pilot scale for a range of electronic materials and transfer the same to industry for commercialization.

- To establish relevant characterization facilities.

- To undertake applied research activities in the areas of its operation.

- To establish national data base on Electronic Materials.

### 9.3.1 C-MET'S Laboratories and their Core Competence

C-MET's R&D activities have been implemented in three laboratories at Pune, Hyderabad and Thrissur. Each of these laboratories has its own area of specialization with requisite infrastructure and expertise. This approach has proven to be successful in creating core competence at each laboratory as follows:

- **Pune Laboratory:** Materials for Electronic Packaging, Materials for Renewable Energy, Nano-materials/composites, Li-ion battery, High pure chemicals and polymers, etc.

- **Hyderabad Laboratory:** Ultra High Pure (UHP) Materials, Compound Semiconductors, Refractory Metals, Alloys, NABL accredited Restriction of Hazardous Substances (RoHS) facilities and E-Waste processing etc.

- **Thrissur Laboratory:** Microwave Dielectrics, Substrates, Multilayer Ceramics, Actuators and Sensors, Nanomaterials and Thin Films, Aerogels and Graphene based supercapacitors, Transparent Conductive Oxides (TCO) materials etc.

### 9.3.2 Products developed by C-MET for different applications

**a. Products developed for ISRO under the programme "Indigenization of Space Materials"**

- Resistor paste for Hybrid microelectronic circuits

- Solder paste for Hybrid circuits and Surface mount technology

- LTCC packages

- Niobium and Hafnium metal for space applications

- Barium Magnesium Tantalate (BMT) for satellite and terrestrial microwave communication systems.

- PTFE/woven cloth microwave substrates for Patch antenna applications

- Ring type actuators for MEMS based microvalves and Crystobalite for re-entry launch vehicle

- Silica aerogel coating for carbon foams and Optical Grade Glasses

**b. Product developed for Dept. of Atomic Energy (DAE)**

- Medium and low dielectric ultra low loss microwave substrates (C-MET is the only source in the country)

- Multilayer actuators for Robotics

- Bimorph actuator based mirror for X-ray focussing

- LTCC based cryocoolers

**c. Products/technologies developed under Make in India Program to support Indian Industry:**

- Development of active material systems for Li-Ion batteries

- Low Temperature Co-fired Ceramic (LTCC) based multilayer circuits and Gas Sensors

- Nanostructured materials for hydrogen energy from sunlight by splitting $H_2O$ and $H_2S$ splitting.

- Silicon Carbide (SiC) Semi-Insulating (SI) Single Crystal suitable for high temperature

(upto 600 C), high voltage (1.5 to 10 kV) up to S-band (2-4 GHz) applications.

- Recovery of precious metals like gold, silver, copper, palladium, etc., from Electronic waste, i.e., Printed Circuit Boards (PCBs) at pilot plant scale with capacity of 1MT.

- Extraction of high purity refractory metals, such as, Tantalum, Tantalum pentoxide, Niobium, Niobium Pentoxide for electronics and allied applications.

- Ultra High Pure (UHP) 6N-7N Purity materials, such as, Cadmium, Tellurium, Gallium, etc., for strategic applications.

- Thermal sensor based monitoring system for the early breast cancer detection and Radiosonde weather monitoring applications.

- Carbon Aerogels and Graphene based Super capacitors for energy storage.

- Graphene based sensors and actuators

- Microwave substrates and Resonators for wireless communication applications

- Piezoelectric actuators, such as, multilayer actuators, flextensional actuators and bimorph.

- Kesterite (CZTS) based thin film solar cells.

- Magneto dielectric substrates for miniaturized substrates.

- Light weight X-ray absorption materials for medical fraternity

- Photoconductor based light sensors and detectors.

- Transparent conducting electrodes

- Nanomaterials for purification of petroleum products

### 9.3.3 Technologies Transferred to Industries:

- The technology on "photopatternable silver and photoconductor thick film pastes for photosensors"

transferred to M/s Ants ceramics, Mumbai on 28th March, 2018.

- The technology on "Quickly Rechargeable Emergency Lamp" transferred to a start-up company M/s. Aessar, Thrissur on 16th February, 2018.

### 9.3.4 Technologies ready for transfer to industry

- Wearable Device and Analysis System for Early Detection and Screening of Breast Cancer

- Technology on (a) Environmental friendly treatment of PCBs and production of black copper enriched with precious metals (b) Recovery of valuable and precious metal from spent printed circuit boards (c) Recovery of valuable and precious metals from black copper obtained from spent printed circuit boards

- Aerogel Supercapacitors for Electronics and Energy Storage Applications

- Button and Pouch type Li-ion Cell

- Transparent thin film heater

- Process for Nano-ZnO powder

- Piezoceramic Compositions and Components

- Lead Free X-Ray Absorbing Materials and Medical Apron

- Microwave substrates with dielectric constant 6.15 and 3.0

- Modified silica fillers for space application

### 9.3.5 Research Performance Indicator:

- 40 Research publications in peer-reviewed journals

- 39 Presentations in Conferences and Symposia

- 49 Invited talks

- 9 Awards and Honors

- 7 Patent applications

- 2 Technologies transferred

### 9.3.6 C-MET's futuristic area of Research

The following activities are planned to explore the cutting–edge technologies in advanced electronic

materials;

- High Energy Storage devices by researching on active materials for batteries for E-Vehicle applications (Supercapacitors, Li-ion battery)

- Indigenous Sensors for Internet of Things (IoT) and Smart cities applications

- Microwave substrates, Terahertz and Milli meter wave Materials

- Cost effective and environmental friendly recycling technologies and RoHS testing

- Silicon Carbide Electronic Device Grade substrates for High frequency applications

- Indigenous u-LTCC material, tape and compatible Aluminum based electrode paste for u-LTCC based electronic packages

- NTC materials for low temperature applications for airport weather monitoring system (-90 oC to +50oC)

- EMI-shielding materials, Nanopowders of Al, Fe, B, BN, BC, AlN for space applications

- Graphene substrate for RF and terahertz devices

- Development of LTCC integrated PZT vibration sensors for defense

- Radio Frequency identification (RFID) Tags on environment friendly, flexible substrate for smart applications

## 9.4 ERNET India

### 9.4.1  NASSCOM – MeitY – ERNET Centres of Excellence

With Internet of Things on rise, ERNET supported MeitY in policy formulation on Internet of Things (IoT) where ERNET worked with NASSCOM in Public Private Partnership (PPP) mode to set up a Centre of Excellence(CoE) in IoT to nurture and promote start-up culture in India. NASSCOM-MeitY-ERNET CoE for IoT @ Bengaluru was setup in June 2015 with the overall objective of enabling India as technology hub for emerging technologies. In addition, CoE will support the Government initiatives in the social areas, such as, agriculture, healthcare, water, transportation, energy, security and privacy of data. Under COE-IoT Bengaluru, a number of start-ups have been incubated and are getting uninterrupted access to advanced equipment. The start-ups have an opportunity to make direct connects with various strategic partners of NASSCOM and get validated by experts of the industry. The following are the highlights of CoE- IoT, Bengaluru:

- 47 start-ups have been incubated till date, connected with 500+ start-ups pan India, 17 start-ups have graduated

- IP's applied -55, Received- 7

- Partners signed up : Strategic-14, Co-create-4, Innovation-3, Infrastructure-4, Association partner-1

- Organised/participated in 21 thought leadership events till date across pan India

- Focus on - Industry 4.0, Automotive/Transportation, Healthcare, Energy, Agriculture, Smart Cities.

- Participation with the industry for IoT standards and policies formation

- 43 IoT researchers incubated

- Societal projects executed by CoE/incubated start-ups:  3/32

Tripura CM, Shri Biplab Kumar visited Bangaluru Centre.

MeitY has taken further steps and decided to add three more CoE's in various states across the country viz. at Gurugram (Haryana), Gandhi Nagar (Gujarat) and Visakhapatnam (Andhra Pradesh).



Inaguration of Gurgaon Centre by Shri Ajay Sawhney, Secretary, MeitY

Operations of CoE, Gurugram started from June'18 and it got officially inaugurated on 5th October 2018. Its focus areas are Industry4.0, Automotive/Transportation, Healthcare, Agriculture . It is also engaged by ICANN to drive the IPv6 research with IIT Hyderabad. In this short span of few months of operations, 07 start-ups have been incubated at this centre.

### 9.4.2 LiFi Experimental Testbed Project

ERNET India is executing an internally funded LiFi pilot project jointly with IIT Madras. The objective is to study LiFi as an alternate communication technology and perform visible light communication experiments, and explore LiFi opportunities in various deployment scenarios, such as, hospitals, smart building and smart cities. The indoor LiFi internet kit was setup at ERNET Chennai to study and demonstrate LiFi capabilities, evaluate the indoor performance and various experiments in single user scenario. As part of indoor experiment, measurement of coverage range, optical power received at different coordinates, outage analysis at different distance in both line of sight (LOS) and non line of sight (NLoS) was carried out. The experimental outcome of the test results was published in APAN44 Network Research Workshop and Global LiFi Congress 2018.

Fig.2. LiFi experimental testbed setup

ERNET India is currently setting up LiFi indoor multi user testbed to study various performances issues like data rate, handover, interference and deployment challenges in a class room/auditorium scenario.

USB Dongle

### 9.4.3 Internet of Things (IoT) Management Framework for Smart Cities

ERNET India is jointly working with Indian Institute of Science (IISc), Bangalore to setup an experimental LoRaWAN network integrated with smart streetlights for real-time experimentation to study deployment, interference and management issues. Under this experiment, it has been considered to use simple streetlight as one of the applications of smart city that can be remotely monitored and controlled. The LoRa gateway (pole gateway) is a low cost compute box that could connect to cameras, temperature, humidity, air quality and other sensors. This pole gateway could perform the local analytics and push data to server/IoT middleware through LoRa communication or passive optical fiber. Some of the smart city applications using this platform could be traffic control using cameras, pedestrian density based lighting, or event based brightening of street light and more. ERNET is also part of the IISc initiative jointly with industry partners to create open smart city consortium to develop standard interfaces for IoT data exchange and analytics.



Downlink LED transmitter

### 9.4.4 Cyber Performance and Tech-Culture fusion programmes under APAN Asi@ Connect initiative

ERNET India as part of the project collaboration under APAN Asi@Connect initiative has been participating in the tech-culture fusion platform including training programmes and cyber performances in a project with 6 beneficiary countries, namely, India, Vietnam, Malaysia, Bangladesh, South Korea and Pakistan. The objective is to build a long-term exchange platform for tech-culture fusion that connects applications, data, people and processes and also to understand tech-culture fusion platform issues using the TEIN network.

The 1st live cyber performance event under the project was held in December 2017, where artists/musicians from India, Vietnam and Pakistan performed together over the TEIN and National Research Education Network (NREN) of each country exchanging high quality video/audio. ERNET India organised this event at IIT Madras and student artists from IIT Madras performed during the event.







Fig.1. Live Cyber performance - Artist from India, Korea and Pakistan

### 9.4.5 Enabling Schools with Smart Virtual Class Room Facility

The objective of the project "Smart Virtual Classroom" was to set-up smart virtual class room facilities in 3,204 Government owned/controlled schools plus 50 DIET in seven pilot states of Himachal, Gujarat, Rajasthan, Tripura, Haryana, Andhra Pradesh and Tamil Nadu with the focus to improve the quality of education to students from remote/rural parts of the country. Also a centralized control system was established in Delhi at ERNET's data centre which hosted the MCU, Streaming/Recording server and other associated components for multiparty audio/video interaction and also offline access of classroom sessions round the clock for learning/collaboration between all the stakeholders. The basic aim of the SVC project was to create technology enhanced classrooms that will foster opportunities for teaching and learning by integrating learning technology, such as, computers, electronic white boards, projectors, specialized software, interactive audio-video systems, etc. Under the project, the operational usage training of SVC infrastructure is provided to the schools and DIETs teachers where DIET is acting as a mentor. Specialized faculty is taking the lectures live to the other schools in that district as well as in the adjoining areas.

Smart Virtual Classroom (SVC) is a scheduled, online, teacher-led pedagogical intervention where, unlike conventional classrooms, teachers are not present with learners physically but instead interact through

public network in an online learning environment. It typically provides solution for capturing audio/video and integration of other electronics devices like Interactive White Broad, Projector, Professional Desktop, UPS, etc. Smart Virtual Classroom (SVC) is just like a real classroom, wherein a student in a SVC setup participates in a synchronous manner, which means that the teacher and students are logged into the interactive video conferencing sessions and experience the virtual classroom environment by making use of electronic interactive white board, projector and professional desktop.
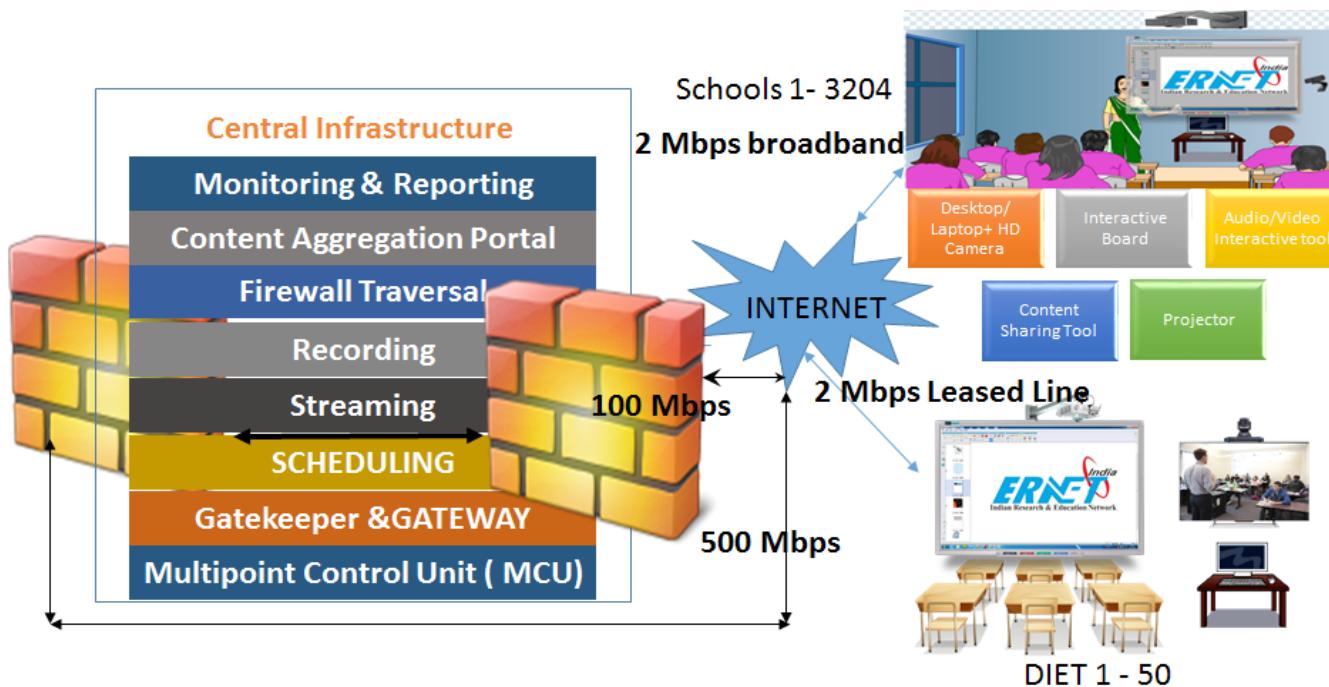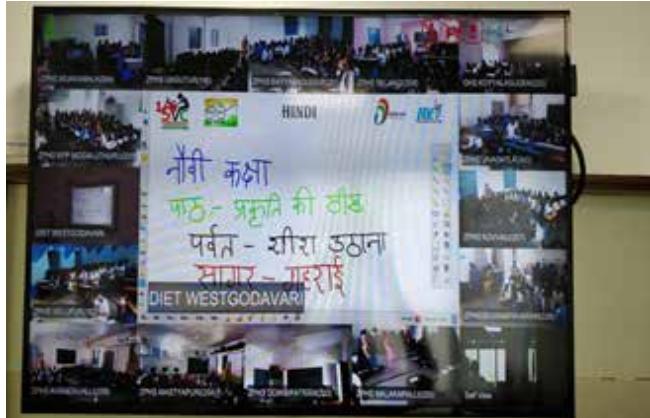


Fig.3. Enabling Schools with Smart Virtual Class Room Facility

**Smart Virtual Classroom project specific deliverables are mentioned below with achievements:**

- To establish 01 Central Location for Hosting MCU, scheduling s/w, Recording/Streaming Solution for enabling storage of live sessions, offline access and multiparty conferencing: - **100% Completion**

- To set-up 50 high-end smart virtual classrooms in each of the identified 50 DIETs, equipped with hardware based video conferencing and electronic teaching aid equipments: - **100% Completion**

- To set-up 3,204 smart virtual classrooms in 07 States,

equipped with software based video conferencing and electronic teaching aid equipments. (Andhra Pradesh, Tamil Nadu, Gujarat, Rajasthan, Haryana, Himachal Pradesh, Tripura): - **100% Completion**

- To setup a knowledge aggregation portal which would contain redirection links to course contents generated and be available on internet: - **100% Completion**

- To impart operational hands-on training to the DIETs/school staff with a training manual: - **100% Completion**

**Achievements till date:**



The installation and commissioning in all 3,204 schools and 50 DIETs have been completed. Also the centralized control system has been established and running in Delhi at ERNET's data centre which is hosting the MCU, Streaming/Recording server and other associated component for multiparty audio/video interaction and also offline access of classroom sessions round the clock for learning/collaboration between all the Schools and DIETs.

**Project usage statistics**

- The live virtual classroom sessions are being conducted through multiple DIETs since April, 2018 and total 7,120 such sessions conducted till date, during the year 2018-19.



Hon'ble Union Minister of Electronics and IT and Law and Justice Shri Ravi Shankar Prasad and the Hon'ble Chief Minister of the State of Tripura, Shri Biplab Kumar Deb formally inaugurated Smart Virtual Classroom facilities established under the project in the state of Tripura on 11th August, 2018

- 65,092 teachers have been trained till date under the project for operational skill set.

- 70,77,600 students have attended the live sessions till date.

- 11,631 sessions have been conducted through Smart Virtual Classroom since the inception of this concept.
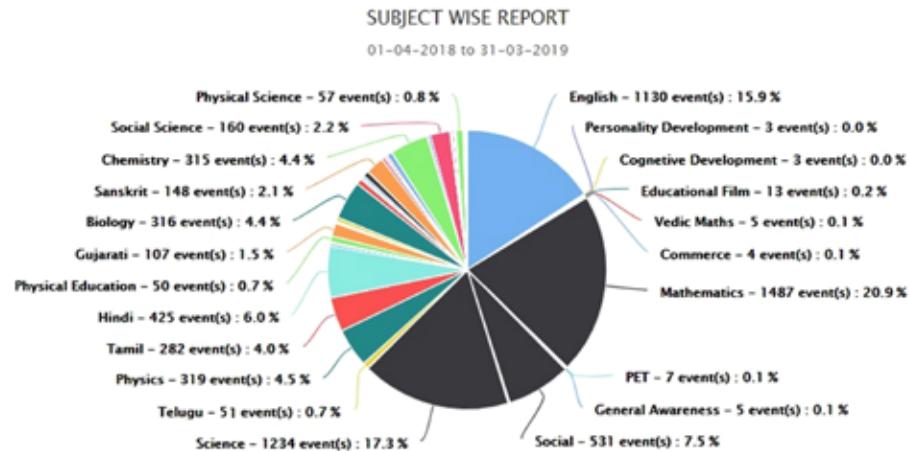
**Social Initiatives Undertaken by ERNET through Smart Virtual Classroom (SVC)**

Total events: 7120



SUBJECT WISE REPORT
01-04-2018 to 31-03-2019

Day Week Month Year

Physical Science – 57 event(s) : 0.8 %
Social Science – 160 event(s) : 2.2 %
Chemistry – 315 event(s) : 4.4 %
Sanskrit – 148 event(s) : 2.1 %
Biology – 316 event(s) : 4.4 %
Gujarati – 107 event(s) : 1.5 %
Physical Education – 50 event(s) : 0.7 %
Hindi – 425 event(s) : 6.0 %
Tamil – 282 event(s) : 4.0 %
Physics – 319 event(s) : 4.5 %
Telugu – 51 event(s) : 0.7 %
Science – 1234 event(s) : 17.3 %

English – 1130 event(s) : 15.9 %
Personality Development – 3 event(s) : 0.0 %
Cognitive Development – 3 event(s) : 0.0 %
Educational Film – 13 event(s) : 0.2 %
Vedic Maths – 5 event(s) : 0.1 %
Commerce – 4 event(s) : 0.1 %
Mathematics – 1487 event(s) : 20.9 %
PET – 7 event(s) : 0.1 %
General Awareness – 5 event(s) : 0.1 %
Social – 531 event(s) : 7.5 %

Virtual classroom is a massive medium for creating general awareness about the initiatives taken by the Government. This infrastructure can be of great use towards communicating various messages of social importance and providing trainings to the society like training on disaster management etc. It is potentially reaching a minimum audience of 20,000 students daily.

**1) IIT-JEE/Medical Entrance Preparation**

Smart Virtual Classroom facility is being used by the State of Rajasthan for imparting IIT-JEE/Medical Entrance Exam preparation in collaboration with Allen Career Institute at Kota. Similar IIT-JEE/

Medical EXAM preparation is being run through Hashlearn studio, Bangalore, for the State of Tamil Nadu. 881 sessions conducted till date.

**2) Social and Vocational Focus: -**

Various sessions/lectures have been conducted towards social awareness and Vocational classes. Social focus includes Environmental Education, Human Rights Education, Yoga Education, E-waste Management, Dengue Awareness, Disaster Management, Personal Hygiene, Swachhta Awareness, Promotion of Digital Payment, Career Counselling, B.Ed. training, etc. Sessions conducted till date :146





### 9.4.6 Wi-Fi Enabled Campus Network

- As part of the Digital India programme, ERNET India has setup Wi-Fi enabled campus network at following universities :

  1. Allahabad University, Allahabad, U.P.
  2. Savitribai Phule Pune University (SPPU), Pune
  3. North-Eastern Hill University (NEHU), Shillong,
  4. Osmania University, Hyderabad, Telangana
  5. Utkal University, Bhubaneswar, Odisha

- The Wi-Fi project is installed, commissioned and operational at all above 5 universities. Phase 2 of the project is under process for remaining locations at Osmania, Utkal and NEHU.

- It provides a high speed wireless access to internet/ intranet resources on any-time any-where basis across the campus. Students/staff are benefitted largely from it. They are accessing e-Books, journals from UGC Infonet, e-journals, video lectures, online study material, digital repository, research projects and collaborations and sharing their information and knowledge among users. It has enhanced user's participation where users from all part of the world are collaborating and sharing information/ data for research and development and education.

- It provides freedom of work on the move, study/ work continuity, easy access to the information, increase in productivity and reduction in day to day cost.

### 9.4.7 Eduroam Services - Global Wi-Fi Roaming services

Eduroam stands for education roaming. It is the secure, world-wide roaming access service developed for the research and education community. It allows students, researchers and staff from participating institutions to obtain Internet connectivity across campus and when visiting other participating institutions. 'Eduroam' service is available in 90 territories world wide catering to more than 70,000 educational institutions globally and provide seamless roaming.



eduroam worldwide presence

ERNET acts as the national eduroam operator for India and is the central point for connecting all the universities/institutes with access to the Indian eduroam national federation service. In India, initially eduroam as a project was funded by Ministry of Electronics and Information Technology from 2012 to 2017. Now, ERNET continues to maintain eduroam services for existing users as well as propagate and promote their benefits. 247 premier institutions including IITs and IIMs have hooked on to eduroam network.

### 9.4.8 PoPs (Points of Presence)

ERNET India is serving academic and research institutions in the country by innovatively connecting them on Intranet and Internet using appropriate state-of-art technologies. Institutions anywhere in the country can now be connected to ERNET network. ERNET India provides services through its following 06 Points of Presence (PoPs) located across the country, which help in rapidly responding to the needs of the institutions in the country:

- ERNET India HQs, New Delhi
- Indian Institute of Technology (IIT), Guwahati
- University of Rajasthan, Jaipur
- National Informatics Centre, Salt Lake City, Kolkata
- VSAT Hub at Software Technology Parks of India (STPI), Bengaluru
- Indian Institute of Technology Madras, Chennai

All PoPs are equipped to provide access to Intranet and Internet through terrestrial leased circuits and radio links to the user institutions. These PoPs also provide technical support and hand-holding to user sites. The PoP at STPI Bengaluru provides Intranet and Internet access through satellite.

In addition to 06 PoPs, ERNET India has setup regional centres at following 2 locations:-

- Bengaluru
- Chennai

### 9.4.9 Setting up of e-Classroom Infrastructure in 50 Medical Colleges for MoHFW

Ministry of Health and Family Welfare (MoHFW) has appointed of ERNET India as System Integrator (SI) for setting up of e-classroom infrastructure in 50 medical colleges at the cost of ₹37, 96, 68,492 plus applicable taxes. This MoHFW project is to be implemented in 50 medical colleges/institutions including a National Resource Centre (NRC) and 7 Regional Resource Centre (RRC)s spread across the country. The project involves supply, installation, commissioning, training and operations of requisite hardware and software for e-classroom and maintenance for 5 years in 50 medical colleges.

The first phase involving setting up of e-classroom infrastructure in 39 medical colleges has been completed. In the second phase, the remaining medical colleges are to be setup and made go-live with the National Resource Centre (NRC) at SGPGI, Lucknow.

After completion of second phase, the entire infrastructure shall be maintained for 5 years.

### 9.4.10 Accessibility India Campaign: Development/renovation of Government/State Government websites to make them accessible for Persons with Disabilities (PwD) as per GIGW/WCAG. 2.0 (A, AA level)

Under Accessibility India Campaign, one of the target is to make Government websites and Digital contents accessible to all. For this, Department of Empowerment of Persons with Disabilities (DEPwD) has funded ERNET India to make State Government websites accessible as per GIGW and WCAG-2.0 (A, AA level) standards. 917 websites across 24 States and UTs of the country are being redeveloped to make them accessible to Persons with Disabilities (PwD) and responsive irrespective of type of device or browser. More than 500 websites have been developed under

the project during the year.

The first 100 fully accessible websites of State Governments complying to WCAG (AA) and GIGW standards were launched by the Hon. Minister, Ministry of Social Justice and Empowerment in January 2018.



### 9.4.11 IPv6 Activities – ERNET leads the way to the Future Internet

• **Capacity Building and Skill Development**

With the aim of churning out competent technical resource in the area of ICT and IPv6 networking apart from other areas, ERNET designs courses and has a specialized training infrastructure to expose participants to hands-on live environment. These courses help in capacity building and enhancing the skillsets required for propagating ICT knowledge and experience especially in new and emerging technologies, such as, AI and IoT. It aims at creating pool of trained technical resources for managing and advancing the deployment and use of information technology in terms of operating the existing computer network/WAN network and at the same time keeping the pace of advancement as per latest technological needs.

• **Consultancy and Turnkey Implementation Services**

ERNET India, the DoT empaneled consulting service provider and MeitY's nodal agency for IPv6 implementation, has been handholding and providing consultancy and turnkey IPv6 implementation services to organisations.

• **YETI DNS Project – A live IPv6 only ROOT DNS system test bed**

"One World, One Internet, One Namespace" is the essence for the success of today's Internet. The top level of the unique identifier system, the DNS root system, has been operational for 25+ years. It is the pivot to make the current Internet useful and make changes in the current Internet Infrastructure which is considered somewhat ossified for stability reasons at present. It is hard to test and implement new ideas evolving to a more advanced level to counter challenges like IPv6-only operation, DNSSEC key/algorithm rollover, scaling issues, etc. In order to make the test more practical, it is also necessary to involve users' environment which is highly diversified, to study the effect of the changes.



ERNET as part of this global initiative is hosting in India 3 of the 25 root servers and 3 out of the 7 root resolver systems operating worldwide under this DNS root server test bed. This also includes one root server having IDN name मूल.येती.भारत connectivity.

### 9.4.12 Domain Name Registration service

ERNET India is an exclusive domain registrar for education and research domains i.e ac.in, edu.in and res.in and IDN domain names under **विद्या.भारत.** More than 13000 domains under the above categories are operational today.

### 9.4.13 Establishment of VSAT connectivity for Internet/Intranet access in the North Eastern States of the country

ERNET India has successfully established VSAT connectivity for Internet/Intranet access in 60 selected schools/institutes located in the remote parts of North Eastern States of the country. The project is funded by MeitY and its duration is 3½ years. The aim of the project is to help narrow the gap between remote areas and other parts of the country. This will also help promote equitable and sustainable development of remote areas of North Eastern States of the country through Internet.

### 9.4.14 Establishment of two High Capacity SCPC VSAT links for NKN Project

ERNET India has established two high capacity SCPC VSAT links for National Knowledge Network (NKN) Project of MeitY. Of these, one link is functional at Kavaratti, Lakshadweep from 1st March, 2017 and second link is functional at Port Blair, A&N Islands from 09th Jan, 2018. Presently, both the links are operating with 33 Mbps (Rx)/14 Mbps (Tx) data rates.

**Various Activities under operations**

- ERNET India provides VSAT connectivity in C-Band using GSAT satellite for Internet and Intranet access throughout the country, which mainly includes hilly/difficult terrains, North-Eastern region, Andaman and Nicobar and Lakshadweep Islands. The network is equipped with state-of-art VSAT technologies to provide data rates from 128 Kbps to 40 Mbps to the users as per their requirement.

- The establishment of nine high capacity SCPC VSAT links in Lakshadweep Islands for Lakshadweep Information Technology Services Society (LITSS) is in progress and expected to be completed by March 2019.

## 9.5 National e-Governance Division (NeGD)

### Achievements (2018-19)

Digital India Programme is a flagship programme of Government of India with a vision to transform India into a digitally empowered society and knowledge economy. The Digital India programme weaves together various Government schemes, many of which cut across all the Central Ministries/Departments. The programme is to be implemented by the entire Government including Central Ministries and State and UT Governments is coordinated by Ministry of Electronics and Information Technology (MeitY).

NeGD has been assigned the responsibility of providing the programme management, technology management, project appraisal, awareness & communication and capacity building support to MeitY for Digital India. NeGD is also assigned the role of implementing innovative and multi-purpose platforms and e-Governance projects. NeGD is playing a pivotal role in supporting Ministry of Electronics and Information Technology for mandate of work assigned and in addition, it is also adding value to eGovernance projects/initiatives undertaken by Ministries/Departments/Agencies both in Central and State/UT Governments.

**Main Functions:**

1. **Consulting and Technology Management Support:**

   NeGD acts as one of the key catalysts and integrators for e-Governance initiatives and Mission Mode Projects under Digital India. While ongoing e-Governance initiatives have reached a certain

stage of maturity, several new initiatives are on the anvil for bringing about further transformation. These include redefining and reprioritizing of the e-Kranti portfolio, integrated services, mandatory Government process reengineering, comprehensive process reform, standardisation, integration, automation and self-service, infrastructure, platform and service on demand, leveraging emerging technologies namely cloud, mobile, analytics, social media, artificial intelligence, etc, putting in place HR policies and structures for e-Governance, capacity building and communication and awareness.

## 2. Monitoring and coordination of MMP/e-Gov projects:

NeGD coordinates with all Central Ministries/ Departments and State IT Departments and provides advisory and technical support in their e-Governance initiatives.

- **Programme Management Information System (PMIS)**

    PMIS is a web-based, centralized tool for monitoring and evaluation of the physical, financial and outcome parameters of the Mission Mode Projects under e-Kranti framework of Digital India programme and other such e-Governance projects. It is developed in-house by NeGD.

**Objectives:**

- To provide centralized monitoring and analytics for physical and financial progress

- To assist the Central/State Departments to track and monitor the progress of the project centrally and State-wise

- To support decentralized data collection at source

- To generate project specific, state/district/ national level MIS and Dashboard reports

- To enable stakeholders to communicate information and decisions on MMPs/NeGD projects quickly, effectively and periodically

- To reduce turnaround time in generating periodic progress reports.

**Features:**

- Pre-implementation (conceptualization, core scoping, design an development) attributes

- Post implementation (operate, sustain, monitor and evaluate outcomes) attributes.

- GIS enabled Dashboard and services monitoring

## 3. Secretariat to Apex Committee, Council of Mission Leaders, Meeting of State IT Secretaries and coordination of Digital India Implementation.

NeGD provides full-fledged liaison, management, secretarial support and critical inputs while organizing the meetings of the Apex Committee (i.e. headed by Cabinet Secretary, GoI), Council of Mission Leaders and State IT Secretaries (i.e. chaired by Secretary, Ministry of Electronics and IT).

## 4. CAPACITY BUILDING:

- A broader outreach programme of MeitY called "Cyber Surakshit Bharat" has been launched in collaboration with leading IT Industry and related Government organisations to educate and enable the CISO's, and broader IT community within Government to address and mitigate the emerging challenges and create awareness among Government users. This includes series of regional awareness workshops, intensive role based trainings for designated CISOs and the officers responsible to observe cyber security in their respective Government Organisation.

- Special focus has been made on engagement with leading training and academic institutes within and beyond Government to maximise

the reach for covering officials and at the same time seeding in e-Governance as part of curriculum in various cadre based state and central training institutes. Central and Administrative Training Institutes (ATIs-CTIs) are conducting specialized trainings; CIO and CISO role based trainings, thematic workshops and developing master trainers in e-Gov along with facilitation from NeGD. Content and faculty support has been provided to ATI- Mysore, NIFM-Faridabad, IGNFA-Dehradun, MGSIPA-Punjab and DIT-Delhi, Uttarakhand, J&K and UP. During the year, MOUs were signed with IGNFA-Dehradun, CeG-Lucknow and MGSIPA-Punjab to take up specialized e-Gov and embedding e-Gov trainings.

- Learning Management System (LMS) and Knowledge Management Systems (KMS) were launched and webinars conducted on GST, GCCS 2017 and in e-Governance domain. Indian Railways, GSTN International Solar Alliance and State Governments of Jharkhand, Kerala and Tamil Nadu are being supported to leverage LMS platform of NeGD.

- The following training programmes/workshops have been conducted under CB schemes Phase II till 31st March, 2019 in FY 2018-19:

| Training Programme/ Workshops | No. of Programmes | No. of Participants |
|---|---|---|
| Thematic Workshop | 2 | 211 |
| Chief Information Officer (CIO) programme | 3 | 60 |
| Central Specialized Training Programmes | 4 | 133 |
| Chief Information Security Officer (CISO) | 9 | 345 |
| NeGD supported Digital India Sensitization Program with State Administrative/Central Training Institutes | 6 | 233 |

## 5. Major Projects of National e-Governance Division (NeGD)

### DigiLocker

DigiLocker is offering private cloud space to citizens to store and share their public documents in a safe and secure way. It is implemented in-house by NeGD.

The operational status of DigiLocker is as follow:

- 350.29 crore issued documents
- 2.06 crore registered users
- 2.56 crore uploaded documents
- 200+ types of certificates made available
- DigiLocker, in cooperation with Kerala IT department, provided digital certificates to Kerala residents during flood in 2018

### OpenForge

OpenForge is providing a collaborative application development platform based on open source software. It is developed in-house by NeGD.

The operational status of OpenForge is as follows:

- 5,027 registered users
- 1,322 registered projects
- Hosting critical projects, namely, GeM, UMANG, DigiLocker, NCoG, UPI, RAS, eGov Smart City Platform etc.

### Unified Mobile App for New-Age Governance (UMANG)

UMANG is providing a single app to citizens for accessing primarily G2C services from the Central Government, State/UT Governments, and local bodies as well as from their agencies. Its development, maintenance and support are managed by NeGD.

The operational status of UMANG is as follows:

- 357 services being offered by 72 Departments and 18 States

- 1.1+ crore downloads

- Supports 12 Indian languages, in addition to English

### National Centre of Geo-Informatics (NCoG)

NCoG is providing single source GIS platform for sharing, collaboration, location-based analytics and decision support system, catering to Central and State Government departments across the country. It is developed by NeGD in collaboration with 'Bhaskaracharya Institute For Space Applications and Geo-Informatics (BiSAG)'.

The operational status of NCoG is as follows:

- 245 GIS Based web applications

- 50+ mobile applications

- Supporting 24 Central Government Ministries/Departments/Agencies and 18 State/UT Governments

### Learning Management System (LMS)

LMS is facilitating self-paced, web based and mobile based learning, anytime and anywhere in a cost-effective manner. Its development, maintenance and support are managed by NeGD.

The operational status of LMS is as follows:

- 130 webinars have been conducted for Goods and Services Tax Network (GSTN), Department of Telecommunications (DoT), Indian Railways, Aero India 2019 (Department of Defence Production, Ministry of Defence) etc.

- More than 150 webinars/videos hosted on the Digital India Learning YouTube Channel with 26,214 subscribers and more than 1 million views as on 31 March 2019. (https://www.

youtube.com/channel/UCbzIbBmMvtvH7d6Zo_ZEHDA)

- 10 international webinars conducted for Aero India 2019 facilitated through the state-of-art lab setup at NeGD office.

- 106 webinars conducted for GST for training tax officials/taxpayers.

- 13 e-modules courses under development under 6 crucial eGovernance topics namely: Project Management, Detailed Project Report, Bid Management, Change Management, Government Process Re-Engineering, eGovernance Lifecycle.

- 53 courses and 8 video lectures uploaded in the LMS.

### 9.6 Government's IT infrastructure: National Informatics Centre (NIC)

NIC was established in 1976, and has rich experience of providing ICT and eGovernance support for the last 4 decades and bridge the digital divide. It has emerged as a promoter of digital opportunities for sustainable development. To its credit, NIC spearheaded "Informatics-Led-Development" by implementing ICT applications in social and public administration and facilitated electronic delivery of services to the Government (G2G), Business (G2B), Citizen (G2C) and Government Employee (G2E). By establishing the ICT Network, "NICNET", NIC has facilitated the institutional linkages with all the Ministries/Departments of the Central Government, 36 State Governments/Union Territories, and 710+ District administrations of India. NIC has been instrumental in spearheading e-Government/e-Governance applications in Government ministries/departments at the Centre, States, Districts and Blocks, facilitating improvement in Government services, wider transparency, promoting decentralized planning and management, resulting in better efficiency and accountability.

NIC has aligned itself with mission and vision of

Digital India Programme. NIC has developed generic, configurable eGovernance products/applications as state-of-art architecture using cutting edge technologies including mobile, cloud, data analytics, and advanced GIS. The focus is to productize software applications with configuration flexibilities for making them readily available with minor customization. To facilitate these, Centre for Excellence for Data Analytics (CEDA), Centre for Excellence for Artificial Intelligence (CoE-AI), Mobile Competency Centres, and Centre for Excellence in Cyber Security have been set up. Some of the important projects like eWaybill under GST, SWaaS, DARPAN, eOffice, eHospital, eProcurement, eTransport (Vahan and Sarthi), eCourts, Service Plus, Soil Health Card, SBM-G, SBM-U, ePrisions, eCourts, eVisa, eSameeksha, eTaal, Direct Benefit Transfer etc. have been rolled out across the country. NIC products and services have been recognized internationally also with signing of agreements with Republic of Uzbekistan, Morocco and Sri Lanka for cooperation in the area of eGovernance. Many other countries have also shown keen interest in taking NIC's support in IT and eGovernance.

NICNET, the nationwide network has over 70,000 nodes in Delhi Government buildings and over 1,00,000 nodes in State Secretariat buildings. Access to NICNET is also available through Wi-Fi in various Central Government offices. There are 3,672 e-services from various ministries, States/UTs and all Mission Mode Projects (MMP) with over 10,500 crore eTransactions till date. Citizens across India access NIC portals every day for information and services. The data centres of NIC host 8,000+ websites of the Government in the secured environment. The NIC National Cloud (Meghraj) is presently hosting a number of critical applications on over 16,563 virtual servers supporting 480+ eGovernance projects and 997+ user departments under Digital India. A new state-of-art data centre at Bhubaneshwar has been set up, which is fully operational and another at Bhopal is being set up. These are in addition to the existing data centres at Delhi, Hyderabad and Pune. NIC has the largest e-mail service of the country with more than 525

million e-mails transacted per month. It has the largest video conferencing network in the country which has facilitated more than 1.91 lakh VC sessions with over 4 lakh studio hours of VC sessions conducted. Over the National Knowledge Network (NKN), 1,687 links to various institutions have been commissioned and made operational. NKN has established its international Point of Presence at Amsterdam, Geneva, Singapore and Sri Lanka. NIC continues to provide vital support to PRAGATI (Pro Active Governance and Timely Implementation of various Government schemes) wherein Hon'ble Prime Minister monitors implementation of critical projects of various Ministries/ Departments across the country.

At the State level, NIC is providing ICT and eGovernance support to State Departments. Some of the important projects implemented are DARPAN, eWaybill, Mid-Day Meal, eHRMS (Manav Sampada), ePareeksha, Real Craft, eVidhan, land records and property registration, SBM-G, PMAY, XLN, treasuries, eHospital, eGranthalaya.

### 9.6.1 NICNET – E- Governance Network Backbone

Core of NICNET backbone is fully upgraded to multiple 10 Gbps capacity with sufficient redundancy. States are connected through multiple 1/10 Gbps links and districts 34/100 Mbps links with redundancy built at State and District links. Last mile redundancy for NICNET has been extended to more number of districts, with primary link from BSNL and secondary links from Railtel/PGCIL. Most of the Bhawan links at Delhi which were on 34 Mbps are upgraded to 100 Mbps and those on 100 Mbps are upgraded to 1Gbps. Direct peering of NICNET with BSNL, PGCIL and Railtel has been completed at Delhi and Hyderabad for saving internet bandwidth and faster access of each other's network and data centre. Peering with Google, Microsoft and Akamai Content Delivery Network has facilitated faster access to Google services and other important International web sites. Re-structuring of video conferencing network has enabled to minimize delay and handle large scale important video conferencing, such as, PRAGATI of Hon'ble PM and GST Council

Meetings by Hon'ble FM. Global server Load Balance setup at NDC, Shastri Park and Hyderabad provides efficient utilization and many websites were migrated for seamless fail-over. Improvements in design change up to District PoP have been done to provide requisite SLAs to NICNET customers. The management and monitoring of various links and applications are performed both centrally at Delhi and in distributed manner by respective State NOC. Network is configured to run completely on IPv6 along with current IPv4. IPV6 is extended to data centres to make more web sites available on IPv6. High speed Internet services are provided to national data centres to ensure that the applications hosted are accessible to users across the globe with minimum latency. Capacity planning and upgradation of internet gateway at regular interval has been undertaken to provide smooth internet access to all NICNET users throughout the country. To maintain accurate timing and synchronization of all network elements and servers on the network Stratum-1 clocks are installed at Delhi and Hyderabad.

### 9.6.2 NICNET - VSAT Services

NICNET has been offering satellite based VSAT Network services over Ku-band VSATs for providing data and video application. NICNET VSAT Network is used widely for various G2G application deliveries across the country. While most of the network connectivity has been migrated to high speed terrestrial and broadband services, there are still areas, especially in regions with difficult terrain, such as, Andaman and Nicobar, Lakshadweep, North Eastern States, hilly regions of Himachal Pradesh, Uttaranchal and Jammu and Kashmir which are dependent on the VSAT based network services offered by NICNET. Some of these locations have VSATs as primary source of connectivity, while others utilize VSATs as backup connectivity.

NIC is also providing satellite bandwidth from NICNET pool for delivering e-governance services to VSATs of various projects of Central/State Government departments, such as, Rural Development, Taxation, Treasury, Finance, Health and Food & Civil Supplies in geographically difficult locations where terrestrial

connectivity is either not available or reliable. For running the VSAT services, NIC has leased transponder bandwidth from DoS/ISRO on the GSAT-18 satellite.

### 9.6.3 National Knowledge Network (NKN)

NKN empowers Digital India, as it is the primary backbone for all e-Governance initiatives in the country. It is the only network globally, that carries R&E, Internet and e-Governance traffic as independent verticals under one umbrella. NKN has multiple 10G links that are combining a core bandwidth of close to 1000G, providing secured and highly resilient connectivity across major institutions for research, education and e-Governance.

Institutes connected under NKN belong to diverse categories as depicted in the table below:

| Major Categories | | | | |
|---|---|---|---|---|
| IITs | IIMs | Medical | Central/ State University | Engineering |
| Agriculture Research | Armed Forces | Quality Testing Labs | State Wide Area Networks (SWAN) | State Data Centres (SDC) |
| Research Labs | CSIR National Labs | National Data Centres | CDAC | Art and Design |
| DRDO | Space | DST | Security | ISRO and DAE |

Today, NKN connects 1,687 institutes (under various categories) providing service to more than 5 crore end-users, more than 498 district links, 33 State Wide Area Networks (SWANS) as well as 30 State Data Centres (SDCs) across the country. Further, NKN has a strong backbone connectivity with 31 Points of Presence (PoPs) in various State Capitals and 92 core links connected with meshed topology. Moreover, currently over 700 Gigabits (reaching a peak of 5 Petabytes) of data is flowing within the NKN backbone every day. Over 40 links (premium institutes, SDC (State Data Centres) and SWAN of many States) have been upgraded to 10 Gbps. NKN has also established a high capacity SCPC

VSAT Connectivity at Kavarati, Lakshadweep and Port Blair, Andaman & Nicobar Island.

Concurrently with strengthening its national footprint, NKN focuses on improving international connectivity by peering with Research and Education Networks (RENs), such as, Asi@connect in Asia Pacific, GEANT in Europe, Internet2 in USA, LEARN in Sri Lanka and NORDUnet for Nordic countries i.e. Denmark, Iceland, Norway, Sweden and Finland. NKN has its own PoPs (Point of Presence) at Amsterdam, Singapore and Geneva.

As part of the directive given by Hon'ble Prime Minister of India, NKN is delivering on its commitment for connecting with South Asian Countries i.e. Afghanistan, Bhutan, Nepal, Bangladesh and Sri Lanka. Sri Lanka was connected in Jan. 2018 and the link was inaugurated by Hon'ble Minister of Electronics and Information Technology. NKN also plans to extend its connectivity to Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) nations.

### 9.6.4 NIC-CERT

NIC being the IT backbone of Indian Government is entrusted with ensuring the information security of the Government assets deployed at the NIC's data centres and connected to the NIC's Wide Area Network across the country. NIC has recently, established its Computer Emergency Response Team (NIC-CERT).

NIC-CERT has been setup with the objective of creating a comprehensive security and incident response framework that integrates world class security components and inbuilt threat intelligence for detection, prevention and incident management. Using the tools, the team monitors and correlates events that would help in generating a canvas of the attack surfaced and identify the vulnerabilities and possible exploits. The mission of NIC-CERT is to collectively lead and coordinate the cyber security incident response and strengthen the cyber security posture of National Informatics Centre. The core mission activities of NIC-CERT include:

- To co-ordinate and respond to cyber security incidents happening in NIC

- To provide intelligence or advisory on the prevailing cyber threats and vulnerabilities, for proactively securing NIC's network and assets.

- To establish and maintain a centralized log management system for NIC and maintain a knowledge base of cyber security incidents handled by NIC-CERT

NIC-CERT supplements the existing cyber security initiatives of NIC and will also ensure an organisation wide uniform and coordinated cyber security strategy and incident response. NIC-CERT has setup a state-of-art "Security Operations Centre (SOC)", which monitors round the clock, the various security events and incidents that happen across NIC's network. Some of the key milestones achieved by NIC-CERT are:

- Published around 140+ Security Advisories and 180+ Threat Intelligence Alerts.

- Played a crucial role in securing Government IT Infrastructure by proactively identifying over 1000+ vulnerabilities affecting Government ICT Infrastructure.

- Identified many security compromises, Government credential compromise, investigated hacking/defacement incidents, phishing incidents, typo-squatting domains, fake Government websites etc.

- Undertook initiative to secure the Government LAN/WAN, by proactively identifying potential compromises and malicious traffic in the network.

- Sent regular security overview reports to the Chief Information Security Officers (CISOs) of various Ministries and Departments.

- Conducted periodic capacity building initiatives and security awareness training to sensitize officials of various Ministries and Departments.

### 9.6.5 NIC IT Infrastructure

National Data Centre Division is executing activities related to strategic planning, design and establishment of National Data Centres and NIC National Cloud, enhancement/upgradation/establishment of existing Data Centres/Cloud, Mini-Data Centres and Mini Clouds in the State Centres and upgradation of infrastructure at NIC District Centres.

### 9.6.5.1 NIC District Infrastructure

NIC has its centres operational/in process of establishing centre in 717 locations across various States/UTs in the country. NIC has also set up its centres in the recently created districts in various States. Under the direction of Hon'ble ME&IT, NIC has undertaken the task of upgrading all its district centres in phased manner. The augmentation and upgradation of infrastructure at the district level would strengthen the network infrastructure, and facilitate the Digital India services for G2C and G2G by availing seamless internet access. Essential requirements have been provided to all NIC District Centres in phased manner. Phase-1 covering 243 NIC districts (including 36 new District Centres) has been completed successfully. Phase-2 covering 457 NIC Districts (including 11 new district centres) is under process.

### 9.6.5.2 Data Centres Infrastructure

NIC is providing Data Centres Services from National Data Centres at Delhi, Hyderabad, Pune and Bhubaneswar. The National Data Centre at Bhubaneswar was inaugurated by Hon'ble ME&IT in May, 2018. Openstack based cloud services have been started and hosting of state applications is now being taken up from this newly established NDC. National Data Centre at Delhi was upgraded with latest start-of-art networking, two petabyte enterprise class storage, backup and load balancing ICT infrastructure and number of projects of national importance were hosted/enhanced. Some of these are E-Way Bill, ICJS, PFMS, Messaging, e-Courts, e-Transport and e-Office. NDC Pune network was also upgraded to high speed and number of projects were moved to NIC Cloud. Some of these are e-Pramaan, e-PDS, e-Certificates and MHA Projects. NDC Pune has also provided DR hosting for e-HRMS and GST.



Inauguration of Bhubaneswar National Data Centre

### 9.6.5.3 NIC Cloud Services

NIC launched National Cloud Services in year 2014 under MeghRaj Government of India Cloud Initiative. NIC Cloud Services are being provided from multiple locations of National Data Centres at Delhi, Hyderabad and Pune. In order to cater to the projects envisioned under Digital India Programme and growing requirements of existing projects, 16,563 virtual servers were provisioned and allocated to 997 Ministries for e-Governance projects.

### 9.6.5.4 Establishment of Mini-Clouds in States

NIC is establishing Mini-Clouds in the NIC State Centres. During this year, Cloud setups have been made operational in four States. Mini-Cloud in the State of Uttrakhand was inaugurated by Hon'ble ME&IT in October, 2018. NIC Cloud has been conferred with prestigious 51 GEMs of Digital India Awards 2018 for excellence in e-Governance.

### 9.6.6 eMail and SMS Services

### 9.6.6.1 eMail Services

NIC is the implementing agency for providing email service to the Government, both at the Centre and State. All services under e-mail are offered free of cost to all officials under Ministries, Departments, Statutory Bodies, Autonomous Bodies, States and UTs. The primary setup is at Shastri Park and the primary email domain is @gov.in. The email service forms the backbone for all eGovernance initiatives in the Government. As part of the mandate under the Digital India programme, Government is providing a secure eMail service to its Government officials for secure communication with a 24/7 support team.

Supporting more than 1,042 virtual domains with over 2 million accounts, the growth in terms of complexity has been evident. The daily email traffic is 15 million. With implementation of approved email policy for the Government of India, the number of users would increase to 5 million for which enhanced infrastructure along with a robust open source email and collaboration platform has been implemented. The platform is based on five primary pillars viz. Security, Performance, Redundancy, Service Continuity and Rich Feature Set.

The messaging service of NICNET also provides an integrated application solution, with proactive management and maintenance. There are various third party applications like Log App, Pass App, Id look up, Profile Update which are used to make email services more effective. NIC also provides eMail distribution list for bulk email for official purpose. Keeping the essence of Digital India in mind, eforms application was launched in 2018 providing end to end, online solution to users starting from applying for NIC email services to final creation of user id. 1.86 lakh users have used the eforms service since its launch.

### 9.6.6.2 eSampark

The IT platform for seamless communication between the Government and citizens, one of the early harvest programmes of Digital India is also configured under NIC Messaging service. With an objective of sending public service messages in the form of email/SMS and establishing proactive communication by digitization of campaigns, eSampark has been utilised by over 25 Ministries, sending 1,262 email campaigns to 636 crore email addresses till Feb, 2019 since the launch in August 2014.

eSampark plans to become an extensive structured database of Government officials (of both Central and State Governments) for sending official information, alerts, draft policies etc. with an option to send to customized user base thereby improving the efficiency of communication. The platform has 5.35 crore email addresses and 103.15 crore mobile numbers. The platform is being used by Prime Minister's Office, MyGov, GSTN, Ministry of Railways, Ministry of Coal to name a few to send out weekly/monthly email campaigns giving public based service messages.

### 9.6.6.3 eGreetings

eGreetings, another initiative under the early harvest programmes of Digital India and configured under NIC

messaging umbrella, is a green initiative for sending eco-friendly cards to each other. The portal allows users to select and send greetings from multiple occasion-specific templates. Government Departments can also customize the greetings by adding tag-lines and messages related to their programmes and schemes. The observance of national and international days and disseminating informational messages and greetings related to such occasions will facilitate sharing and dissemination of educational and informational content to citizens. With 947 cards marked under 49 categories for all festivals and days of national importance, the initiative supports text, audio, pre-defined quotes by Hon'ble PM, slogans and logos of each Ministry. 6.36 crore cards have been sent since its launch.

### 9.6.6.4 SMS (Short message services) Services

SMS gateway service is also provided by NIC as a part of its messaging solution. The service is available to all Government applications both at the Centre and States. It has various advance features like PUSH, PULL, Block out time, scheduling, localization of content, international SMS, OBD (Outbound dialling), Missed call service, SMS analytics/visualisation etc. Currently around 2,000 eGov applications are integrated with the gateway which include various critical projects like Mann Ki Baat, MyGov, Sampark, Digital India portal, eHealth, National Scholarship portal, JeevanPramaan, BAS, Mother and Child Tracking, KhoyaPaya, Income Tax, Vahan, Sarathi, eProcurement, e-way bill, GST etc. The average monthly traffic is about 90 core SMS. The service also offers multilingual SMS options for localization in difference parts of our country.

### 9.6.6.5 NIC Service Desk

NIC service Desk is a single-window platform for resolving various service related issues/requests. It is a single point of contact for users for all NIC services with fastest possible routing of issues to the concerned. It ensures transparency and accountability. There is timely resolution of services with provision for escalations. Detailed responses are given to users' issues with feedback. 18.31 lakh plus

serviced tickets have been handled with an average of 4,500+ new tickets per day, involving 35 plus core services and 1,000 plus Government offices covering 36 States/UTs, 650 plus districts.

### 9.6.7 Application Security

NIC is formulating and updating the security policies for NICNET as and when required. 'Version Tracker' for latest versions/patches of operating systems, web servers, frameworks, content management systems, mobile O.S. etc. are also issued biweekly. security audit of web applications/websites, penetration testing and vulnerability analysis, ssl compliance testing, version detection for application hosting environment with infrastructure compliance checks are also done as per user requirement. Critical web applications are secured through Web Application Firewall (WAF) to counter application layer threat, management and administration of deployed WAF solutions configuration of critical sites including CMF (Drupal) based portals, WAF service support at NIU Hyderabad for non-compliant web applications and 24x7 monitoring service. The centre provides incident handling and malware analysis, sanitization of security controls based on analysis results and issuing advisories to NICNET users.

### 9.6.8 Video Conferencing (VC) Services

Videoconferencing services are being provided from 1,843+ studios spread across the country including State capitals, districts, union territories, Departments/Ministries. Video conferencing services are being used for monitoring of various Government projects, schemes, public grievances, monitoring of law and order, hearings of RTI cases, tele-education, tele-medicine and launching of new schemes. NIC's VC services are being extensively used by Hon'ble Prime Minister, Union Ministers, Governors, Chief Ministers of States, Cabinet Secretary and Chief Secretaries, Chief Information Commissioner and various other senior officials across the country. NIC is also providing web based desktop video conferencing services to users of various departments of Central Government and State

Governments. It has the largest video conferencing network in the country which has facilitated more than 1.91 lakh VC sessions with over 4 lakh studio hours of VC sessions conducted as of now. Around 20,000 users are using web based VC facility with more than 2.47 lakh hours of VC duration for implementation and monitoring of various e-governance activities.


PRAGATI Video Conferencing

### 9.6.9 Capacity Building of Officers

### 9.6.9.1 e-Learning Management System (e-Learning Services)

E-learning offers greater degree of ease and flexibility than the traditional classroom-based learning. Major advantage of e-learning is its accessibility and cost effectiveness as the trainings are available online and costs associated with travel and accommodation of participants at offsite locations can be eliminated. E-learning can be leveraged for courses which require some prerequisite training to shorten classroom trainings, courses which require re-training on regular basis (compliances). Two important applications,, namely, Webcon and VidyaKosh are being run under e-Learning System of NIC.

### 9.6.9.2 Webcon – A NIC Virtual Class Room:

Virtual Classroom Setup 'Webcon' is well established and being used regularly by different divisions of NIC for product, technology training and project implementation. These sessions are being attended by NIC officers from all over NIC offices in States and districts across the country. The important sessions

running on regular basis are training on Central Public Procurement Portal, Computer Networking of consumer Forum (CONFONET), Soil Health Card Software, Integrated Disease Surveillance Programme (IDSP), daily(2 session/day) technology training sessions. 836 virtual class room sessions (with the participation of 21,168 officials) were held during 2018-19).

### 9.6.9.3 VidyaKosh – A Learning Management System (LMS)

Vidyakosh is a National Digital Repository to store, index, preserve, distribute and share the digital learning resources with NIC employees. It facilitates efficient administration of self- learning for all NIC officials. A large number of courses have already been made available in Vidyakosh and efforts are being made to include many more in near future. Courses are listed in two categories: (1) In-house courses those are readily available on the Dashboard of each employee. (2) Off the shelf (OTS) courses which are to be used through named licenses.

With the emphasis on capacity building of the NIC officers, NIC eLearning Services would be playing a vital role in enhancement of the technical skills of the officers. After the launch of VidyaKosh in February 2018, NIC e-learning services have been increasing by leaps and bounds by adding many new features for user and administrator on regular basis. Both Webcon and Vidyakosh have been developed using open source technology on NIC cloud-Meghraj, thus saving annual maintenance cost of proprietary software. The e-learning services have resulted in significant time and cost saving of the Government workforce by reducing travel for training and meeting. More than 2,700 NIC officers are pursuing courses through VidyaKosh.

### 9.6.9.4 Technical Development Programmes

TDP-Training Division, NIC has conducted technical training programmes mainly on GIS, development of mobile apps on Android and iOS Platform, network technologies, software development on Microsoft platform, software development in open source technologies (Mysql and PostgreSQL), enterprise

architecture, cyber security, cloud and data centre, emerging technologies (like Artificial Intelligence and deep learning, ELK stack for data analytics, Internet of Things etc.), specific products (e-office, PFMS, email and SMS integration), video conferencing and technology services so that NIC officers could initiate development activities in these new areas. It has organized 44 technical training programmes at NIC HQ up till now. Regional training programmes are also being organized in these domain areas all over India with its coordination.

### 9.6.9.5 GuDApps tests:

NIC has raised the standard of software processes for development of robust, inter-operable, intelligent and user-friendly e-governance applications with consistent interfaces through the guidelines for Development of Good Applications (GuDApps). The purpose of these guidelines is to provide a set of practices to make development efforts more predictable and presumably of higher quality in terms of the system interactions or interfaces with its external environment. The GuDApps test has been successfully cleared by 2,126 NIC S&T officers and out of 2,126 NIC Officers, 689 officers were awarded distinction certificate.

### 9.6.10 Open Technology Group (OTG)

NIC has established Open Technology Group (OTG) to spearhead the technology exploration and provisioning support services for adoption of OSS in various e-Governance Projects and applications under NIC and NeGP programme of MeitY. NIC-OTG is mandated to facilitate strategic control of open technology within NIC and spearhead the knowledge centric activities in e-Governance projects all over India. OTG made the significant contribution for formulation of e-Governance Standards, Policy on adoption of Open Source Software for Government of India, Framework for adoption of Open Source Software in e-Governance Systems and Open API Policy. OTG was entrusted with implementing the Open Source Activities of National e-Governance Standards and Technology (NeST), a project of MeitY executed by NICSI with STQC as technology partner.

Key technology services supported by OTG are PWA based application development, CMS/Portal using Drupal, trouble shooting, performance configuration and data model design for PostgreSQL Database, Replication using SymmetricDS, Database Migration to PostgreSQL, Migration from RDBMS to Document Oriented Database, Single Sign on Solution using CAS, Recommendation of Open Source Stack after due exploration and evaluation, Bundled OSS Stack for Development, Staging and Deployment, CentOS and RedHat templates for NIC Cloud Services, Source Code/Project Management Support to TechGov 2018, Capacity Building and Hand holding on Recommended Open Source Stack, Provisioning Support for recommended stack, Auditing and solutioning for the open source applications architecture, DB design, deployment, performance tuning etc. Major activities are: 19 awareness programmes and 11 class room based programmes under NeST for e-Governance practitioners for use of Open Source Software/Tools, 12 Best Practices/White Papers/Case Studies/Policies/ Framework/Guidelines and 12 technical documents were prepared, performance auditing, solution, fine-tuning and performance improvement for National Rural Livelihood Mission/Deen Dayal Upadhyay Grameen Kaushal Yojana and Kaushalpanjee projects.

### 9.6.11 IVRS (Interactive Voice Response System)

IVRS is used as the cheapest mode to collect/ disseminate data across the world. It provides a 24x7 support-contact mode for people on the move and for those with just the basic phone facility. NIC IVRS has been doing the same for more than a decade. It is seen as a major mode to disseminate information in the e-Gov era, to touch base with the grass roots level through the basic phone e.g., Hon'ble PM's Mann Ki Baat (MKB) data collection on 120 lines for approx. 10 days a month, IVFRT e-TVoA 24x7 Help Desk, application status and general information, Kailash Mansarovar Yatra (KMY) Helpline with 8x5 help desk, application status, draw and waiting list status and general information from February to September (during yatra period). CBSE

10th and 12th Results dissemination over IVRS. Some of the other applications are Fertiliser Management Registration (eFMS), case status for Hon. Uttarakhand High Court, Case status of National Commission for Consumer case redressal (CONFONET) and Voter ID application status for CEO Delhi. Call Count through IVRS are as follows:

| Application Name | Call Count |
|---|---|
| IVFRT eTVoA | 7,14,926 |
| Hon. PM's 'Mann Ki Baat' | 5,24,386 |
| CBSE12th | 54,636 |
| CBSE10th | 41,927 |
| Kailash Mansarovar Yatra | 27,466 |
| National Dental and Oral Health Awareness | 21,555 |
| Hon. Uttarakhand High Court | 4,081 |
| eFMS | 3,197 |
| CONFONET NCDRC | 2,449 |
| CEO Delhi Voter ID application Status | 661 |
| **Total Call Count** | **13,95,284** |

### 9.6.12 Chat bot for NIC Services Desk

VANI – Virtual Assistant of NIC was released on 4thJan, '18 to complement the already existing online portal and call centre for NIC service desk (NSD) to register service requests for any technical issues related to NIC services. The classification feature was implemented by building an NLP based AI agent on Dialogflow. Since the agent matures with continuous learning, in the event of recognition failure by the AI agent, a feature for forwarding the chats to the human agents with queuing facility is also provided.

Chatbot feature is being expanded for other applications like CGHS, CONFONET.

Apart from the web version of VANI (which is already in production), POCs for the following mediums (mobile & telephone) are functional –

1. Speech enabled Android app.

2. Speech enabled IVRS.

During the period from Jan'18 to Dec'18, VANI was able to successfully raise 2,908 service requests with correct problem classification, which is equivalent to 39.91 human working days.

### 9.6.13  Software Development Unit (SDU), Pune

Some of the major projects of SDU Pune are Maharashtra Audit Information Network System (MAINS) for Directorate of Local Fund Accounts Audit (DLFAA). It is an e-Governance solution to DLFAA comprising audit life cycle of certification audit of urban and rural bodies. L-CAP portal is an On Line Compliance of Audit Para for auditee offices. It facilitates to prepare and submit compliance of pending paras. Review Audit Report (RAR) Portal facilitates to shortlist important issues derived from audit reports, prepare summary audit paras and finally prepare consolidated report of issues identified for consideration by legislative body. Staff Port is part of SARAL project (Systematic Administrative Reforms Achieving Learning by Students) developed for School Education and Sports Department of Government of Maharashtra and received IT Innovation Excellence Award 2017 CSI – IT 2020 Best Government Organisation in implementation of Cognitive Technologies for Inter District Transfer System.

Employee Information System (EIS), a centralized web based application for salary processing of Central Government employees, has been rolled out for more than 5,000 DDOs across India by O/o CGA. EIS is integrated with Public Financial Management System (PFMS). 5,536 DDOs are on EIS with salary being processed for 2,74,394 employees.

Some other projects developed by SDU, Pune are Online GPF, a centralized, web based system for meeting the requirements of GPF accounting system for Central Government employees; eFerfar – a flag ship project which provides facility for recording and certification of online land transactions; e-Mojani – (Computerization of Land Measurement Cases). The process of the back

office work flow of land measurement cases has been computerized. eMarksheet Portal (MSBSHSE) provides verification of SSC and HSC records. Government Receipt Accounting System (GRAS) is a secure web based Receipt Portal which provides a facility to the citizens and business community to pay taxes to the Government of Maharashtra electronically. GST-AR (Goods and Service Tax Accounting and Reconciliation is for accounting and reconciliation of the GST receipts which are collected by the GSTN Portal Centrally. Treasury Net is a secure web application for automation of Treasury and Sub Treasury offices. Several mobile apps were also developed. Some of them are Crop-Clinic (mobile app) to provide list of recommended insecticide by agriculture scientists based on Crop and Pest and Pest-Messenger (mobile app) to provide location based, crop and pest specific advisories.

### 9.6.14 Software Development Unit (SDU) and Training Centre Kochi

The initiatives of SDU Kochi are: KOMPAS developed for Department of Mining and Geology, Kerala State for bringing efficiency and transparency to mineral administration in the State. The KOMPAS provides statistics of mineral concessions in the State, particulars of mineral concessions and documents submitted for availing concessions, locations of working mines, quarries, crushers and dealers and information on mineral availability to public. KOMPAS also provides information pertaining to genuineness of ePass, permits/licenses to other regulatory agencies like police and land revenue authorities of the State. KOMPAS has been implemented State wide and around 2,600 movement permits and 11 lakh passes have been issued online. Also details of around 8,000 concessions have been entered along with the mining entities like quarry, depot and crusher. (https://www. portal.dmg.kerala.gov.in)

My Coir project aims at total computerization of the Coir Board based on an ICT Solution with INTERNET and INTRANET portals along with a dynamic website and portals for scheme monitoring, marketing and trading with associated software components promoting coir



Union Agriculture Minister inaugurated Agmark portal designed and developed  by NIC SDU Pune and NIC SDTC Nagpur

beneficiary schemes of Ministry of MSME. My Coir Mobile App has been launched for beneficiaries to know the status of their submitted applications. Management Information System for Advocate General Kerala (MISAGO) is to streamline the day-to-day activities of the office of the Advocate General using the latest information and communication technologies available. The proposed system will help the office of Advocate General to get various details from stakeholders through a web based system.

Online Admissions and Campus* Suite for Maharajas College, Ernakulam has been developed to facilitate online admission of candidates for under graduate and post graduate admissions commencing from academic year 2018-19 onwards along with the Campus*Suite. Kerala University of Fisheries and Ocean Science (KUFOS) Campus* Suite a fully workflow based architecture for the university covering all the functional areas and activities.

### 9.6.15 Service Plus

ServicePlus is a metadata-based eService delivery framework using which eServices can be rapidly rolled out without developing a new software for each service. It is a configurable, multi-tenancy framework with built-in interfaces to NSDG/SSDG, CSC 2.0, DigiLocker, RAS, Payment Gateways (NDML and SBI ePay), Aadhaar and DSC (Dongle-based as well as eSign) and eKYC. Integration with PFMS is under way which will enable it to be used to deliver payment services as well.



It is also integrated with eTreasury of Kerala. The services can be operationalized (i.e. defined and managed) by service owner department by using a definer wizard available as part of ServicePlus. The framework is domain agnostic and can be used to configure and operationalize services of any department at any level of Government (Central, State or Local) without any architectural changes to the framework. It is based on open source tools and technologies and the forms used by the applicants or officials and the documents generated by the system can be defined in all UNICODE compliant languages. It is fully compliant with Local Government Directory (http://lgdirectory.gov.in) which has been declared by Government of India as the standard platform for providing standard location and local Government codes. It has a built-in form designer, process-flow designer, notification designer and document designer. It can be integrated with any application through web services either at form level or as a task. It also provides facilities for plugging-in small pieces of code to customize ServicePlus to meet the needs of a specific service.

At present, it is being used to deliver 607 services in 24 States (Arunachal Pradesh, Assam, Bihar, Chandigarh, Chhattisgarh, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Puducherry, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal, etc.) and 2 Central Departments and more than 1.93 crore applications have been processed so far.

### 9.6.16 Lal Bahadur Shastri National Academy of Administration

NIC Training Unit, Lal Bahadur Shastri National Academy of Administration, Mussoorie provides Information and Communication Technology related training to the officers of All India Services during all the training programmes conducted at the Academy. 181 Officer trainees of IAS Professional Course Phase-I (2017-19 Batch), 81 candidates of Phase-III Mid-Career Training Programme, 370 Officers trainees of 93rd Foundation Course, 79 participants of 120th Induction Training Programme for IAS Officers participated during the year 2018-19. Apart from the training to the senior officers of Government of India, following mobile apps were developed for the use of Officer trainees:

- ISM Live app was developed for Live Commentary,

Current Scores, Results, Urgent Messaging, and Updated Points Table for Inter-Services Meet 2018 (29-31 March) at LBSNAA Mussoorie. The mobile app was extensively used by the Officer trainees of participating academies LBSNAA, IGNFA, NAAA, NADT, INDEM, IRITM, IIMC, NACIN, NAIR, PSCI, NACEN, NIFM and IICA.

• Android app was developed to monitor the delivery of the services of the Officers Mess of LBSNAA, Mussoorie.

• Online questionnaire on National Rural Employment Guarantee Scheme (NREGS), Offence Against Public Servants, False Evidence and Offences Against Public Justice, False Evidence Relevancy, Admissibility, Confession and Admission and Preventive Detention.

• Online Feedback System for senior IAS Officers by National Gender Centre and Time Allocation Exercise for Senior IAS Officers.



A session on "Enterprise Architecture" by Shri D.C. Mishra, DDG to Officer Trainees of 93rd Foundation Course at LBSNAA, Mussoorie

### 9.6.17 NIC Media Interaction and Protocol Division (MIPD)

NIC has been contributing in the digital India initiatives for many years. A need was felt to highlight NIC's contributions in India's digital growth story to the outside world through media. Hence media Interaction and Protocol Division was formed on 14th March, 2018, to effectively interact with media and associated agencies/people for branding of NIC and disseminate information on eGovernance schemes and programmes

being implemented with the technical support of NIC. The MIPD team promotes and highlights the brand NIC - its products and services, projects, apps, s/w application etc. along with other initiatives on various social media platforms viz. Twitter and Facebook.

Since its formation, approximately 350 posts have been posted across its social media pages. The important NIC/NICSI events attended/presided by Hon'ble PM/Cabinet/State ministers are effectively covered through live posts and their webcast/live telecast on all digital platforms. The team also highlights States and districts related news emphasizing the efforts and success stories of NIC across the country. Inputs received through NIC social media pages are compiled and forwarded to the respective divisions and the groups for immediate responses and resolution.



NIC on Social Media

### 9.6.18 e-Granthalaya

e-Granthalaya provides e-Library services to Government institutions. Under the project, a digital agenda for library automation and networking has been developed for computerization of Government libraries. It is a web based Integrated Library Management Software to automate in-house activities of libraries as well as to provide various online library services to members. The current version of the software is Version 4.0 – Enterprise Edition with a centralized database option for many libraries under one organisation. The

software is a multitenant application hosted in NIC Cloud and being used by Government libraries for online data entry and member services.

e-Granthalaya has been implemented in 200 libraries during 2018. Thus total implementation has reached upto 4,576 libraries. 100 more libraries were shifted to NIC Cloud, making total 923 libraries on Cloud, with 50.85 lakh records of books holdings generated, where 2.52 lakh registered members access the library services. 7 training programmes were conducted on e-Granthalaya and about 200+ librarians were trained. A union catalog of Government libraries, a byproduct of e-Granthalaya software, was also hosted in NIC Cloud with public access of bibliographic records of 59.53 lakh holdings (books catalog) belonging to 611 libraries, with 3,045 registered members.

### 9.6.19 Mobile App Store

376 Mobile Apps in the area of e-Governance have been

developed. Some of these are Yuva-Rujhan Arunachal Suraksha, Arunachal Police Finder, UP e-Krishi Gyan, T-Registration, आसरा-AASRA), Meghalaya SignBank, C.G.Khadya – Janbhagidari, Mukhyamantri Gramin Peyjal Nischay Yojana, CSCNellai, Ente Ration Card, CSCNellai, Melghat Tiger Project, CGHS Service Feedback, Water Monitoring etc. Apps are also available in Google and Apple App stores. Confederation of Centres for Mobile App Development with 4 Competency Centres across the country and a Nodal Centre at Delhi support rapid development of Mobile Apps on all Platforms.

### 9.6.20 GIS Services

### 9.6.20.1 GIS and Remote Sensing

Geo-spatial electronics delivery system as part of National GIS Mission Mode Project, GIS Platform established by NIC, MeitY, using NICMAPS services has been revamped as "BharatMaps". This depicts

core foundation data as "NICMAPS", an integrated multi-scale multi-resolution base map service using reference data from Survey of India, ISRO, FSI, and RGI and so on. This encompasses large number of layers containing administrative boundaries, transport layers, such as, roads and railways, forest layer, settlement locations etc., including many base map services.

NIC developed an automated map service dissemination application consisting of about 32 layers. This platform enables all NIC officers to access and integrate map services in their e-gov application. RS&GIS division has also developed tools and templates which are being made available through resource section in the application. State GIS Portal powered by BharatMaps is a simplified user interface for all the States and Union Territories of India.

BharatMaps is a National GIS (NGIS) initiative as multi-layer GIS platform using NICMaps services. The NICMaps as base map service with 14 levels of scale from 1:40 M to 1:18 K or higher around SOI reference

system and multi-resolution satellite imagery from ISRO is already available. This covers 23 categories of layers, Terrain Map Service and also integrates with other external map services. GIS for financial inclusion (DBT GIS Ver 1.0) : for mapping all Banking and postal assets has been developed and released under G2G domain https://dbtgis.nic.in/bankgis.

### 9.6.20.2 Utility Mapping

Utility Mapping Division plays a crucial role in the management and planning of utility service systems. It lends order and meaning to the chaos by generating detailed and precise digital maps of these systems. Utility Mapping Services mainly includes; Global Positioning System, Topographic/Cadastral Mapping, Photogrammetry and AM/FM/GIS.

SRA GIS web portal http://umd.nic.in/sra enhancements for internal users and dashboards, encompasses GIS layers containing boundaries of District, Taluka, Ward, Village, Slum Cluster, SR Schemes, Huts, etc. The layers have been created using a highly accurate base map



SRA Mumbai GIS web Portal and AASRA Mobile app inauguration by Hon'ble Chief Minister of Maharashtra

on scale 1:1000, LIDAR survey and CORS reference station. Mobile APK AASRA was developed for SRA Mumbai. To provide citizen centric information of SR schemes on mobile in a bilingual interface (English/ Marathi), based on user location GIS data for slums spread over entire Mumbai Municipal Corporation area has been created. Currently this application is on Android platform and is also being developed for iOS. AASRA Mobile app was launched by the Hon'ble Chief Minister of Maharashtra.

GIS portal has been prepared for LandDO and linking with existing E-Dharti MIS. YEIDA GIS portal was created to cater to the need of the ease of doing business for YEIDA and portal was launched by Hon'ble Chairman

of YEIDA. Jan Dhan Darshak Mobile app is an location based banking information and postal information for general public and was launched by the Hon'ble Finance Minister of India on 25th September, 2018.

### 9.6.21 PARIVESH (Pro-Active and Responsive facilitation by Interactive, Virtuous and Environmental Single window Hub)

'PARIVESH' is a Single-Window Integrated Environmental Management System, developed in pursuance of the spirit of 'Digital India' and capturing the essence of "minimum Government and maximum governance". A workflow based application has been rolled out for online submission, monitoring



PARIVESH has been designed, developed by Ministry of Environment, Forest and Climate Change with the technical support of NIC.



Launch of PARIVESH by Hon. Prime Minister of India Shri Narendra Modi

and management of proposals submitted by project proponents to the Ministry of Environment, Forest and Climate Change (MOEFCC), Government of India as well as to the State Level Environmental Impact Assessment Authorities (SEIAA) to seek various types of clearances (e.g. Environment, Forest, Wildlife and Coastal Regulation Zone Clearances) from Central, State and district-level authorities. It automates the entire process of submitting the application and tracking the status of such proposals at each stage of the processing.

### 9.6.22 International Cooperation at NIC

NIC, being the prime builder of eGovernance applications across various levels of Government, is promoting international cooperation in the emerging and frontier areas of Electronics and Information Technology (E&IT) under bilateral and regional framework of entire spectrum of Information and Communication Technology (ICT) cooperation. NIC is collaborating with number of countries for fostering bilateral and multilateral ICT cooperation in the area of eGovernance products and services which are generic, configurable, built with cutting edge technologies and could be replicated in other countries. MoUs/Agreements were signed with Republic of Uzbekistan, Morocco and Sri Lanka for cooperation in the area of eGovernance. NIC officials participated in Joint Working Group meetings held with Vietnam, Uzbekistan, Kazakhstan, Belgium, Cambodia and other countries. Seven NIC officers were deputed to Estonia for Chief Information Officer eGovernance Leadership Programme. NIC team participated at X International IT Forum held in June 2018 at Khanty-Mansiysk, Russia and showcased eGovernance products. NIC team also participated in Digital Bridge Summit at Astana, Kazakhstan. eOffice has been implemented in Sri Lanka. ePrisions has been implemented in Mauritius. National Knowledge Network (NKN) link is extended to Sri Lanka and Bangladesh. A 5 member delegation from Morocco visited NIC to gain understanding and insight into the eCourts project. A delegation from Kazakhstan visited NIC getting consultancy and gaining understanding on email services, SOC and Digi Locker. On the request of Eurasia Division of MEA, presentation on NIC was given to all the CIS countries. NIC participated in Global Exhibition on Services (GES), 2018 at Mumbai and showcased eGovernance products and services.



Signing of Agreement between NIC and eGovernment System Development Centre, Republic of Uzbekistan

### 9.6.23 Domain Registration Service (http://registry.gov.in )

GOV.IN domain registration services is for online registration of domain name (websites under gov.in) for all Government offices across India through the website https://registry.gov.in. In this era of digital revolution, websites containing .Gov.in represent the digital identity of Government and establish trust of people with Government. It provides the trusted medium to access Government and its services by all the citizens. Gov.in Domain registration service provides TLD (third level domain) as well as FLD (fourth level Domain) services. In case the same department requires more than one domain, FLDs are recommended to establish an association with the department.

| Sl. No. | Activity | Total Count |
|---------|----------|-------------|
| 1. | Total 3rd Level Domains Registered | 6,561 |
| 2. | Total 4th Level Domains Registered | 1,48,131 |
| 3. | 3rd Level Domains Renewed | 4,826 |
| 4. | WHOIS Updated | 4,491 |
| 5. | Name Server Updated | 1,903 |

### 9.6.24 Electronic Human Resource Management System (eHRMS)

The proper maintenance of the service records is crucial to employee as well as organisation, as it contains vital information with regard to every aspect of service of an employee. In actual practice, it is observed that though entries are being made in the service book and verification is also done, in many cases the record is not up-to-date, verification of service book by employee does not happen regularly and in case of transfer of employees the service books get transferred after long time. This results in delay in sanctioning and payment of due benefits/pension etc. In the event of death of the employee and/or in the absence of proper nomination in many cases, the final payment is delayed. Many cases of regularization of leave etc. are received years after the retirement of employee which often lead to litigation and payment of uncalled for interest on delayed payments. This may perhaps be happening as the employee doesn't have easy access to his/her service record even though it is envisaged in the rules.

DoPT, in its nodal role, as the formulator of policy and the monitor of the Government ensuring that certain accepted standards and norms, as laid down by it, are followed by all Ministries/Departments/Organisations, entrusted NIC for design, development, roll-out and maintenance of the eHRMS for Government of India employees.

The aim of this project was to build an application that computerizes the existing service book for existing employees, creates service book of new joinees and automates the updation of service book thereafter from the day to day processing of various records of employee. This results in real time updation of service book and uniform implementation of the service record rules across the Government. eHRMS consists of creation of e-service book and development of work flow based solutions for all processes/information impacting service book. eHRMS will create data exchange which will have latest data of all employees registered into eHRMS and related code master data, which can be shared with other applications. This will expedite the development of other applications and facilitate integration of application. The application went live in Department of Personnel and Training (DOPT) on 1st July 2018.

### 9.6.25 Central Government Health Services (CGHS)

NIC has developed Central Government Health Services (CGHS) software to facilitate Central Government employees to avail better health services. QR code based mobile app has been developed for CGHS beneficiaries to submit their feedback on defined CGHS services. Self-printing has been facilitated for downloading of CGHS card. It also features Automatic Purchase Order placement without human intervention for 272 medicines for all Wellness Centres. Appointment System with time slot has been

introduced in CGHS. Online transfer of CGHS card to any of the CGHS cities for serving beneficiaries has been facilitated. The beneficiaries can receive prescription in email after giving consent for the same. A pensioner beneficiary can get the nominee details updated for reimbursement of claims. Dashboard has been facilitated for monitoring and public view as well.

### 9.6.26 Cooperative Core Banking Solution

Co-operative Core Banking Solution (CCBS) is a comprehensive, web based core banking solution, addressing banking requirements of credit societies, banks and financial institutions which are primarily regulated by Co-operative Society Act. The solution adheres to RBI/NABARD guidelines together with CAS (Common Accounting System), designed for PACS (Primary Agriculture Credit Societies). At present, the solution has been implemented across Punjab and Himachal Pradesh and 50% branches of Gujarat. Automation of Karnataka SCARDB has been initiated. CCBS for Financial Institutions has been implemented in Delhi Financial Corporation (DFC) and National Scheduled caste Financial and Dev. Corporation (NSFDC). New initiatives have been taken at Odisha, Tamil Nadu and Karnataka. State Bank of Sikkim is fully operational with 46 live branches on CCBS platform. NAFCARD (Federation of SCARDB) has recognized the efforts of NIC for bringing on suitable solution for achieving the goal of computerization in SCARDBs and recommended to all remaining SCARDBs for its implementation. CCBS is currently maintaining more than 1.25 crore financial transactions along with KYC details of 15 lakh customers.

### 9.6.27 Development of North Eastern Region (DoNER)

The Ministry of Development of North Eastern Region is responsible for the matters relating to the planning, execution and monitoring of development schemes and projects in the North Eastern Region. Its vision is to accelerate the pace of socio-economic development of the region so that it may enjoy growth parity with the rest of the country. As a recent development, a new

online e-Portal (https://nlcpr.mdoner.gov.in/) has been designed, developed and customised for submission, surveillance and follow up of development projects related to Northeast falling under the category of Non-Lapsable Central Pool of Resource (NLCPR). The portal has been programmed to send automatic computerised reminders through SMS and e-mail. The android as well as iOS version of the MyDoNER App have been developed and published which has been utilised as one of the front-end interface of NLCPR (Non Lapsable Central Pool of Resources). In order to provide easy access information to citizens, various important events and announcements are regularly updated in this dynamic portal. The MIS for the North East Special Infrastructure Development Scheme" (NESIDS) has been developed and is operational. The data portal of MDoNER has been developed i.e. http://data.mdoner.gov.in where data related to NER are published from various sources. The DBT portal covering 4 DBT (Direct Beneficiary Transfer) schemes has been developed i.e. http://dbt.mdoner.gov.in. Track 10 MIS has been developed to monitor the fund flow of various Ministries/Departments to NER. MyDoNER app has been upgraded with NLCPR and NEC projects to locate their projects in map along with project at a glance.

### 9.6.28 Digital NIC

Digital NIC has been conceived and implemented by Office Automation Division (OAD) of NIC with a vision to provide a single window solution to NIC Administration, State Offices, District Offices and employees for administrative, technical, financial activities and employees related services. It contains upper level view of various information about NIC, such as, technical and administrative manpower strength and its distribution in States and HQ, budget monitoring, DDO wise budget allocation and its expenditure, employees attendance, employees on tour/leave, Store Statistics and progress of projects undertaken in NIC at HQs and State level. State Informatics Officer (SIO) and Head of Group (HoG) can view the details with respect to their State or Group. They can view the technical and administrative manpower distribution within their state or group, total

number of districts or division and employees working in those districts or divisions. Employees can view their Profile, Service Book, Entitlements, Tours, Leave Balance, Payments, Payslip, Form 16, GPF Statement, IT Statement, Digital and Physical Assets, Appraisal, Attendance, Immovable Property Return, Projects, Team, Directory Search etc. Some online services are also provided to employees, such as, Online APAR, WCAR, PAC, e-Tour, NOC, News Paper, Tuition Fee, Online Exam (GudApps), and Monthly Performance Report, Feedback etc. Besides, all kinds of forms are available online to submit their request for various services, such as, payment/re-imbursement of medical, newspapers, LTC.

### 9.6.29 E-Awas

E-Awas application facilitates accommodation management, monitoring, application, bidding and allotment of General Pool Residential Houses and allotment of Offices of Government of India for Government-to-Employee (G-to-E) services. The application caters to about 100,000 Government residential houses spread over 10 cities and also caters to residential houses of Hon'ble Members of Loksabha and Rajya Sabha (MPs) for bidding and allotment of quarters every month through automated process. It also includes features like rent assessment, retention, regularisation and cancellation management, litigation and subletting cases management, on-line inter-pool exchange of quarters, 5 Ashoka Road Bungalow

booking and allotment, Vigyan Bhawan booking and allotment, allotment of Office Spaces all over India, market space allotment and Western Court Hostel booking and allotments.

A mobile App "m-Awas" has also been developed and launched in March 2018 for bidding and allotment of quarters for ease of beneficiaries.

### 9.6.30 E-Nivesh - National Portal for Monitoring Clearances

E-Nivesh is a single window system for monitoring clearances required for setting up business/projects in India. The monitoring mechanism has been developed to fast track the pending clearance proposals beyond timeline at various Ministries/Departments/Organisations of the Government of India and Governments of States/UTs. It aims at operationalizing a transparent, efficient and convenient interface, through which the Government and businesses can interact and improve the business environment in the country for setting up investment related projects by enabling fast and efficient Government-to-Business (G2B) services. The portal tracks all digitized proposals starting from the online submission till issue of clearance by pulling the essential information from various online Central and State level services/clearances portals. Project Monitoring Group, Cabinet Secretariat will monitor and resolve pending clearance proposals beyond timeline in the Tripartite Sub-Groups meetings involving



Launch of m-Awas Mobile App by Hon'ble MoS for Housing and Urban Affairs (I/C) Sh. Hardeep Singh Puri

various Ministries/Departments. More than 15.90 crore applications have been filed as of now and more than 40 lakh applications are under process. More than 14.40 crore applications have been approved till date.

### 9.6.31 E-Samiksha

E-Samiksha, an online Monitoring and Compliance Mechanism has been developed to fast track the compliance of pending action-points/proposals/issues/projects/schemes/targets etc. of various implementing agencies, such as, Ministries/Departments/Organisations of Government of India, State Governments, Autonomous Bodies, PSUs, etc. The system has been designed in such a way that it will enhance efficiency, bring transparency, reduce the need of protracted correspondence and improve the communication between Government to Government(G2G), Government to Business (G2B) and vice versa. It automates the tracking of action-points/proposals/issues/projects/schemes/targets, etc. starting from online submission to its compliance. System also interfaces with customized digital Dashboard. It features role based MIS reports for monitoring purpose and privileges and roles are defined as per the Responsibilities. Automatic mailer and SMS notification/alert is also provided to take instant action. The system has Central Document Repository for quick and easy retrieval. E-Patrachar, a tool is provided to track, improve, speedup the communication among stakeholders along with E-SamikSha Form to collect information in an easy, streamlined way from different stakeholders.

### 9.6.32 E-Suvidha – Project Management System (ePMS)

E-Suvidha, an Online Project Management System portal has been developed to fast track stalled protects, involving investment over ₹1,000 crore for the Central PMG Cell, Government of India. This system has been designed to enhance efficiency, bring transparency, boost investor confidence, revive investment cycle, eliminate unnecessary human intervention and improve communication between industries and Government (B2G). It automates entire tracking from submission of issues to the commission of projects. It also facilitates preparation and circulation of agenda to all the nodal officers, Secretaries of the Ministries/Departments and Invitees. Minutes of the meetings can be generated and circulated through the system. In view of the success of the e-Suvidha Central Portal, there was a demand from the industry to lower the threshold limit for the States PMG portals. Accordingly, E-Suvidha system implemented for various States for projects entailing at investment between ₹150 crore to ₹11,000 crore. So far, it has been adopted by Government of Odisha, Uttarakhand, Kerala, Chhattisgarh, Uttar Pradesh, Jharkhand, Karnataka, Maharashtra, Himachal Pradesh, Gujarat, Assam, Puducherry, Rajasthan, Madhya Pradesh, Andhra Pradesh, Bihar, Haryana, Delhi, Punjab and Goa. Also it has been adopted by Ministry of Coal, Ministry of Power and Department of School Education and Literacy with some customization. It has been developed using open source technology, Apache with PHP as a web application server and MySQL as a database server.

### 9.6.33 National Power Portal (NPP)

NPP is a unified system for Indian power sector which facilitates online data capture/input (daily, monthly, annually) from generation, transmission and distribution utilities in the country and disseminates power sector information (operational, capacity, demand, supply, consumption etc.) through various analysed reports, graphs, statistics for generation, transmission and distribution at all India, region, state level for central, state and private sector. Central Electricity Authority is Nodal Agency for implementation. It is integrated with associated systems of Central Electricity Authority (CEA), Power Finance Corporation (PFC), Rural Electrification Corporation (REC) and other major utilities and is serving as single authentic source of power sector information to apex bodies, utilities for the purpose of analysis, planning, monitoring as well as for public users. The system is available 24x7 and ensures effective and timely collection of data. A dashboard has been designed and developed to

disseminate analysed information about the sector through GIS enabled navigation and visualization chart windows on capacity, generation, transmission, distribution at national, state, DISCOM, town, feeder level and scheme based funding to states. The All India Installed Capacity data is captured from around 650 stations and 1,900 units which comprises

- Thermal 223027.34(MW)
- Coal 197452.50 (MW)
- Gas 24937.22 (MW)
- Diesel 637.63 (MW)
- Hydro 45399.22 (MW)
- Nuclear 6780.00 (MW)
- RES74081.66(MW)

### 9.6.34 NIC States and UT Units

NIC units in state and districts help to roll out the central projects and policies in local bodies. NIC State Units and NIC district Units provide ICT and eGovernance support to State Government, District administration and local Government bodies. While some State level projects are developed by the state units as per requirements of the State Government, many of the state projects are adopted by other states and become national projects. Many central projects under Digital India initiatives have been rolled out successfully, such

as, Ayushman Bharat (PMJAY), CARD-New Citizen Services, Dkrishi mobile Seed Management, HORTNET, WATERSOFT, e-Procurement, Manav Sampada, Mid Day Meals MIS, IFMS, Transport Project, Land Record Computerisation (Bhunaksha), ICAR Experts SMS Services to Farmers, GST and development of Back-end System, e-hospital, e-Granthalaya, Soil Health Card, National Knowledge Network (NKN), Targeted PDS, e-Procurement, Mother and Child Tracking System (MCTS), National Social Assistance Programme (NSAP), TREASURYNET, Pension Payment System, IVFRT, AEBAS, National Scholarship Portal, PRAGATI, Jeevan Pramaan, ePrison, ePanchayat, Immigration Control System, mobile Apps eChallan and mParivahan, eVidhan, eOffice, eTaal website on S3WaaS platform, Immigration Control System, National Knowledge Network, ReLIS.

A number of states have also developed and released citizen centric mobile apps in the area of e-Governance. States of Himachal Pradesh, Madhya Pradesh, Karnataka, Andhra Pradesh, Chhattisgarh and Meghalaya are actively involved in mobile app development.

Some of the important activities in states are summarized in the following table:

| State/UT | Project | Summary |
|---|---|---|
| Andhra Pradesh | Supply Chain Management System | Integrated Aadhaar Enabled Supply Chain Management |
| | CARD | Computer-aided Administration of Registration Department |
| | WEBLAND | A Bankers interface to Land Records to process the Agricultural Loans to farmers |
| Arunachal Pradesh | Mobile Apps | Arunachal Suraksha-Arunachal Police Finder<br>eMilap- meeting management |
| | 'Unnati' VC | Monthly review meeting on PM/CM flagship programmes |
| | Farmer's Portal | Online issue of Land Possession Certificate and Land Ownership records for Land Management Department and Building permit for Department of Town Planning and ULB |

| State/UT | Project | Summary |
|---|---|---|
| Chhattisgarh | Crop Doctor Mobile App | |
| | Hand Pump Tracker Android App | Public Health Engineering Department |
| | Bhuiyan | |
| | RevCase | |
| Delhi | Door step delivery of Public services through e-district | Total service requests (SR) received at Call centre : 63472<br>Total SR attended by VFS : 61776<br>Number of SR discarded after house hold visits : 46887 |
| | (AePDS) | Aadhaar enabled Public Distribution System |
| | Mobile app for GST of Sales Tax department | Dealer is of normal category or composite category |
| | Delhi Land Records System (DLRC) | Mutation module has been implemented |
| Gujarat | iASS | Integrated Application Scrutiny System on TOP of Online Job Application System (OJAS) for Gujarat Public Service Commission (GPSC). |
| | iRCMS | Integrated Revenue Cases Management System |
| | WMS | System provides Works monitoring for budgeted works of water resources department and Roads and Buildings Department |
| | Road Cutting/Right of Way Permission | |
| | CCU | Command and Control Unit (CCU) at CM office |
| | eOlakh | Civil Registration System |
| | Quarter Allotment System | |
| | Reservoir Data Management System | |
| Haryana | Customised Public Grievances Redressal and Monitoring Solution | Reduces costs of service delivery |
| | SARAL Haryana | All inclusive, real time, action oriented to address citizen and officials concerns. It offers 400+ services and Schemes of 37 departments |
| | Haryana Real Estate Regulatory Authority | Citizen centric services, end to end office business work flow to evoke SMART (Simple, Moral, responsible, Responsive and Transparent) governance. |

| State/UT | Project | Summary |
|---|---|---|
| Himachal Pradesh | HimPragati | Effective monitoring of CM announcements, relief requests, demands, grievances, employment, project monitoring, schemes status, beneficiary lists, Jan Manch data collection/ranking |
| | Mobile Apps | Shor Nahin - reporting sound pollution<br>MyMeeting<br>Songat<br>JK PSC |
| Jammu and Kashmir | BEAMS | Online Budget Estimation, Allocation and Monitoring System |
| | GENPROFIT | Online General Provident Fund System |
| | XLN(Extended Licensing Node) under Health and Medical Education | For obtaining drug license and its renewal of retail sale and wholesale establishments |
| Jharkhand | NGDRS | National Generic Document Registration System |
| | Chancellor portal | Common platform for all state universities covering complete student life cycle |
| Karnataka | GSTPro | Processing of back-end activities related to GST system |
| | K-KISAN | Karnataka – Krishi Information Services And Network |
| Kerala | Regional Centre of Excellence for Application Security | Security audit of applications to be hosted in NIC Data Centres, clearance of 3rd party audited applications, assistance for clearance of penetration testing tickets for the southern states of Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Telengana, and Pondicherry. |
| | PRICE | Project Information and Cost Estimation implemented in PWD Buildings, Roads, NH and Electrical, Irrigation, Agriculture, LSGD, HED, Kerala Agriculture University, Soil Conservation, Ports, PMKSY and Kerala Water Authority. |
| | SPARK | Service and Payroll Administrative Repository for Kerala |
| | PEARL SUITE | Package for Effective Administration of Registration Laws |
| | e-SAGARA | Ensuring Fishermen security, focused on monitoring the movements of fishing vessels and registering the crews going for fishing operation |
| | KOMPAS | Kerala Online Mining Permit Awarding Services |

| State/UT | Project | Summary |
|---|---|---|
| Madhya Pradesh | GeoSearch | |
| | GeoTnCP | Town and Country Planning |
| | e-Uparjan | Agricultural Produce Procurement System for crops |
| | GeoURS | GIS-based Unified Road System for MPRRDA |
| Maharashtra | MAHAPAR | Maharashtra – Performance Appraisal System |
| | E-Procurement System | Enables the Tenderers to download the Tender Schedule free of cost and then submit the bids online through this portal |
| | Targeted Public Distribution System | Digitized 1.3 crore Ration Cards |
| Meghalaya | Online Enrolment to the NCC | |
| Nagaland | TreasuryNET | Online Treasury Software under Mission Mode Project (MMP) in the Treasuries/Sub-Treasuries of Nagaland. |
| | Online GPF System, Nagaland | PAG's office need not print the hardcopy of the GPF statement annually resulting into saving of the printing cost, time and the hurdle distribution of Annual GPF statement. |
| | PlanTrack | A tool for monitoring of the approved Plans/Projects/Works and for fiscal decisions. |
| Odisha | Nyaya Sanjog | Legal Assistance Establishments of 30 DLSAs and computerization of 150 nos of School Legal Literacy Clubs |
| | Harischandra Sahayata Yojana | |
| | e-Shramik | Registration module of beneficiary through CSC |
| Puducherry | Encumbrance Certificate | Helps citizens to search the encumbrance on properties |
| | Auction Soft | eAUCTION of Arrack and Toddy shops |
| | Petition Monitoring System | Helps to track all the grievances through petitions as well as sensitize the departments |
| | Marriage registration | Provides Marriage certificate to citizens using signature, photo capturing. and bio-metric details. |

| State/UT | Project | Summary |
|---|---|---|
| Punjab | Punjab Sewa Portal (PSP) | Delivers citizen-centric services of all departments under one roof |
| | e-Labour Punjab @ https://pblabour.gov.in | One of its kinds in India which has simplified work of different stakeholders like employers, employees, industries and enforcement agencies under various Labour Laws/Acts. |
| | Ercms | Revenue Court Cases Management System |
| | S3WAAS | 19 out of 22 districts |
| | PPSCISR | Integrated solution for recruitments, Punjab Public Service Commission |
| Rajasthan | Integrated Finance Management System (IFMS) | Comprises aspects including Budgeting, Receipts, payments, treasury, account compilation, pension, GST accounting, Works Accounting, Social Security Pension etc. |
| | Green Assembly | Online systems for questions and answers, assembly debates, Motions, Bills, etc |
| | ShalaDarpan, ShalaDarshan | Web based solution for education department |
| | Medical and Health Department, Rajasthan | Pregnancy and Child Tracking System (PCTS) implemented for all 17,000+ health units in Rajasthan. PCTS Mobile app has been provided to ANMs integrated with AshaSoft and OJAS. |
| | Pehchan | Civil Registration System provides Registration of Birth, Death, Still Birth and Marriage Events in Rajasthan from all 12,000+ registrars and 2,000+ medical institutions |
| Tamil Nadu | Online Patta Transfer System | Enables citizens to apply at CSC and get status through SMS. Citizens can view Patta Order Copy and TSLR Extract with 2D barcode online |
| | TNGIS Portal | Handles geospatial data from various departments and enabling GIS based decision support system for Tamil Nadu |
| | Mobile Apps | Tamil Nilam, CSC-Nellai, Revised Non Communicable Devices and ITMS |
| Telangana | Rythu Bandhu Rythu Bima | Investment Support Agriculture and Horticulture crops by way of grant of ₹4,000/- per acre per farmer Rythu Bima for life insurance support to nominees of Rythu Bandhu farmers |
| | TS-Weather | Track weather conditions with hourly basis, daily and three-day rainfall |
| | Mobile Applications | Rythu Bima, TS Weather, Rastriya Bal Swathya Karyakram (RBSK), T-Registration, Pharmacy Council, TRation, School Education Dept. |
| | eLaabh | Benefit Management System designed for the welfare of Dairy Farmers and Fishermen. |
| | OSSDS | Online Subsidy Seed Distribution System |

| State/UT | Project | Summary |
|---|---|---|
| Tripura | Drug Supply Chain Management System | |
| | eGRAS | |
| | eHospital | |
| Uttarakhand | Uttarakhand Health Services Dashboard | |
| | Budget Information System | Online System for management of Annual budget |
| | GIS | Stamps and Registration Department |
| | School Education Portal UK | Study and Development of module for receiving online application for the recruitment of Guest Teachers |
| Uttar Pradesh | eDistrict UP-Janhit | Citizen can avail the online services of UP Government from their nearest CSC through OR Using the Citizen Services Online Portal |
| | E-Madarsa | For effective monitoring and control of Madarsa educational system |
| | e-Parinaypatra | Marriage Registration Certificate is issued by the Stamps and Registration Department, GoUP to both husband and wife whose marriage has already been solemnized. |
| | e-Nagarsewa | A responsive, scalable, adaptive and easy to use e-Governance application for urban citizen for various activities of Urban Governance named as eNagarSewa. |
| | Teachers Transfer | To ensure the smooth, transparent and trouble free transfer policy for the Teachers of Basic, Secondary and Higher Education Departments, Uttar Pradesh, |
| | E-TULA | eTransformation of UP Legal Meterology Administration |
| | Srishti | Web based GIS framework |
| | Prerna | PRoperty Evaluation and RegistratioN Application is designed to reorient the Stamps and Registration Department towards 100% automation in the registration process and speedy delivery of registered documents to the citizens of Uttar Pradesh |

Launch of 'Shor Nahin' Mobile app by Hon'ble Chief Minister in HP



Launch of Online System for issuance of Succession and Solvency Certificate through eDistrict portal by Hon'ble Chief Minister of Uttar Pradesh

Hon'ble CM of Madhya Pradesh, inaugurated eHospital system for district hospital at Satna

### 9.6.35  Reproductive and Child Health (RCH)

In order to monitor the health services provided to eligible couples, pregnant women and children, NIC has developed Reproductive and Child Health (RCH) software. RCH facilitates data entry, work plans, SMS integration, monitoring through MIS reports and dashboard. It is an upgraded version of Mother and Child Tracking System (MCTS). 5 States have been migrated from MCTS to RCH making it 30 States on RCH. More than 74 lakh eligible couples have been registered in RCH during 2018-19 with total eligible couples of more than 12 crore. More than 43 lakh pregnant women have been registered during 2018-19 with total pregnant women of more than 17 crore. More than 31 lakh children have been registered during 2018-19 with total children of more than 14 crore. More than 16 lakh health workers including ANM, ASHA and other ground staff are registered on RCH.

### 9.6.36 Centre of Excellence for Data Analytics

National Informatics Centre (NIC), in a joint initiative with National Informatics Centre Services Incorporated (NICSI) has set up Centre of Excellence for Data Analytics (CEDA) to promote the fast track adoption of advanced analytics in Government. CEDA will support Government departments to unlock the hidden potential of the data that they are generating as a part of the governance processes, and use it to improve the overall governance. It will provide world class data analytics services to the Government. It will act as a focal point and centre of expertise in data analytics for Government and public sector. It will facilitates faster and cost effective technology adoption and promotes capacity building to enable the departments to self-service analytics with minimum technical support. It also implements knowledge repository to collect learnings from across projects and share best practices across initiatives to ensure adoption of best practices.

Launch of CEDA

### 9.6.37 National Informatics Centre Services Incorporated (NICSI)

National Informatics Centre Services Inc. (NICSI) is a Section 8 Company (erstwhile Section 25 Company), a Government of India Enterprise under National Informatics Centre (NIC), Ministry of Electronics and Information Technology (MeitY). It was set up in August 1995 for facilitating Central, State Government Departments and Organisations in executing and implementing ICT solutions/projects. Its services include resource provisioning i.e. support for procuring and operationalizing state-of-art ICT infrastructure viz. hardware, networking etc; data centre services, facilitating project management, software design and development, GIS services, roll-out support, facility management, help desk operations etc. Some of the prestigious projects include National Data Centre at Lakshmi Nagar, New Delhi, enhancement of NIC Cloud Services, National Data Centre at Shastri Park,

New Delhi, National Knowledge Network (NKN), enhancement of NIC Cloud Services, facilitating various projects like e-Procurement, e-Office, e-Hospital, KV Shala Darpan, a School Automation System, Aadhaar Enabled Bio-Metric Attendance System, Jeevan Praman, e-District. The turn-over of the Company in 2017-18 was ₹1,336.43 crore.

Apart from adding new clientele and further strengthening various projects, in the FY 2018-19, NICSI has established a state-of-art Centre of Excellence for Data Analytics (CEDA) at its office in Bhikaji Cama Place, New Delhi. This Centre is in the process of establishing data analytics infrastructure and tools and also building data analytics modules and dashboards in coordination with various Central and State Government Departments and organisations, with a view to facilitate more informed decisions and strengthen e-service delivery.

NICSI achieved another milestone in the FY 2018-

19 by setting up a Product Business Division (PBD) with an aim to productize, standardize, promote and market software products developed by NIC/NICSI at International level, particularly the countries in South Asian Region having similar legacy and background. The Division has initiated its operations and is strategizing various aspects to promote Indian software products in international market. Both, Centre of Excellence for Data Analytics and Product Business Division are first-of-its-kind initiatives.

## 9.7 Standardisation, Testing and Quality Certification (STQC) Directorate

### 9.7.1. Introduction :

Standardisation, Testing and Quality Certification (STQC) Directorate, an attached office of Ministry of Electronics and Information Technology, is a major infrastructure in the field of quality assurance. The objective is to help Government and Indian industries, especially MSMEs, to improve quality of their products and services.

STQC provides testing, calibration, training and certification services, through its well-developed network of four Electronics Regional Test Laboratories (Delhi, Kolkata, Mumbai and Thiruvananthapuram) and eleven Electronics Test and Development Centres (Agartala, Bangalore, Chennai, Goa, Guwahati, Hyderabad, Jaipur, Mohali, Pune, Ajmer and Solan). A team of engineers trained extensively in different aspects of quality, testing, calibration, software evaluation etc. is available to provide services to the industry.

STQC Directorate has also been providing a range of IT related services in alignment with Ministry's policies and programmes. These services include:

- Software Application Testing

- Website Quality Certification

- Information Security Management System (ISO 27000) Certification and training as well as IT

security product testing.

- Penetration Testing and Vulnerability Analysis of IT Networks and Systems.

- Quality Assurance and Conformity Assessment Support for e-governance products and services.

STQC Directorate supports Government policies, initiatives and programmes concerning standardisation, quality assurance and management besides providing above services to the industry on commercial basis. Several projects sponsored by the Ministry in the area of standardisation, software quality assurance, information security management, quality assurance of Indian language technology and products have been executed.

**Major Achievements during FY 2018**

**Services rendered in the field of Information Technology**

STQC Dte. is one of the empanelled organisations for information technology security audit with Indian Computer Emergency Response Team and Public Key Infrastructure audit with Controller of Certifying Authority. Third party information technology security assessment/training services are regularly provided for the e-Governance initiatives under e-Governance Conformity Assessment (e-GCA) project. STQC IT Centres have provided the following services :

**ERTL (East), Kolkata**

- Completed Conformity assessment of e-Procurement and e-Auction platform of different organisations. The systems are being successfully used in different e-auction exercises of Government of India.

- Completed Conformity assessment of CHIPS-MMS (Khanij) system of Government of Chhattisgarh.

- Undertook IT hardware testing of UCO bank used in ATM counter.

- Undertook functional testing of Sampada (Land

Registration solutions software) for Department of Registration, Government of MP.

- Conducted TPA (Third Party Auditor) audit for various SDCs (State Data Centre) for North-East States (Meghalaya, Tripura), and other States (Chhattisgarh, Bihar and Odisha). The audit is carried out to ensure that the audits conducted by respective TPAs on infrastructure, utilization, security, service level agreements, operation and management are adequate in terms of audit methodology, findings and their follow up.

- Undertook e-Governance solutions like e-Districts Assam etc. for assessment

- Completed security assessment of e-Bidding Portal of Directorate General of Hydrocarbons, Ministry of Petroleum and Natural Gas, Government of India

- Completed security assessment of 'Online Draw System for LPG distributorships' under Pradhan Mantri Ujjwala Yojana (PMUY).

- Completed security assessment of IT infrastructure of CRIS and Power Grid Corporation.

- Completed security audit for www.irctc.co.in .

- Security vulnerability assessment conducted for the websites of Mission offices of Government of India at Geneva, Amman, Hamburg, Hong Kong, Istanbul, Islamabad, Kuwait, Maputo, Prague, Milan, New York, Seoul, Stockholm, Sydney, Tokyo, and Windhoek-Namibia; some of them are completed and remaining in progress.

- About 54 web applications/web sites from different departments of State Governments have been assessed for security vulnerabilities and cleared for 'safe to host'.

- Completed initial security assessment for about 150 web applications/websites from different organisation and waiting for closures (by the developers) to issue final clearance.

- New service started for security assessment of

Mobile Apps for Android against the security requirements of OWASP for L1.

### ERTL (North), Delhi

e-Governance projects of Central and State Governments completed/in-progress:

- Government e-Market Place
- MCA 21, Ministry of Corporate Affairs
- CBI Application System
- Income Tax, Ministry of Finance
- Ayushman Bharat Application, Ministry of Health
- Employee Provident Fund Organisation, Ministry of Labour
- S/W Applications of Election Commission of India
- S/W and Mobile Applications of CEO, Delhi (Delhi Election Commission)
- E-Procurement System (NIC, BSNL, NPCIL, Next Tender, C1 India, EESL)
- UPSDC Audit, Uttar Pradesh
- UP Excise Application, Uttar Pradesh
- E- Procurement System, CRIS, Indian Railways
- IFMS, Ministry of Fertilizers
- NDMC Application and System
- Digi Locker, MeitY
- Common Criteria Project
- Smart Card testing covering card layout, card OS, software application for the following:
  a. DL/RC (NIC), Ministry of Surface Transport
  b. National Population Register (NPR), Ministry of Home Affairs
  c. e-Passport (NIC), Ministry of External Affairs
  d. Rashtriya Swasthya Bima Yojana (RSBY), Ministry of Labour

### ETDC, Bengaluru

e-Security testing and assessment by IT Centre, Bengaluru : Provided web applications security testing/ assessment services to following Government and semi Government Departments.

- Directorate of Treasuries, Department of Commercial Tax, Department of Posts, Department of Health, Department Income Tax, Central Silk Board, Indian Institute of Science (IISc), Principal Controller of Defence Account (PCDA), ISRO, Centre of e-Governance (CeG) Karnataka, Karnataka State Unorganised Worker Social Security Board (KSUWSSB), Chief Registrar of Births and Deaths Karnataka etc.

- e-Procurement systems Evaluation: Centre has established the competency in evaluation of e-procurement systems (e-tender/e-action) as per STQC e-procurement system certification guidelines. Two e-procurement (e-tender and e-auction) systems have been evaluated.

### ETDC, Chennai

- Smart City Project: Initiated and carried out third party conformity assessment (Review, Testing and Audit) of network of smart elements in Pune city project. The assessment primarily covers project components, such as, application software, IT infrastructure, network, security and service operation processes, and service quality (SLAs).

- Lab Information System: Carried out third party functional assessment of e-BAS application, a system specially developed for National Institute of Research in Tuberculosis (NIRT) to implement an automated business process.

### ETDC, Hyderabad

- Performed functional testing of e-auction application to be used for agricultural produce market committee, Maharashtra.

- Performed application security testing for centralized access control system software of Bureau of Civil Aviation Security (BCAS).

- Performed application security testing of e-auction and e procurement applications of Andhra Pradesh and Telangana States.

### 9.7.2 Common Criteria (CC) Test Laboratory

#### ERTL(East), Kolkata

- Common Criteria (CC) testing lab is successfully carrying out evaluation activities of EAL4 CC evaluation project of Indian Air Force of national importance having resilient security posture meeting the ever changing security dynamics of the organisation to cater to the security needs and real time responses/remediation of threats across the Indian Air Force Command and Control System (IACCS) infrastructure.

- Conducting EAL4+ CC evaluation of a Certificate Authority (CA) server and CC evaluation of Tele Communication network elements.

- Conducted several CC related trainings for a number of organisations.

#### ETDC, Bengaluru

- Common Criteria Test Laboratory (CCTL) is established under CC augmentation programme to evaluate the security features of IT products and systems as per ISO/IEC 15408: Evaluation criteria for IT security. The CC laboratory has evaluated following two products up to EAL level 2:

  a. DDoS Mitigation Platform (developed by a startup company)

  b. Privileged Access Management (PAM)

- CCTL Bengaluru is accredited as per Indian Common Criteria Certification Scheme (IC3S) under Ministry of Electronics and Information Technology (MeitY) as part of cyber security assurance initiatives of the Government of India IC3S.

- Under CC augmentation programme, IoT security testing laboratory is being set up in Bengaluru centre. As part of the setting up of the laboratory, ITDC Bengaluru has developed security requirements for IoT products and also recommendations and security controls to enhance the security of such products.

### 9.7.3 National facility for Quality Assessment of Biometric Devices

**ETDC, Bengaluru**

Evaluation of Registered Devices for Bio-metric authentication: To eliminate the use of stored biometrics, UIDAI has mandated the use of registered devices for biometric authentication. Before deployment of registered biometric devices in the field, hardware and RD services of the registered devices have to be certified by STQC.

As part of L0 provisional certification, STQC IT Services, Bengaluru has evaluated 131 registered devices for 36 vendors as per UIDAI technical specification Ver2.0. Based on the evaluation report, 126 registered devices pertaining to 33 vendors have been provided with provisional certificates. The centre has initiated process for L0 RD service final certification; the activities include functionality testing, security testing and secure code review.

Secure Code Review: To support secure code review of registered devices under UIDAI and also products as per CC criteria, IT services Bengaluru has developed the guideline document on good practices for code review of applications and APIs from security perspective.

**ETDC, Chennai**

ETDC Chennai tested Aadhaar enabled Point of Sale devices which are used in the digitization of the beneficiary data and create a centralized database with clear process of data updation to be put in place in a time bound manner for Government of Maharashtra and National Fertilizers Limited to facilitate cashless payment for Government services in rural areas.

### 9.7.4 Website Quality Certification

STQC Directorate has established a Website Quality Certification Scheme based upon national and international standards/best practices. The certification scheme aims to help in hardening of websites from wide range of security threats, increasing accessibility,

assuring commitment to services and ensuring compliance to the requirements of Guidelines for Indian Government Websites (GIGW) developed by National Informatics Centre (NIC) and adopted by Department of Administrative Reforms and Public Grievances (DARPG), Government of India.

The award of the mark "Certified Quality Website (CQW)" is a recognition that the website complies with the requirements of GIGW and the organisation has adequate procedures and processes in place to provide reliable and dependable information and service through their website.

Under the Website Quality Certification Scheme, 210 websites have been certified as per Guidelines for Indian Government Websites (GIGW 2009).

### 9.7.5 Test and Calibration Services

STQC laboratories have provided test and calibration services to a large number of industry, public sector undertakings and Government organisations. Some of the major testing and calibration projects undertaken during the period are indicated below -

**ERTL (East), Kolkata**

- Provided calibration services, in-house and on-site, for electro-technical, non-electrical, optical parameters including calibration of medical instruments at ATC in Eastern Region, Haldia and Kolkata Dock Complex, Hospitals, PSU and Private Industries, R&D institutes etc.

- Conducted safety testing of single and three phase static energy meters under STQC 'S' Marking scheme as per IEC 61010-1:2010,3rd edition.

- Conducted safety testing of IT-products like automatic data processing machines, power adapters, mobile phones, self-ballasted lamps, UPS, VDU etc. as per relevant BIS standards under CRS/surveillance scheme of BIS and MeitY.

- Conducted type testing of energy meters and tri-vector meters of various types up to 100A ($I_{max}$)

for major Indian manufacturers under licensing scheme of BIS and requirements of Electricity Boards across the country.

- Conducted EMI/EMC testing for limited parameters under RDSO standards for various signalling and power electronic products to be used for Indian Railways.

- Received NABL accreditation for test facility of solar photovolatic module as per IEC 61215.

- Conducted testing of LED based solar lighting system, battery, as per MNRE and BIS standards.

- Conducted characterization of various PV Modules and LED.

- Conducted climatic conditioning, mechanical endurance and ingress protection tests on electrical/electronic equipment/system for telecom, defence, railway and other industrial applications.

- Conducted testing and certification of electrical equipment intended to be used in potentially hazardous atmospheres in underground coal mines and surface industries dealing with hydro-carbon and other combustible materials as per IS/IEC 60079 series for BIS, DGMS and PESO approval.

### ERTL(North), New Delhi

- System performance testing: QR code scanner testing under certification scheme for the first time.

- EMI/EMC Testing: Following special products tested for EMI/EMC testing

  a) Variable frequency drive panel
  b) RT tube scale
  c) Blood collection monitor
  d) Fibre optic multiplexer comprising SDH system
  e) Ottomed video endoscopy system
  f) Medical products

- Initiatives in Calibration: Procedure developed

for calibration of rpm simulator and established traceability in collaboration with NABL.

### ERTL(W), Mumbai

- Carried out on-site EMC testing of electro mechanical machines viz. horizontal form fill machine, vertical form fill machine, blister packing machine with add-on-robotics, cartoning machine, denster machine and induction cap sealing machine as per IEC 61000-6-2 and IEC 61000-6-4.

- Carried out on-site safety evaluation of electro mechanical machines viz. horizontal form fill machine, vertical form fill machine, blister packing machine with add-on-robotics, cartoning machine, denster machine and induction cap sealing machine as per IEC 60204-1.

- Conducted testing of energy meters as per international standards (IEC 62052-11, IEC 62053-21 and 22). ERTL (W) Mumbai has also developed the expertise to conduct the testing of current rectifiers, as per AC 150/5345-10H, which are used/installed in Indian Airport runway lighting.

- Evaluated Unmanned Aerial Vehicle (UAV), ultrasonic single/double rail testers and LED light fixtures and auxiliary warning systems, which have their application in Indian Defense, Indian Railways and Indian Power Transmission systems, respectively.

### ETDC, Bengaluru

Development assistance and accredited EMC compliance testing facilities are extended to industries to ensure developed products meets national/international EMC standards like IEC, CISPR, and FCC and IS standard. Following new products were tested:

- Finger print reader as per CISPR 11 and IEC61000-4 series (immunity testing)

- Two wheeler temperature/pressure sensor as per CISPR 22 and IEC61000-4 series (immunity testing)

- Surgical operation table as per CISPR 11 and

IEC61000-4 series (immunity testing)

- Air conditioner for Noida Metro and for driver Cab as per CISPR 11 and IEC 61000-4-2 (standard for ESD Test)

- Gear hobbing machine (used for making gear tools for automobiles) as per CISPR 11 and IEC61000-4-2 (standard for ESD Test)

- Line and traction control unit (for Railway) as per CISPR 11 and IEC61000-4 series (immunity testing)

- Wireless Radio as per CISPR 11 and IEC61000-4 series (immunity testing)

- Fermentor control panel (used for making vaccine) as per CISPR 11 and IEC61000-4-2 (standard for ESD Test)

- Fog vision system as per IEC 62236-3-2

**Safety Compliance testing as per National/ International standard:**

ETDC Bengaluru is recognized by BIS to test 31 products under CRS scheme. Following major new products were tested under CRS scheme:

- Automatic sliding door, as per IEC 60204-1
- AMR Modem, as per IS 13779
- CCTV, as per IS 13252 (part-1)
- Gear hobbling machine, as per IEC 60204-1
- Dell server, as per IS 13252 (part-1):2010
- Microwave oven as per IS 302-2-25

**Environmental and Mechanical Simulation compliance testing :**

The following products were tested as per national/ international environmental and durability standards:

- Distributed power wireless control system as per IEC 60571

- High speed Wi-fi access point as per QM 333 cat D for CDOT

- Testing of magnetic drain plug as per Mil-STD-810F-509-4

- Vehicle control unit as per IEC 60068-2-30 for BHEL

- Vibration testing of VVPATs and EVMs as per ECI requirement.

- Actuator piston rod as per customer specification

- STM-1 synchronous multiplexer as per QM 333 Cat B

- High precision calibration service: To ensure speedy delivery and reduce the down time of customer's calibrated standards, ETDC Bengaluru has automated major areas of calibration parameters and operations covering majority of calibration of multifunction calibrators and higher end multimeters. The automation effort has enhanced productivity by 30% and also ensured higher accuracy in reporting of results.

**ETDC, Chennai**

- ETDC Chennai tested and evaluated laptops computers as per ELCOT tender requirements as part of the Government of Tamil Nadu flagship scheme of distribution of laptop computers to the students studying in Government and Government-aided schools in the 10th, +1 and +2 standards especially in the rural and semi-urban areas in the State to facilitate the disadvantaged in acquiring better soft skills and meet the requirements of the digital era for employability.

- Evaluated and tested Moored Buoy network system which is used to provide continuous real time marine meteorological and oceanographic data for ocean state forecast and weather prediction which plays a crucial role in cyclone and tsunami warning.

- Tested railway maintenance head lamp assembly, railway hand signal assembly for Indian Railways supplied by OEM of Coimbatore.

## CFR, Chennai

- Carried out MTBF and MTTR study for "Digital AC Servo Drive" for naval applications manufactured by Kirloskar Electric Company Limited, Bengaluru. This study quantitatively assessed the system/subsystem design MTBF (reliability parameter) and MTTR which is an important parameter to assess the maintainability of the system.

- Carried out Reliability Prediction Analysis based on MIL-HDBK-217F Notice-2 on KAVACH system for naval applications manufactured by BEL, Chennai. The Kavach Fire Control System operates as a decoy system with built in intelligentsia to counter the threat of various anti-ship missiles.

### 9.7.6 Acceptance Testing of EVMs and VVPATs for Election Commission of India

#### ETDC, Bengaluru and ETDC, Hyderabad

- Election Commission of India (ECI) identified STQC as an independent testing agency and issued work order for third party testing of 16.15 lakh VVPAT machines, 13.95 lakh Ballot Units and 9.30 lakh Control Units manufactured by BEL Bangalore and ECIL Hyderabad on sampling plan basis.

- ETDC Bengaluru and ETDC Hyderabad have been testing VVPAT machines, Ballot Units and Control Units manufactured by BEL Bengaluru for functional, electrical, environmental, EMI/EMC and mechanical compliance of the products as per standards and quality process and sampling procedure set by Technical Evaluation Committee of ECI.

### 9.7.7 Continuing participation in Space Programmes at ERTL, Kerala

ERTL(South), Thiruvananthapuram continued to provide the third party quality assurance services to VSSC.

### 9.7.8 National Accreditations of Test and Calibration facilities and BIS Recognitions

It is the constant endeavor of STQC to obtain accreditation or recognition of their services from national or international bodies. Details of major assessments are indicated below –

#### ERTL (W) Mumbai

Retained NABL (National Accreditation Board for Testing and Calibration Laboratories) accreditation certificate for testing and calibration services. The discipline in the testing field is electronic/electrical testing covers EMI/EMC, safety, environmental testing and electrical testing parameters. In the calibration area, the discipline is Electro-Technical, Mechanical and Thermal.

Retained the recognition from BIS for the further period of three years for testing of products including safety testing of products covered under 'Compulsory Registration Scheme (Electronics and Information Technology Goods Order, 2012) of MeitY.

Completed assessment of internet service providers as per CSAM guidelines issued by Ministry of Electronics and Information Technology.

ERTL (W) Mumbai started testing of bio metric devices.

### 9.7.9 Training Services

#### ERTL (East), Kolkata

Conducted various knowledge-based and skill oriented training programmes for industries, laboratories, students and individuals in different areas of technology, such as, industrial automation, bio-medical instrumentation, repair and maintenance, electronic manufacturing technology, test and measurement and quality assurance and management standards (ISO 9001: 2015, ISO/IEC 17025:2017, ISO 27001:2013).

Conducted 46 training courses in different areas of technologies.

Conducted training courses on 2017 edition of Laboratory Quality Management Standards (ISO/IEC 17025).

Conducted training courses under STQC Programme for Women and SC/ST participants.

### ERTL (North), Delhi

Training arranged for ERTL(N) officials to keep in line with National Training Programme :

a. 167 mandays training was arranged in total in-house and external in on different topics. Eight external training were arranged on PV module testing, physio–mechanical metrology calibration and risk management techniques etc.

b. Training arranged for students under Digital India Internship Summer Training Scheme of MeitY.

c. Training arranged for industries by CETE(Noida): 12 training programmes were conducted by CETE(Noida) where in 190 officials from 76 different organisations were imparted training.

### Centre For Reliability (CFR), Chennai

- Four Certified Reliability Professional (CRP) training programmes were conducted by CFR, Chennai. 56 participants from various organisations in India and abroad participated in this programme.

- Successfully crossed the 100th CRP training programme. Over 2,000 professionals from India and abroad representing over 150 organisations have been trained in the technology area. DG (STQC) inaugurated the 101st CRP programme in Chennai on 18th June, 2018 to give further impetus to the CRP training. It is a rare milestone achieved under the Skill India mission.

### Certification Services

### Eastern Region, Kolkata

- Quality Management System certification as per ISO 9001:2015 standard: Served numerous industries in the eastern region and Government organisations (ITR, PXE, CDAC, Coast Guard etc.) as well as Pvt. organisations (Nihilent, ICRA, Vivek, Prakash etc.).

- Information Security Management System certification as per ISO/IEC 27001:2013 standard: Served number of industries in the eastern region and Government organisations (BHEL different units, MSTC, etc.) as well as Private Organisations (Nihilent, ICRA, Mjunction, Nihilent Analytics etc.).

- S-mark product certification for safety marking as per different IEC standards: Served industries (Landis and Gyr+, Benteck) and certified 8 products.

- Conducted factory inspection on behalf of Aenor, Spain.

### 9.7.10  Activities in North-East Region

ETDC, Guwahati and ETDC, Agartala are the two laboratories established by STQC Directorate operating in the NE Region and extending following services to eight States of the region:

- Test and calibration services to the industries, technology users and service providers.

- Testing of e-Governance software as well as State portals/websites etc.

- Audit of IT infrastructure/third party auditors for the e-Governance projects like State Data Centres (SDC)/SSDG/e-District/SWAN.

- Training services in the field of electronics and Information technology and quality and reliability

### Initiatives in Test and Calibration services:

Test and calibration services of ETDC Guwahati and

ETDC Agartala are extended to the organisations located throughout the NE Region towards improvement of quality of their products and services. The services are received by most of the small, medium and large scale industries covering industrial sectors like – Oil and Natural Gas, Oil Refineries, exploration units, Railways, Indian Air Force(IAF), power generation, transmission and distribution, paper, cement and building material, food and beverages, cosmetics, cable and conductors, fertilizer, plywood, carbon products, steel, and service sectors like – aviation, engineering and construction, telecommunication, automobile, service and maintenance units, R&D and test labs, hospitals, pharmaceutical and pathological laboratories etc. About 1,500 calibration jobs are being executed covering more than 30 LSI, MSI, SSI industrial units, Government. PSUs, private and other technology user organisations of NE-Region.

### On-Site Calibration Camps:

To make STQC services available at door steps of client's site located at various remote places in the NE Region, 13 on-site calibration camps were organised by ETDC Guwahati.

### NABL Accreditation and Inter Laboratory Comparison (ILC):

Calibration services of ETDC, Guwahati have been accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL) in conformance to ISO/IEC 17025 international standard for accreditation in the fields of electro-technical, thermal, mechanical and optical calibration services and new scopes being applied for inclusion. Inter Laboratory Comparisons (ILC) programme is also pursued towards achieving satisfactory qualitative performance level.

### Initiatives in IT Test and Assessment Services:

ETDC, Guwahati in association with ERTL(East), Kolkata also initiated more than ten security test/assessment of web applications/websites of various Government/PSU organisations of NE-Region, from time to time in compliance to security requirements of OWASP international guidelines. Beneficiaries are the Government/PSU/autonomous body/society/educational institution/research centres and other organisation of the country.

ETDC Guwahati and ETDC Agartala carried out SDC-TPA assessments/audits of the State Data Centre projects implemented by the north eastern States, like Meghalaya SDC to assess the various requirements of audit frameworks and procedures, infrastructural, O&M process and control, service level agreement, usage, security, functionality and qualitative parameters towards improvement of quality of SDC services.

### Initiatives in Training Services in the fields of Electronics and IT/Quality and Reliability:

Seven short term training courses in the fields of information technology were conducted at Agartala for the benefit of 146 local participants. One training course each on "Computer Fundamental" is planned to be organised by ETDC, Guwahati and ETDC, Agartala for the SC/ST/OBC/economically backward community at Guwahati and Agartala respectively.

### 9.7.11  Promotional Matters

ERTL(N), Delhi promotional matters: Lab infrastructure improvement like few rooms, tiffin room and washrooms renovated. Swachhta Pakhwada and Hindi Pakhwada were organised.

### 9.8 National Institute of Electronics and Information Technology (NIELIT)

### 9.8.1 Introduction

National Institute of Electronics and Information Technology (NIELIT), is an autonomous scientific society under the administrative control of Ministry of Electronics and Information Technology (MeitY), Government of India. NIELIT is actively engaged in capacity building and skill development in the areas of information technology (IT); electronics; communication technologies; hardware; cyber law; cyber security; IPR; GIS; Cloud Computing; ESDM;

e-Waste; IoT; e-Governance and related verticals.

It offers courses in the formal sector in association with State Universities/Technical Board, such as, ME/M.Tech, BE/B.Tech, MCA, BCA programmes and PG Diploma courses. Aurangabad Centre is also facilitating for conducting PhD Program in the area of electronics.

Courses in the non formal sector in IT, hardware, animation, multimedia and bio-informatics at four levels, namely NIELIT IT 'O' Level; NIELIT IT 'A' Level; NIELIT IT 'B' Level; NIELIT IT 'C' Level; NIELIT CHM 'O' and 'A' Level, NIELIT MAT 'O' Level and NIELIT BI 'O' and 'A' Level; short term courses in niche areas; and; IT Literacy Programmes for the proliferation of Digital Literacy in the country; besides specialized programmes in e-Governance targeted towards empowering the employees of the State Governments are conducted. In addition, NIELIT has created expertise for the roll out of customized skill development programmes, as per specific needs of public and private sector firms.

NIELIT is also one of the National Examination Bodies which accredits institutes/organisations for the conduct of Electronics and IT courses in the non-formal sector. NIELIT is well represented in the country and has pan India presence through a network of 41 own centres and a network of about 800+ Accredited Training Partners and about 8700+ Digital Literacy Facilitation Centres.

NIELIT qualifications are widely accepted at both national as well as international levels. Owing to the quality some of the NIELIT digital literacy courses are linked with both promotion and recruitment State Governments of Arunachal Pradesh, Bihar, Chandigarh, Daman and Diu, Gujarat, Rajasthan, Sikkim, Uttar Pradesh and a few Government Departments viz; DGE&T (for trainees of ITIs/ITCs under Craftsmen Training Scheme (CTS), UPPCL, O/o the CGA (JAO exam).

NIELIT is amongst the front-runners that have aligned 75 skill oriented courses with National Skills Qualifications Framework (NSQF) at different levels ranging from Level 2 to 8. {NSQF is a competency-based quality assurance framework that organises qualifications in terms of aptitude, knowledge, skills and Learning outcomes; whether they are obtained through formal, non-formal or informal learning.}

Since inception, NIELIT has trained 55+ lakh candidates. Examinations of digital literacy programmes are conducted online and digitally signed e-certificates are issued to successful candidates. 15,48,913 digitally signed e-certificates have been kept in digital locker of the students and NIELIT is among the foremost educational institute in the country to institutionalize the mechanism i.e., linking of e-Certificates with digital locker.

Taking into account the high rate of obsolescence in IT and electronics and emergence of disruptive technologies, NIELIT has been making efforts to update its repertoire of courses in upcoming technologies, such as, Artificial Intelligence, IoT, Big Data, Cloud Computing, Robotics, 3D Printing etc. In this regard, prominent NIELIT Centres, such as, Aurangabad, Calicut, Kolkata are in the process of being identified as Technology Resource Centres to offer blended learning programmes under the FutureSkills Prime initiative which is being jointly conceived by MeitY and NASSCOM. Up-skilling/re-skilling eco-system in emerging and futuristic technologies would facilitate continuous enhancement of skills as well as knowledge of IT professionals in line with their aspirations and aptitude. Institutionalization of blended learning mechanism through Technology Resource Centres and affiliated training partners using hub-n-spoke model would widen reach and also ensure deeper penetration in the country. NIELIT is expected to render a pivotal role in the re-skilling/up-skilling eco-system as well.

### 9.8.2 R&D, Innovation and Design:

**"Indigenous Colour Doppler Ultrasound Scanner with PNDT Compliance"**

NIELIT Calicut is developing an Indigenous Color Doppler Ultrasound Machine with Prenatal Diagnostic Technique (PNDT) Compliance, an R&D project funded

by MeitY. The machine developed will generate PNDT compliance reports using which authorities can look for patterns of female foeticide. The machine has unique ID and any movement of the machine will be automatically tracked with inbuilt GPS facility. The machine also supports aadhaar based authentication of doctor and patient undergoing scanning. The machine will also be an import substitution for the nation.
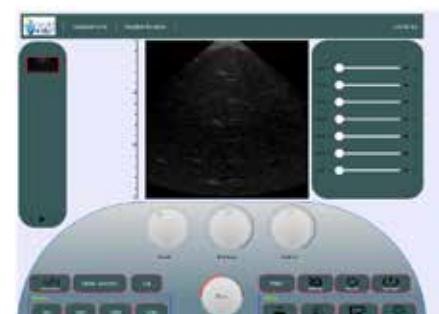
**Progress:** Lab Model Prototype Design is completed and manufactured. 8 Channel Real-time B-Mode system is integrated with custom probe connector board and existing Ultrasound Evaluation Boards. 128 Channel Ultrasound Transceiver Board is Designed and Manufactured. 128 Channel DBF Board and Power Management Board Design is completed. human machine Interface is developed and Tested with real-

time data. Ultrasound research platform is procured and functional.

The 128 channel DBF board PCB layout design is being completed for fabrication which is expected by May 2019. The Gigabit Ethernet and high speed LVDS interface is also under progress.
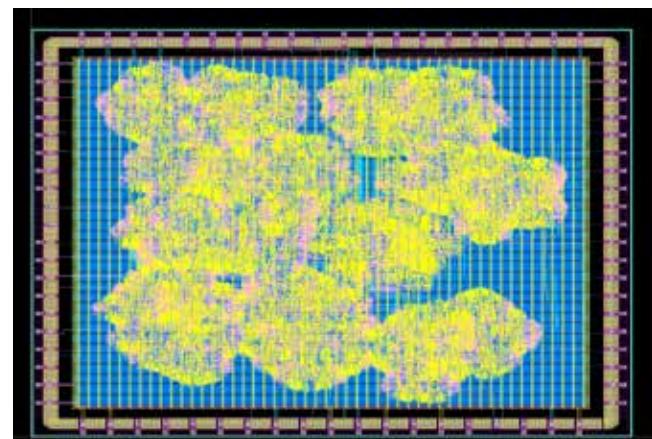
## "NIELIT Array Signal Processor ASIC"

NIELIT Calicut successfully completed the tape out of the Array Signal Processor at Semi-Conductor Laboratory (SCL) Mohali. The processor is an Application Specific Integrated Circuit (ASIC) targeting under water acoustic camera/SONAR and medical ultrasound beamforming applications and is being developed under Special Manpower Development Program for Chips to System Design (SMDP-C2SD)
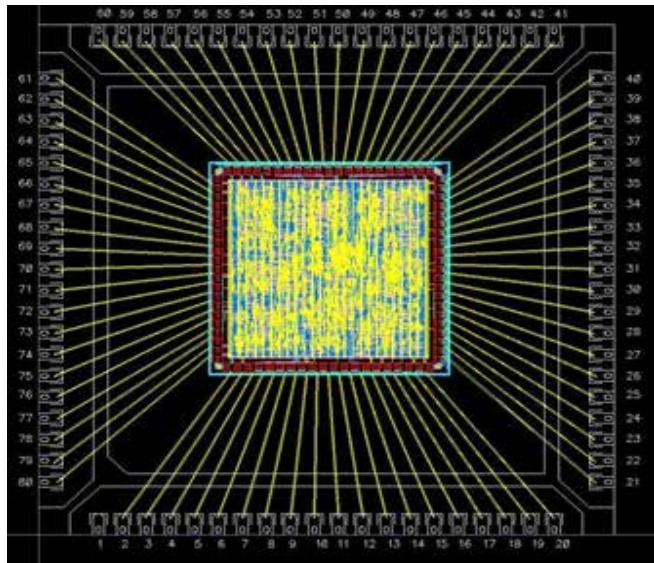


project funded by MeitY. The processor performs antenna array beamforming of underwater acoustic sensor data/medical ultrasound sensor data from various directions. The processor supports up to 8 channels, and can be interfaced with commercially available Analog Front End (AFE) chips. To debug the functionality of the processor, on chip trace/debug logic is also integrated with the processor. The complexity of the design is 1.6 Million gates and supports up to 20 MHz core and 50MHz I/O operating frequency. The processor layout passed all critical timing and Design for Manufacturability (DFM) checks as required by the SCL Fab targeting 180nm technology. The processor can be used for high frequency imaging SONAR as well as medical ultrasound imaging system developments. The area of the processor is 5mm x 5mm and targeting

80 pin QFN package. The peak power consumption of the processor is 683mW.



**Array Signal Processor Layout for Fabrication**
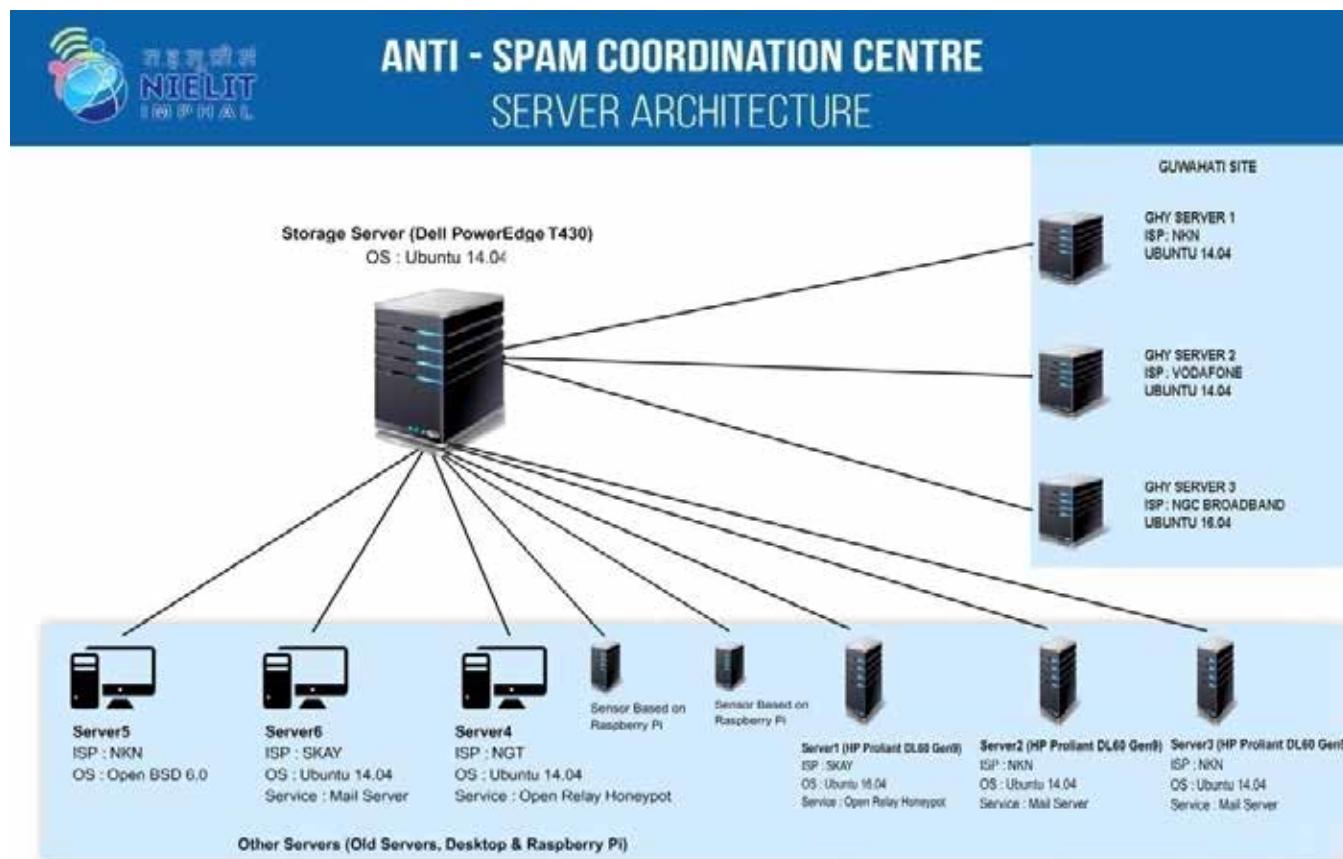
**Array Signal Processor Bonding Diagram**

Under SMDP-C2SD Project NIELIT Calicut also started an M.Tech in VLSI and Embedded Course in collaboration with Defence Institute of Advanced Technology, Pune (under Department of Defence Research & Development, Ministry of Defence, Govt. of India). NIELIT Calicut has also trained nearly 200 B.Tech students and 100 M.Tech students by employing SMDP-C2SD facilities.

"**Establishment of an Anti-Spam Coordination Centre**"

NIELIT Imphal and Guwahati under the project have developed an anti-spam facility with framework for collection, analysis and exchange of information about spam mails. For this purpose, distributed spam-bots emulating open relay mail servers and numerous spamtraps have been setup. The spam mails collected are being analyzed to find out the origin of such mails and classified into categories. Based on the analysis, a database as per the international practices and the report is being shared with stakeholders including CERT-In.

**"Setting up State of Art Digital Forensic Data Centre to provide forensic services including remote forensics live acquisition and analysis of digital evidence, Virtual Training Services to NE States"**

NIELIT Kohima jointly with NIELIT Imphal and NIELIT Aizawl are implementing the project with financial support of MeitY, with following objectives:

(i)   To set up Digital Forensic Data Centre with essential digital forensic tools and to offer forensic services by sharing the resources in the facility with virtual technology concept for North Eastern States. The digital forensic data centre is proposed to act as a repository of digital forensics tools for NE States and the services will be offered in cloud environment;

(ii)  Creating web based virtual environment laboratory with training content covering latest trends in cybercrimes, seizure/acquisition & analysis of digital evidence, building case scenarios with advanced forensics techniques to enable LEA officials to gain hands-on forensics investigative skills in various area like disk forensics, mobile

forensics, network forensics, social media etc. through the virtual mechanism;

(iii) Development and integration of web related evidence acquisition tool including automated screen capturing while acquiring web related evidence like media files and documents with forensically sound methods.

### 9.8.3 Capacity Building Projects:

**Training of Visually Impaired Persons in Manipur on 'Course on Computer Concepts (CCC) of NIELIT**

The project is being implemented by NIELIT Imphal with financial support of MeitY over a period of 2 years 6 months, with an objective to train 200 blind candidates of Manipur State on Course on Computer Concepts (CCC) of 200 hrs duration (4-weeks/1-month) covering NIELIT's CCC syllabus with soft skills, as a residential training programme. The training would be implemented by using Indian Text to Speech Software titled "Shruti Drishti" with Braille refreshable keyboard to train blind students.

**Skill Development Training of Unemployed SC & ST Youths of Tripura towards enabling entrepreneurship & sustainable development**

The project is being implemented by NIELIT Agartala with financial support of MeitY over a period of 2 years, with an objective to train 1,940 unemployed SC & ST candidates of Tripura by providing skill development training in 06 NSQF aligned courses viz; Certified Graphic Designer, Data Entry and Office Automation, Repair & Maintenance of ECG and ICCU Equipment, Telecom Technician-PC Hardware and Networking, Repair & Maintenance of Power Supply, Inverter & UPS and Installation of Repair of Consumer Electronics.

**Empowerment of SC/ST Youth and Women on Enhancement of Livelihood activities using IT and Tool**

The project is being implemented by NIELIT Kolkata (in 2 selected districts of West Bengal i.e. Darjeeling and Alipurduar) with financial support of MeitY over a period of 2 years, with an objective to develop 800 IT skilled resource members from SC/ST and women candidates under capacity building programme. 800 beneficiaries will be empowered from two districts on computer fundamentals and soft skills, design for handloom/handicrafts products and solar-LED power assembly and installation.

**Setting up of Medical Electronics Laboratory**

The project is being implemented by NIELIT Guwahati at its Silchar Extension Centre with financial support of MeitY over a period of three years with an objective to set up Medical Electronics R&D Laboratory at Silchar EC for undertaking repair and maintenance of medical electronics equipment of various hospitals in Assam, so as to solve the major problems faced by the hospitals and patients due to non-operable defective hospital equipment.

**"Capacity Building in the areas of Electronic Product Design and Production Technology"**

The project is being implemented by NIELIT

Aurangabad and Chennai with financial support of MeitY over a period of seven years with an objective to develop human resource at various levels including Certificate, Diploma, Post Graduate, and Research Professionals with adequate competence levels.

**Create Skill Development facilities in deprived areas through strengthening NIELIT**

A project on **"Development of North-Eastern Region by enhancing the Training/Education capacity in the Information, Technology (IECT) Area"** is being implemented. It has the objective of upgrading the six existing centre of NIELIT in the North-Eastern Region at Guwahati, Imphal, Shillong, Itanagar,Gangtok and Aizawl; and setting up of ten new Extension Centres and upgrading two Extension Centres (Tezpur in Assam and Chuchuyimlang in Nagaland).

All the eighteen (18) Centres/Extension Centres are operational as on date. Ten Extension Centres are imparting training from built-up space at Silchar, Dibrugarh, Jorhat and Kokrajhar in Assam; Pasighat and Tezu in Arunachal Pradesh; Senapati and Churachandpur in Manipur; Tura in Meghalaya and Lunglei in Mizoram.

45,877 students have been trained so far under the project. Possession of land for construction of permanent campuses has been obtained at 15 locations (out of 18) in Pasighat, Guwahati, Kokrajhar, Jorhat, Tezpur, Dibrugarh, Imphal, Senapati, Churachandpur, Aizawl, Lunglei, Gangtok, Shillong, Tura and Chuchuyimlang. Possession of land is yet to be obtained at Tezu and land is to be identified at Itanagar in Arunachal Pradesh. Possession of land at Silchar is yet to be obtained. Three Central PSUs have been appointed as Project Management Consultants (PMCs) for construction of permanent NIELIT Centres and Extension Centres. Construction activities are in progress at 12 locations i.e. Imphal, Gangtok, Aizawl, Jorhat, Tezpur, Dibrugarh, Kokrajhar, Chuchuyimlang, Pasighat, Senapati, Churachandpur and Lunglei. Construction at 02 locations i.e. Guwahati and Shillong has been put up on hold due to issues pertaining to

State Government and Local Government respectively.

NIELIT is presently offering training courses from 20 locations in all eight (8) NE States covering two additional locations at Agartala and Kohima under other funded projects by the MeitY.

NIELIT has started Centres from permanent campus at Ropar, Patna, Agartala, Ajmer and Kolkata after completion of construction activities.

In addition, two (02) Extension Centres at Mandi (Himachal Pradesh) under NIELIT Shimla and Majuli (Assam) under NIELIT Guwahati have been made operational. NIELIT Centres at Buxar, Muzaffarpur (Bihar), Goa (Maharashtra), and Jalandhar (Punjab) are under establishment.

### "Capacity Building in IT and Digital Services (including Digital Payments and GST)"

NIELIT is implementing a project entitled **"Capacity Building in IT and Digital Services (including Digital Payments and GST)"** with financial support of Ministry of Development of North Eastern Region (MDoNER), with an objective to enhance the IT skills of State Government officials of NER by providing them digital skills viz. digital literacy, digital payments, e-Governance services and GST training and to facilitate adoption as well as regular use of IT and digital services as a way of life, and especially in official work.

It consists of 100 hours of course curriculum delivered over a 7 hour schedule daily for 14 days comprising of theory and practical classes.

MDoNER had assigned a target to train 10,000 State Govt. Officials in North East States. Assigned target has been successfully achieved from 616 Departments in all eight (08) participating North East States.

### 9.8.4 Skill Development in ESDM Sector:

**'Scheme for Financial Assistance to select States/ UTs for Skill Development in Electronics System Design and Manufacturing (ESDM) sector'**

Employment in the electronics industry is estimated to grow significantly. Hence to facilitate skill development in ESDM sector focusing on students/unemployed youth at 9-10th standard onwards, ITI, Diploma, non-engineering graduates, Engineering Graduates (in level 5) and with a view to increase their employability to work in 'manufacturing' and 'service support' functions, a 'Scheme for Financial Assistance to select States/UTs for Skill Development in Electronics System Design and Manufacturing (ESDM) sector' was approved in November, 2013. 90,000 persons are to be supported under the scheme in the States of Andhra Pradesh (50% target) Telangana (50% target), Jammu & Kashmir, Karnataka, Punjab, Uttarakhand (for two levels only) and Uttar Pradesh in 5 levels of vocational skill development courses. The total outlay of the scheme is ₹113.77 crore with Grant-in-Aid of Rs. 100 crore (approx.).

The scheme duration has been extended upto 31st March, 2020.

### Scheme for 'Skill Development in ESDM for Digital India'

Under the aegis of 'Digital India' programme launched by Hon'ble Prime Minister, MeitY has approved a scheme for "Skill Development in ESDM for Digital India" on 09.12.2014 to cover all the States/UTs of the country in order to facilitate creation of an eco-system for development of ESDM sector in the entire country facilitating skill development for 3,28,000 persons in ESDM sector at an outlay of Rs. 411 crore (approx.) . This is in continuation of the above mentioned 'Scheme for Financial Assistance to select States/UTs for Skill Development in Electronics System Design and Manufacturing (ESDM) sector' approved earlier. Both the schemes are to be implemented concurrently.

These schemes provides for 75 % of training fee as assistance for training courses identified by Electronics Sector Skills Council, Telecom Sector Skills Council and NIELIT. The scheme also provides for 100% fee reimbursement to 40% of the seats which would be reserved for the candidates belonging to SC/ST/ economically weaker sections. Further, Registration-

cum-Certification fee per candidate (for the first attempt only) would also be reimbursed to assessing/certifying agencies.

NIELIT is implementing both these schemes on behalf of MeitY and an ESDM-Programme Management Unit (ESDM-PMU) is set-up by MeitY under administrative control of NIELIT to monitor the project at ground level.

Under these ESDM schemes skill development training in electronic sector is provided to students and unemployed youths through Training Partners which are registered under the three key implementing agencies viz. Electronics Sector Skills Council, Telecom Sector Skills Council and NIELIT.

Till 31st March 2019 cumulatively in both the schemes 2.88 lakh candidates have been enrolled and trained, out of which 1.95 lakh candidates have been certified and 16,847 candidates have been placed.

The scheme duration has been extended upto 31.03.2020.

### 9.8.5 Advanced PG Diploma programme in Electronic Product Design and Manufacturing



**Advanced PG Diploma programme in Electronic Product Design and Manufacturing (PD 900-1 year**) programme of **NIELIT Calicut** is offered in collaboration with **Maker Village Cochin** (the electronics incubator is a joint initiative between Government of India and Government of Kerala) as a unique programme to develop trained manpower for ESDM industry and providing the participant with knowledge and hands-on exposure in various dimensions of electronics product design and manufacture. Apart from the 6 months training at NIELIT, programme offers **assured 6 months industry internship in Maker Village and associated electronic industries and hands on training on SMT assembly line** to the participants. This programme

provides trained and skilled manpower to electronics industry so that industry can use this human resource on live projects without any induction training/period.

### 9.8.6 Training of Government Officials on e-Waste Management under 'Digital India':

MeitY had initiated **"Awareness programme on Environmental Hazards of Electronic Waste through Digital India Initiative"** and provided responsibility to NIELIT for conducting the awareness programme on e-Waste management for the Government officials in different States through 1/3/5 day training programme so that the Government officials were made aware about e-Waste, its hazards and management.

Phase-I (Completed): In Phase-I of the project, NIELIT imparted training to Government officials of ten (10) States through 1/3/5 day training programme. The target of training 2,000 Government officials were exceeded by NIELIT and 2,273 Government officials were trained from Assam, Bihar, Goa, Jharkhand, Madhya Pradesh, Manipur, Odisha, Uttar Pradesh, West Bengal, and Puducherry.

Phase- II (Undergoing): Based on the success of the Phase-I of the project, the Phase-II of the project has been awarded to NIELIT Kolkata with the target to impart training to 3,500 Government officials in 19 States/UTs which were not covered earlier under Phase-I. The States covered under Phase-II are – Andhra Pradesh, Arunachal Pradesh, Chattisgarh, Delhi, Gujarat, Haryana/Punjab, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Maharashtra, Meghalaya, Mizoram, Nagaland, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand. Phase-II of the above awareness programme is presently in progress.

As an outcome of the training programme, the Government officials in identified States/UTs are effectively dealing with the management and disposal of e-Waste in their department/division, resulting in freeing up of valuable office space and better revenues, through a proper process which is both environment friendly as well as in line with the applicable laws of the land. Out of the target to train 3,500 officials, NIELIT

has so far trained 3,461 Government officials.

### 9.8.7 Information Security Education and Awareness (ISEA) Project Phase- II

Activities carried out as part of Information Security Education and Awareness (ISEA) Project Phase- II are as listed below:

2,284 Government officials have been trained by conducting 77 Information Security Awareness workshops by NIELIT Centres.

A Live programme on "Security in Cashless Transactions" was telecasted on 14th June, 2018 by DD Bihar in which Director-in-Charge NIELIT Patna Shri Alok Tripathi participated as expert and replied to queries of viewers.

### 9.8.8 Cyber Forensics Lab setup for Law Enforcement Agencies

To address prevention of cybercrimes with effective and timely investigation of such crimes and to resolve issues associated with cyber security, NIELIT Kohima Nagaland, has setup a Cyber Forensics R&D and Training Lab in the year 2010 with the technical,

financial and active support from (MeitY). The initiative was supported by MeitY in 2 Phases and the projects were completed in September, 2017. In the second phase the lab was upgraded to advanced forensics lab.

o Established well-equipped Cyber Forensics Lab with state-of-art device specific and subject specific cyber forensics tools for providing hands-on training for seizure and acquisition, cyber forensics analysis, mobile forensics analysis, malware analysis, cloud forensics analysis, social media forensics analysis, etc to facilitate effective investigation with digital evidence extraction and analysis.

o Trainings have been imparted to law enforcement agencies of NE States in cyber forensics, advanced forensics and cybercrime investigation techniques. More than 400 persons including the senior police officials have been trained

o Forensics analysis services have been provided to LEA of NE States and LEAs assisted for on-site seizure and evidence collections. More than 80 cybercrime cases have been solved.

o Certificate course on cyber security and cyber law has been imparted to 325 ST youths of NE States.

o NIELIT Kohima has developed web based Cyber Crime Case Management System (CCCMS) for storing and management of cybercrime cases forwarded to forensics lab.

o Cyber forensics and advanced forensics Lab manual was developed and distributed to LEAs.

### 9.8.9 Synergy through Collaborations and MoUs:

NIELIT Calicut signed an MoU with Maker Village, Kochi, Kerala, a joint initiative of Ministry of Electronics and Information Technology (MeitY) and Government of Kerala for Skilling and Technology based Entrepreneur Development Programmes (TEDP) in Electronics and IT sector.

NIELIT Calicut signed MoU with Malabar Cancer Centre (MCC), Thalassery for R&D in Medical Electronics equipments, enabling IT software for cancer patients etc. Under this MoU both Institutes will work together towards developing indigenous medical electronic equipments, enabling IT for cancer patients, etc.

NIELIT Calicut signed a MoU with Indian Institute of Technology, Madras (IIT Madras) to foster research in Bio-Medical Electronics Systems. The collaboration, aims at research and capacity building in the areas of specialized electronics domains, such as, Bio Medical Hardware, Medical Ultrasound Imaging, etc. through effective utilization of resources available with both institutions. The facilities at Bio-Medical Engineering Department, IIT Madras, and NIELIT Calicut would be utilized for collaborative research in high-end medical imaging systems. The Ultrasound Research Platform, which is the unique research facility available in India at NIELIT Calicut and IIT Madras will be used for high-end algorithms development for elastographic, tissue harmonic imaging etc. The institutes with expertise in advanced signal processing and electronics domains foresee that there is a vast scope for development of qualified manpower in the areas of Medical Imaging, VLSI, and Embedded Systems. Through this initiative, both institutions together facilitate the capabilities of young talent pool available in the country in general and research organisations in particular to make them ready for meeting the requirement of high-end electronic design areas. The joint research aims at developing indigenous techniques for bio medical instrumentation, high end medical ultrasound imaging etc. and implementing them through indigenous designs. In long run the research will fulfil the need for indigenous high end medical diagnosis systems.

NIELIT Ropar signed an MoU with IET Bhaddal for employability enhancement of students. The MoU covers Digital Literacy Training to first and second semester students of B.Tech Programme and also for Industrial and summer training to B.Tech and other undergraduate courses students.

NIELIT Ropar signed an MoU with Punjab Technical

University (PTU) for imparting training to the students of all PTU affiliated colleges under Employability Enhancement Training Programme in line with MoU already signed with AICTE. Director General, NIELIT graced the occasion and signed the MoU on behalf of NIELIT. Vice-Chancellor, PTU signed the MoU on behalf of PTU.

NIELIT Aurangabad signed an MoU Employability Enhancement of the students covered under the AICTE's Employability Enhancement Training Program (EETP) to provide competency based employability enhancement skills and to set forth the modus operandi to provide training in the field of IECT and all related areas by NIELIT to students of Dr. BATU affiliated colleges/institutes under following categories:

a) Semester/Industrial Training Programmes of 5-6 Months duration

b) Summer Training Programmes of 6-8 weeks duration

The aim of the programme is to equip the students with necessary knowledge of the key industry practices and skills to be fruitfully employed besides providing exposure to live projects and hands-on practical training

An MoU was signed between NIELIT Kolkata and West Bengal Electronics Industry Development Corporation (WBEIDC) for skilling 54,000 youth in the districts of WB over a period of 3 years.

NIELIT J&K has signed a MoU with Rashtriya Madyamik Shiksha Abhiyaan (RMSA) - J&K and Sarv Shiksha Abhiyaan (SSA)-J&K for implementing Smart Class Technology across the State of J&K. NIELIT J&K commenced training of 14,265 Government teachers of High Schools and Higher Secondary Schools in the J&K State. NIELIT J&K plays a significant role in creating an e-learning environment in the State.

### 9.8.10 Some Notable Achievements:

Shri Ravi Shankar Prasad, Hon'ble Union Minister of Electronics and Information Technology and Law

and Justice adopted the village Lakhanpura of block Bakhtiyarpur, Patna under second phase of Pradhan Mantri Sansad Adarsh Gram Yojna (PMSAGY). In this endeavour, NIELIT Patna opened Adarsh Computer Saksharta Kendra in the village which was inaugurated by Hon'ble Minister on 21st June, 2018. On the occasion Shri Ranvijay Singh, MLA, Bakhtiyarpur; Shri Gyanendra Kumar Singh, MLA, Barh, Shri Rajiv Kumar, the then DG NIELIT and JS, MeitY and Shri Alok Tripathi, Director I/c, NIELIT Patna Centre were also present. The newly opened Computer Saksharta Kendra is equipped with modern multimedia classroom and computer lab. It will facilitate local youth of the area, specially women candidates who are expected to enroll in various job oriented courses in the centre.





With the slogan **"Digital Literacy for all"** and a deep belief in uniform growth of the society, NIELIT Aizawl has launched a digital literacy programme for

Visually Impaired persons. The training programme on NIELIT CCC course, was conducted using screen reading software for visually impaired persons- **JAWS ("Job Access With Speech")**. It was launched by Dr. Lalnunthara, Commissioner for Persons with Disabilities, Government of Mizoram. This is the first of its kind training programme in the NE region.

NIELIT Srinagar in accordance with the standardized format of the **Indian Road Congress developed automated Road Accident Data Management System (RADMS),** with a view to create a platform for on-the-spot collection of standard and accurate road accident data, soon after an accident. RADMS will be tremendously helpful for policy makers and Governmental executing agencies, be it municipal bodies, road construction agencies, traffic and transport departments, towards mitigation of road safety related problems in J&K. RADMS is a Geographical Information System (GIS) based solution for identification of black spots, wrong driving practice, road infrastructure, vehicular defects, road types, damage to property, overloading issues and other factors related to road accidents. The android based mobile application supported by a backend analysis dashboard and data server will facilitate end-to-end accident data management. The system is backed by a powerful GIS standard facilitating plotting of accident data on digital maps enabling in-depth spatial analysis. The RADMS is capable of presenting 65 different reports on various parameters by using its analytical tools. The RADMS App was launched by Dr Asgar Hassan Samoon, Principal Secretary, Transport Department, Jammu and Kashmir.

In order to enhance the skilling of young graduates in the field of CAD and Rapid prototyping, NIELIT Gorakhpur established a **"3D Printing and CAD Lab"**, and a course on **"3D Printing using AutoCAD"** was also launched at NIELIT Gorakhpur centre.

After attending training on e-Yantra and to explore the possibilities for setting up the Robotics Lab, NIELIT Gorakhpur has set-up a lab under e-Yantra Lab Setup Initiative (e-LSI) Program. The e-LSI programme is a part of e-Yantra, which is an initiative of IITB and sponsored by MHRD under the National Mission on Education through ICT programme. The lab is equipped with Firebird-V and Spark-V Robotic kits, various sensor modules and wireless modules. Various short-term course on "Robotics" with duration of 2-Weeks, 4-Weeks and 6-Weeks, were launched at NIELIT Gorakhpur centre.

The availability of NIELIT Services (online services) through smartphone devices in 24x7x365 mode leading to opening of new paradigms for penetration of skill development programmes in rural and remote areas is being developed with a suitable mobile apps with lightweight features.

Government of Madhya Pradesh has considered NIELIT IT 'O' Level qualification as one of the mandate courses for employment in the Madhya Pradesh Secretariat Service Recruitment Rules 1976.

NIELIT Chandigarh has becomes the first Centre of Excellence in India for Embedded System Design and Simulation certified by Labcenter Electronics Ltd - United Kingdom.

### 9.8.11 Embedded and IoT Ventures:

Utilizing the excellent infrastructure and the guidance of the faculty, students of the Post Graduate Diploma courses in Embedded Systems and IoT have dwellt on several resourceful ventures. All the projects make effective use of IoT and Embedded System Concepts and are useful and practical.

## 1. The INS AUTOMOV



The INS AUTOMOV is an indoor navigation robot which can estimate the location and distance to move by receiving signal from the beacons implemented using IR transceivers. A combination of ultrasonic sensor and buzzer is used for obstacle detection. In this navigation system, the robot can navigate to the location with the help of a map, by acquiring the information of pre-set map deployed in an indoor environment and robot locates itself and knows its position.

## 2. The Embedded Fruit Segregator



The Embedded Fruit Segregator aims at meeting the demand of an automated system that can analyze the external quality of fruits. This being done in a non-destructive way, using image processing can help reduce the number of samples being tested. This innovative method of fruit segregation will improve the quality of distribution.

This system can analyze the quality of at least two fruits per second, while the number of fruits processed can be increased with further optimizations. The user can select the type of fruit and start the system, where a conveyer belt transports the fruit and a camera captures the image of the fruit once it triggers an IR sensor. This image is processed and the quality of the fruit is then assessed. The quantity and quality of the fruits analyzed can be obtained through a database implemented in server using raspberryPI. These details can be accessed using a GUI based application developed which will be available to the customers who can select the best quality fruit provider.

## 3. Embedded Cane



Embedded Cane is low cost solution to address the difficulties faced by visually challenged persons. Embedded cane will detect the knee above obstacles, pits which may help the visually impaired people to navigate very easily by providing voice alerts and vibrations, which will considerably reduce accidents. Also it helps the user to identify the location. The Embedded Cane

has been implemented using Arduino open source hardware, Ultrasonic sensors, RF Transceivers, vibrator and wave audio player module. When an obstacle is detected, signals will be sent to microcontroller unit, which is pre-programmed to calculate the distance and send appropriate signal to wav audio player to play pre-recorded audio message. The vibrating motor will vibrate if the distance of the obstacle is nearby or less than 40 cm distance. RF Transceivers helps to find the location in the indoor.

### 4. The Embedded Power Supervisor



The Embedded Power Supervisor aims to provide a clear picture of an organisation's electric power usage, considering the heavy equipment and through this data provide an estimate to power consumption. The ultimate goal is to present a user with energy usage information with the hope that they could use this information to optimize and reduce their energy consumption.

The node module of the system is developed using open source hardware Arduino and a NodeMCU. The web based data base system implemented on Raspberry server, which stores the power consumed by each device i.e. the air conditioners in the laboratories.

### Embedded System Based Projects
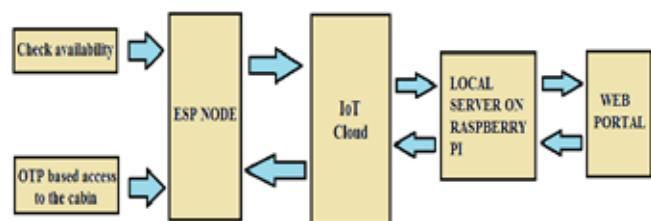


### ENERGY EFFICIENT WSN FOR POWER MANAGEMENT

This project presents a low cost and flexible electrical devices monitoring and control system. As the most power consuming appliances in home/office are air conditioners, NIELIT has implemented the system for ACs.

It employs an embedded micro – web server in Node MCU, with IP connectivity for accessing and controlling the home appliances remotely. These devices can be controlled through a web application or via a web page. The system does not require a dedicated server PC like other similar systems and offers a novel communication protocol to monitor and control the home environment with more than just the switching functionality.
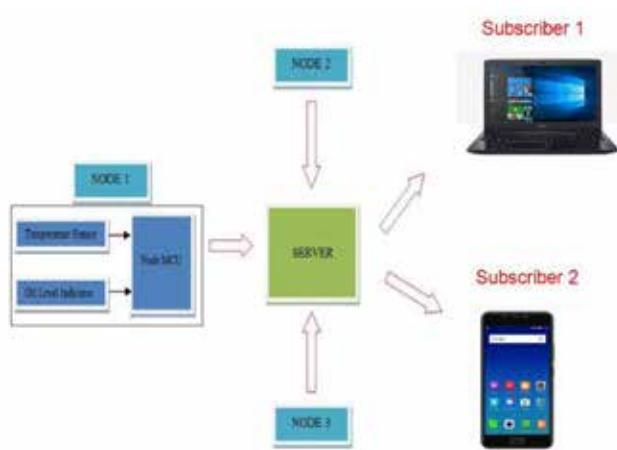
### SMART CABIN

Most of the time in offices, people find it very difficult to meet an official due to some reasons like the official's unavailability, due to rush or may be because the official is attending an important meeting. So, people have to wait for a long time until the official is free to meet. Even though most of the offices provide a log register as well as a token system, people are still feeling inconvenience to meet the desired official. Also, these facilities are more tedious and time consuming as people need to wait for a long time period. The SMART CABIN project solves these issues with a proper visitor management system.

This project aims at demonstrating a concept of smart cabin or cube that can be installed along with existing infrastructure, to meet the requirements. This project is a demonstration of a single model of smart cabin. The system uses Kiosk placed at the entrance of the office which can be used to check the availability of the concerned official. The availability of the concerned official is monitored using embedded system fitted with the chair in the cabin. If the official is available in the cabin and seated then the visitor can submit a request for appointment. The request will be forwarded to the concerned official and he/she can provide an OTP based authentication facility to the visitor if he desires to meet. Once the visitor receives the OTP, it can be used for unlocking the door by visiting the cabin area. This system is able to provide security and OTP based authentication with time limit for usage.
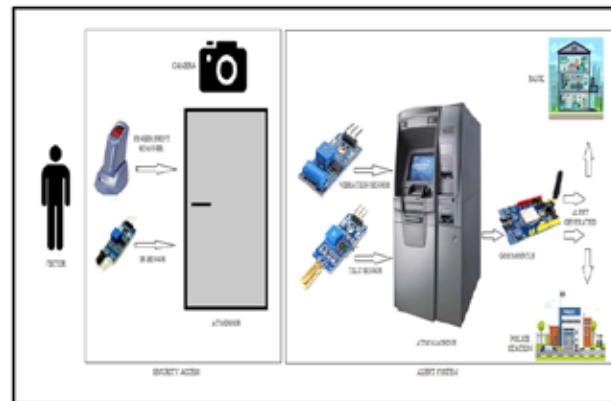
**TRANSFORMER HEALTH MONITORING**



Transformers are an important part of the power distribution system. As a large number of transformers are distributed over a wide area in present electric systems, it is difficult to monitor the condition of every single transformer manually. Monitoring and maintenance of the transformer regularly is the need of the hour as the efficiency of the transformer affect the power distribution.

The Transformer Health Monitoring System is designed to measure the transformer parameters like oil level and Temperature using noninvasive technique. The embedded device attached to the transformer collects this information and continuously transmits to the remote server through Wi-Fi connectivity. By using this information the authorities at remote office can identify transformer condition and take necessary actions to repair if required. Several such nodes can be monitored through the web page by switching the tabs.
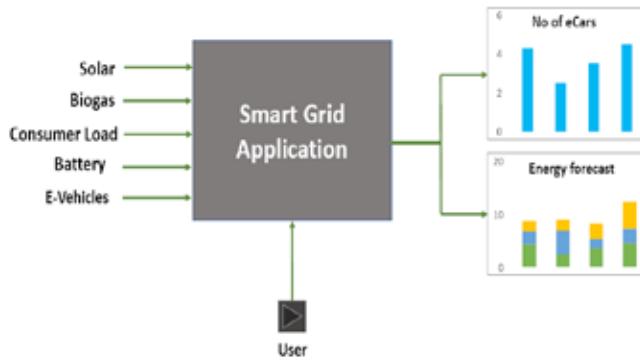
**SMART ATM ACCESS and SECURITY SYSTEM (SAASS)**



In today's modern world, autonomous systems play an important role in our day to day life. As social computerization and automation have drastically increased, the number of ATM Centres have also increased rapidly. Most civilians use ATM's regularly. The main motive of this project is to prevent ATM theft. The SAASS project is designed to avoid/detect ATM robbery and to alert the concerned officials in real time by means of embedded and GSM technology using smart sensors. SAASS consists of Security and Alert
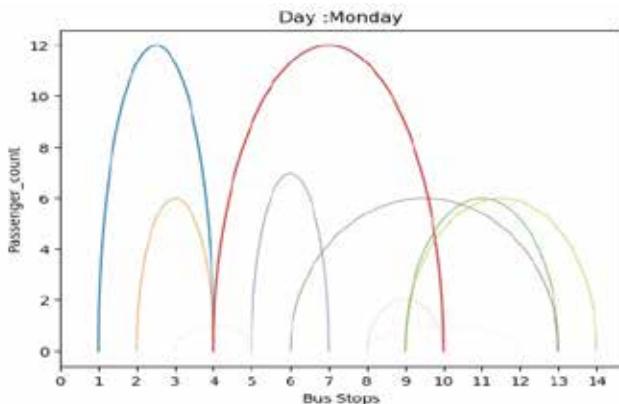
System. While Security System is used to provide the overall security to the ATM machine using camera and Alert System generates an alert to the concerned authorities in case of any tampering.

**Artificial Intelligence Based Projects**
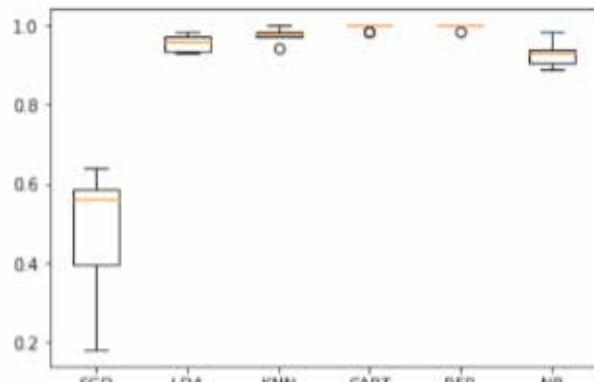


**Communication Intelligence in Smart Grids**

The goal of the project was to establish a comprehensive communication methodology between the load side and the production side from the point of view of an energy distribution network operator of a region, which balances the load on demand side and the production on the supply side using machine learning.



**Machine Learning Based Air Quality Index Forecasting Model**

Dataset related to the various parameters including NO2, SO2, etc. responsible for air pollution and the corresponding data from 1991-2018 and regions were used to develop the model. The model can forecast the Air Quality Index of the regions.



Algorithm Comarison of Classification of AQI

**Analysis, Visualization and Prediction of KSRTC Passenger Flow**
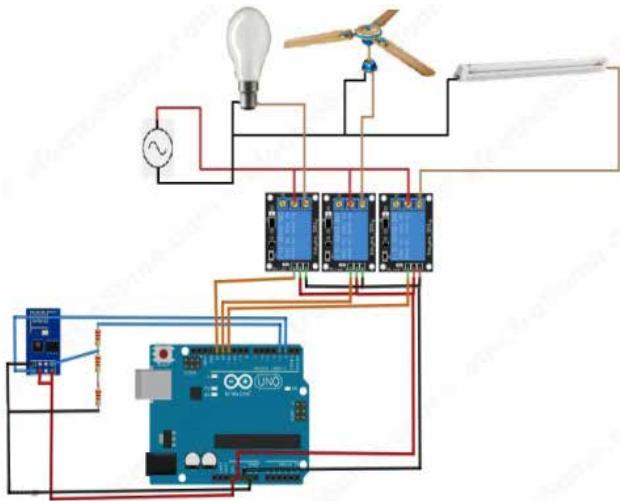
The aim of the project was to optimize the routes and trips of Kerala State Road Transport Corporation by analyzing and visualizing the data received from Bus Ticket Machines. Predicting the future passenger flow using machine learning will help KSRTC in planning and optimizing their routes and trips.

**Electronic Raisin Sorter**



Raisin sorting done manually increases labour cost, time and is less accurate. Electronic raisin sorter is a machine vision system that sorts raisins automatically according to color (4 major colours). Webcam is used to capture images of raisins. These images are processed using MATLAB tool to sort raisins according to their colours.

**Lab Automation**



Automation of Smart Labs like MCC,SDL lab to control lighting, air conditioning, appliances, communication systems, entertainment and home security devices, to improve convenience, comfort, energy efficiency and security.

### 9.8.12   AIR LIVE TALK SHOW

NIELIT Kohima participated in Live Talk Show at All India Radio, Kohima for discussion on information security in English and Nagamese dialect with Shri. L. Lanuwabang, Director I/c, NIELIT Kohima; Shri A. Morimenba Amer, Scientist- 'C' and Shri. Moasunep Kichu, STA as the speakers. Further, a workshop on the topic was conducted for staff of All India Radio and Doordarshan, Kohima.

NIELIT Shimla participated in a Live Phone-in programme of All India Radio and shared skill development activities of NIELIT and various digital initiatives of MeitY. Several people from all over the State called to enquire about various skill development courses in the field of Electronics and Information Technology. Shri Rajiv Aggarwal, Director I/c, NIELIT Shimla and Shri Pratiyush Guleria, Deputy Director, NIELIT Shimla talked in detail about various skill development programmes and schemes of MeitY launched for the benefit of students and citizens.

## 9.9 Software Technology Parks of India (STPI)

**Introduction:**

Software Technology Parks of India was set up in 1991 as an autonomous society under the Ministry of Electronics and IT, Government of India. STPI's main objective has been the promotion of software exports from the country. STPI acts as 'single-window' in providing services to the software exporters. The services rendered by STPI for the software exporting community have been statutory services, data communications services, incubation facilities, training and value-added services. STPI has played a key developmental role in the promotion of software exports with a special focus on SMEs and start up units.

STPI has been implementing the Software Technology Park (STP) scheme and the Electronics Hardware Technology Park (EHTP) scheme for the promotion of IT/ITeS/ESDM industry. The phenomenal success of the IT/ITeS industry has been possible, inter-alia, due to pivotal role played by the STP scheme. STP scheme is a unique scheme, designed to promote software industry and growth of Start-Ups and SMEs without any locational constraints. As on 31st March, 2019, more than 4,164 units are exporting under STPI.

During the FY 2018-19 (till March, 2019), IT/ITeS export earnings from STPI registered units are ₹3,76,726 crore (tentative) and Electronics Hardware export of ₹7,438 crore (tentative) under EHTP scheme.

**STPI Centres**

To provide statutory and incubation services to industry, major thrust was given on the establishment of new centres as well as revamping of existing centres. As on 31st March, 2019, 59 STPI centres/Sub-centres are operational across the country, out of which 51 centres are in Tier II and Tier III cities.

STPI is working closely with the respective State Governments/local authorities for creation of more space, equipped with state-of-art infrastructure facilities, for development of the software industry and increasing exports.

**Services:**

The main services rendered by STPI for the software exporting community are as below:

- **Statutory Services**

  STPI provides Single Window Clearance to software exporters under the STP scheme. STP Scheme provides these units with various fiscal incentives making it a phenomenal success.

- **Incubation Facilities**

  Business and technology incubation stimulate the growth of startups. STPI is offering ultra-modern office facilities to small units and entrepreneurs. Plug-n-Play facilities for startups enable short gestation period. This has encouraged many entrepreneurs to start their own operations and grow in a competitive environment.

- **Datacom Services**

  One of the STPI's remarkable contributions to the software-exporting sector is provision of High-Speed Data Communication (HSDC) services. STPI has designed and developed state-of-art HSDC network called SoftNET for software exporters. Local access to international gateways is provided through point-to-point and point-to-multipoint microwave radios which has overcome the last mile problem and enabled STPI to maintain an uptime more than 99%.

- **Consultancy Services**

  STPI provides consultancy and project management services and turnkey solution to various national and International organisations in the areas of Communication Networks, Network Operation Centres, Network Management Systems, Computerization, e-Governance networks etc. The technology capability coupled with process strengths has enabled STPI to secure a number of projects from time to time.

**India BPO Promotion Scheme/North East BPO Promotion Scheme**

STPI is the nodal agency for implementation of India BPO Promotion Scheme (IBPS) and North East BPO Promotion scheme (NEBPS) under Digital India Initiative. The objectives of the schemes are to create around 1.5 lakh job opportunities for the local youths of smaller towns and also to attract investments in the respective regions for all round development. These schemes will help in creating right ecosystem required for the growth of smaller towns and bring prosperity to those locations.

The schemes provide financial support along with several special incentives like encouraging employment to women and physically disabled persons, setting up operations at other than State Capitals, promoting local entrepreneurs etc. upto 1 lakh/seat in the form of Viability Gap Funding (VGF). The selection of eligible companies to set up BPO/ITeS operations under IBPS and NEBPS is through online bidding process. Around 48,300 BPO/ITeS seats have been provisioned across State(s)/UT(s) under IBPS and 5,000 seats for BPO/ITeS Operations in North East Region under NEBPS.

Under IBPS, till 31st March, 2019, 189 companies have been declared successful to setup BPO/ITeS operations for 51,297 seats distributed around 109 locations covering 20 States and 2 UTs.

Under NEBPS, till 31st March, 2019, 1,625 seats have been allocated to 15 successful bidders to setup BPO/ITeS operations covering 6 States of NER (Assam, Nagaland, Meghalaya, Manipur, Tripura and Arunachal Pradesh).

**Electropreneur Park**

Electronic System Design and Manufacturing (ESDM) is one of the fastest growing sectors of the Indian economy. In order to support the new entrepreneurs of this industry, STPI in association with University of Delhi and Indian Electronics and Semiconductor Association (IESA) has set up an Electropreneur Park in the Delhi University campus.

The initiative will support 50 startups in ESDM space and aims to create at least 5 global companies over a period of five years. The park will focus on local IP creation and indigenous product development resulting in increased domestic value addition and will witness a unique integration of academia, industry, Government and other incubative supportive elements. The initiative is first of its kind in the industry and it is likely to set a role model, which may go a long way in the annals of incubation centre.

Till 31st March, 2019, three seasons of invitation for proposals and selection of startups has been completed with 18 beneficiaries. There has been a significant achievement by the startups during this period where they were able to take the product to the next step by filing national patents. 18 IPRs have been filed by the startups and 19 new products have been created. The startups at EP continue to scale new heights and have carved a niche for themselves in the country's ESDM landscape.

**Centre of Excellences (CoEs)**

To ensure India builds leadership in the emerging sectors of IoT, BlockChain and FinTech, Artificial Intelligence, Augmented and Virtual Reality, Medical Electronics and Healthcare, Gaming and Animation, Machine Learning, Data Science and Analytics, Cyber Security, Chip Designing, ESDM, etc and to build next wave of budding entrepreneurs, CoEs are being setup in collaborative approach by STPI across the country and STPI shall act as single-window facilitation centres to extend requisite lab support, funding and mentoring. The CoEs will have dedicated Chief Mentor and eminent experts who would also act as brand ambassador of particular CoE. Currently, STPI has taken-up establishment of 11 domain-specific CoEs spread across country viz. Bengaluru, Bhubaneswar, Chennai, Mohali, Guwahati, Lucknow, Gurugram, Patna, Pune & Hyderabad. More such CoEs are in pipeline. Substantial progress in terms of implementation has happened for 6 CoEs viz. STPI IoT OpenLab at Bengaluru, ESDM Incubation Centre at Bhubaneswar, VR/AR CoE at Bhubaneswar, Fintech

CoE at Chennai, Big Data, AVG and IoT CoE at Mohali and Automotive CoE at Pune.

**Promotion of Small and Medium Entrepreneurs by creating a conducive environment in the field of Information Technology**

STPI has been promoting SMEs and their cause by offering incubation services, organizing events, sponsoring/co-sponsoring events, participation in events and export promotion efforts. Some of the major events in which STPI participated/sponsored includes:

- 105th Indian Science Congress from 16-20 March, 2018 at Imphal

- 14th India Innovation Summit 2018 from 12th- 13th July 2018 at Bengaluru

- INFOCOM- The Telegraph Advantage Odisha 2018 on 23rd June 2018 at Bhubaneswar

- TiEcon Chandigarh 2018 from 8th-9th March, 2018 at Chandigarh

- Global Exhibition on Services (GES) 2018 15th – 18th May, 2018 at Mumbai

- SRISHTI-2018 from 22nd – 24th May, 2018 at Bengaluru

- INFOCOM Delhi on 18th July 2018 at New Delhi

- INNOG 2018 from 27-30 August, 2018 at New Delhi

- CONNECT 2018 at Chennai from 09th-10th October 2018 at Chennai

- Digital Rajasthan Conclave on 29th August 2018 at Jaipur

- INFOCOM 2018-Calcutta from 06th-08th December 2018 at Kolkata

- TiEcon Chandigarh 2019 on 16th February 2019 at Chandigarh

- Conclave on "Sustainable Development Models for Hilly States in New emerging India" during 02-03 March 2019 at Shimla

- Global Economy Zones Expo & Convention 2019 during 27-29 March 2019 at New Delhi

## 9.10 Digital India Corporation (DIC)

### 9.10 .1. Introduction

Digital India Corporation (DIC) is a not-for-profit Company set up under Section 8 of the Companies Act, 2013 by MeitY, with an aim to bring the benefits of Information and Communication Technologies (ICT) to the common man and the needy. 'Innovation for Digital Inclusion' is its vision.

The Board of the Company is chaired by Hon'ble Minister for Electronics and IT with other Directors being Hon'ble MoS for MeitY; Secretary, MeitY; AS and FA, MeitY; Former President, NASSCOM and other eminent members from industry and academia.

The Company is engaged in the areas of livelihood enhancement (Agriculture, CAD tools for artisans, ERP for SMEs etc.), healthcare and empowerment of Persons with Disabilities (PwDs). In this endeavor it is working with Government (user Departments/ Ministries), R&D Institutions, academia, industry, NGOs and other organisations/industries.

National e-Governance Division (NeGD) is a business division within DIC to take up programme management of the National e-Governance Plan (NeGP) of MeitY. MyGov (a platform for citizen engagement towards good governance in India) is another business division within DIC.

The Company focuses on 'Lab to Land' and 'Early Harvest' projects useful for the masses.

### 9.10 .2 Achievements during 2018 - 2019

#### 9.10.2.1 ICT Based Integrated development programme for women empowerment in Lallapura Craft cluster of Varanasi (Uttar Pradesh)

The project is being implemented with the support of MeitY (under IT for Masses scheme) for skill improvement, livelihood enhancement and health awareness to the women/girls in cluster. The project activities include providing training to women on digital designs using Computer Aided Design (CAD) software Chic™, e-Commerce, online marketing, brand value of the products, retail management and entrepreneurship development. An ICT based Resource Centre (ICTRC) has been setup for this purpose with requisite hardware and software and infrastructure. 3,591 persons have been benefited against the target of 3,500 beneficiaries from the trainings/awareness provided under the current phase of the project with following skill-wise breakup:

- Chic™ (CAD tool for Crafts) - 516
- e-Commerce - 510
- Enterprise Development Programme (EDP)  - 505
- Health Awareness Programmes- 2060

In addition, 36 awareness building/sensitization programmes have been conducted and 595 khaka patterns have been prepared.

#### 9.10.2.2 Skill Enhancement and Health Awareness via Knowledge Transformation using ICTs for Women Empowerment in Bithoor Cluster of Kanpur – Bithoor Shakti

The project has been implemented with the support of MeitY (under IT for Masses scheme) to enhance the skills, productivity and livelihood of identified women artisans engaged in Zari and Zardozi work using Computer Aided Design (CAD) software viz. Chic™. The project was aimed to empower the adolescent girls and women in and around Bithoor by providing awareness and counselling on issues viz. health and hygiene, education, career and social security etc. The no. of women/girls, benefitted under the project, are as follows:

Training Session at the Centre


Design on Cloth


Finished Products showcasing at the Centre


'Joint Secretory Mr. Jaydeep Mishra, drawing designs throughout Chic™ cad tool during his visit of centre


Centre visit by Ms. Shushila Chintala, GM, Nabard, Head Office Mumbai


Women Artisans receiving training on Advance Embroidery Design


Health and Hygiene Awareness to Adolescent Girls under the project

| Sr. No. | Training Programme | Target | Achieved |
|---|---|---|---|
| 1 | Chic™ (CAD tool for Crafts) | 1,000 | 1,001 |
| 2 | Entrepreneurship Development Programme (EDP) | 300 | 300 |
| 3 | Women Health Awareness | 1,500 | 1,520 |
| 4 | Adolescent Awareness Program | 1,900 | 1,969 |
| | **Total** | 4,700 | 4,790 |

In addition, more than 1,000 designs have been created by women trainees.
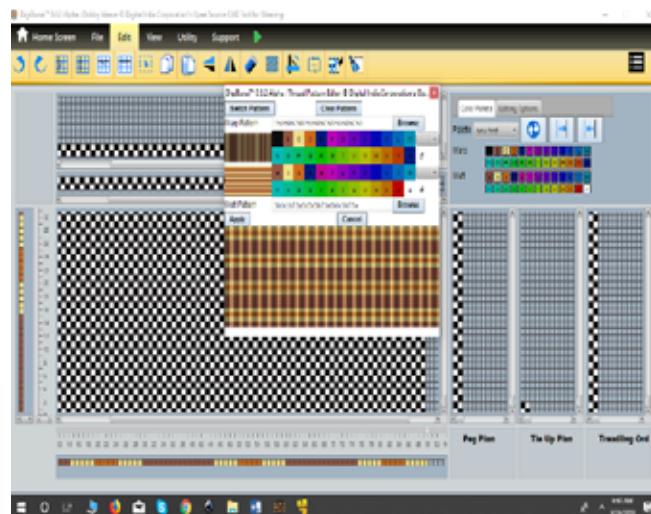


Products Created under the Project

### 9.10.2.3 DigiBunai™ - "An Open Source CAD Tool developed for Weaving of Banarasi Sarees"
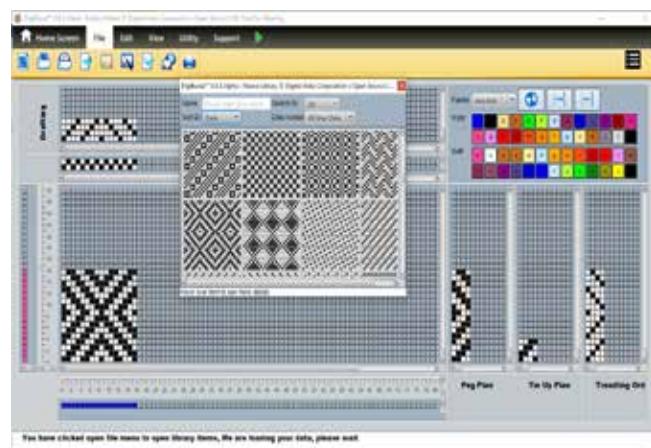
DigiBunai™ optimizes the pre-loom loading process of design creation, graph generation and punching the jacquard cards with the ability to view the complete garment digitally along with various color, design and size combinations before weaving. The tool has been developed under the aegis of MeitY. The project review group included the representation from the O/o DC (Handloom), Weavers Service Centre (WSC) Delhi/Varanasi, IIT-Delhi, and Indian Institute of Carpet

Technology, Badohi. With the support from O/o DC-Handloom (Ministry of Textile, Government of India), the application has been pilot tested at WSC-Varanasi and its 4 Common Facility Centres (CFCs) with the active engagement of weaving community.
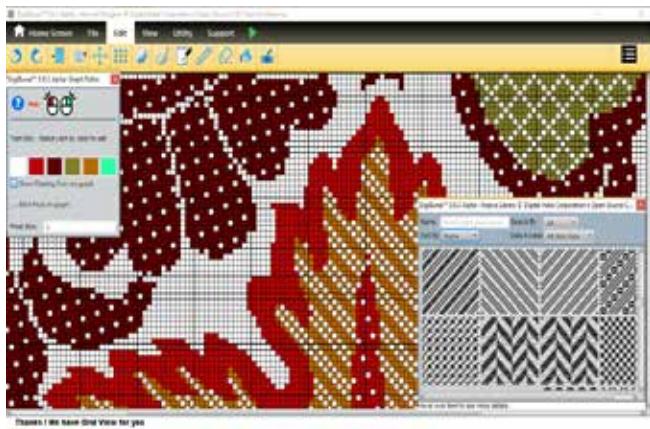


DigiBunai™ helps both Dobby and Jacquard users:

**Dobby Module** provides the facility for creating different types of innovative weaves with various editing facilities to generate the complex weave patterns. User can use these weave patterns to generate various fabrics with multiple yarn color combinations. The module provides 2D visualization of yarn interlacements in fabric. It also provide auto yarn color pattern generator to fabric. It facilitates exporting the weave & fabric with constructional parameters.
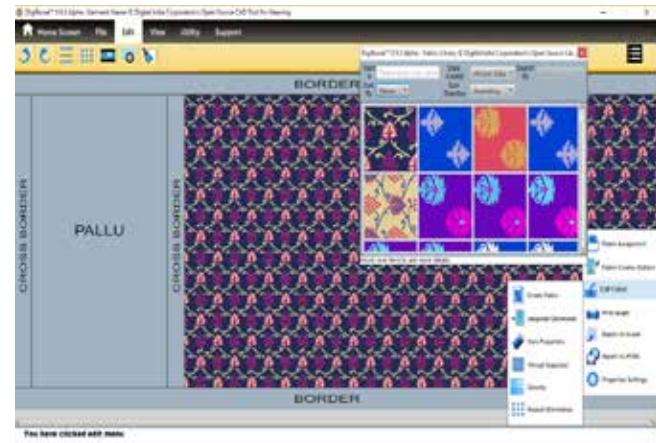
**Jacquard Module** facilitates producing workable jacquard designs with base fabric. These designs can be developed from the paper drawing or can be created directly on software as per loom specifications. User can fill multiple weave patterns in design (shape/color based) and generate various graphs for card punching (Manual, Piano and Electronic Punching Machine) and weaving requirements. It also provide facility to customized the yarn parameters (color/density) and design orientations like mirroring, tilting, rotation, design drop, etc. on fabric visualization.



The created fabric can be visualized on different portions of garment with multiple editing facilities. The layouts of garments are customizable according to users' requirements. Users can save the layouts in CAD library for future use. The created garment layout can be exported with their constructional parameters for the buyers' approvals and marketing purposes.



User Groups of DigiBinai™ application:

- **Designers:** For creating digital designs (focus on re-use and reproduce)

- **Graph Makers:** To add the weaves in design and generating the graph (use the weave library to generate the graph for printing and computerized punching)

- **Card punching vendors:** By generating output compatible with the computerized jacquard card punching machine.

- **Master weavers:** By rendering/showcasing the complete garment digitally with various color, design and size combinations before weaving (reduce the expenses of creating samples before getting orders from the customers)


DC Handloom advising for further development and deployment


DC Handloom advising for further development and deployment

- **Next Generation:** To teach them the concept of designing, weaving, creating layouts and jacquard card punching practically (create interest through Computer Aided Textile Design application)

Development Commissioner (Handlooms) reviewed the tool on 10/05/2018 at CFC, Cholapur and WSC, Chowkaghat in Varanasi and appreciated the work. He advised to scale-up the deployment to other weaving clusters.

### 9.10.2.4 Setting up of Rural Women Technology Park at Basani, Varanasi

The project is being implemented with the support of Department of Science and Technology (DST) under its Science for Equity, Empowerment and Development (SEED) scheme to set up a Rural Women Technology Park (RWTP) for Women Empowerment through Skill Enhancement, Entrepreneurship Development and Providing Market Linkages Using ICT. The activities include training on Chic™ (Computer Aided Design tool for crafts) for digital designs creation, Retail management, food processing and health awareness.

The project with a duration of 3 years started in April 2018 with target of 6300 beneficiaries. During the year, the food processing lab has been constructed, all requisite capital equipment (hardware and software) have been procured and installed, manpower has been recruited, training programmes have commenced. In addition, a web portal and web application have been put up to monitor the activities of Centre. So far, 70 women have been trained on Chic™ CAD for making digital designs, 14 on retail management and 150 beneficiaries have participated in health awareness programmes. More than 200 designs have been created by women trainees.



Women Artisans receiving training on Embroidery Designs using Chic™ CAD with hands-on experience

### 9.10.2.5 'Interactive Information Dissemination System (IIDS)'

IIDS is a pull and push based system currently being used for delivery of agro-advisories. It is a combination of Smart Phone Application, Interactive Portal and Interactive Voice Response System. There is a mobile interface at front end and web interface at back end. Data is transmitted through voice, text, images and videos from both ends (farmers to experts and back).



Senior Director, DIC receiving Technology Sabha Award from Sh. J. Satyanarayana IAS, Former Secretary MeitY; IT Advisor, Government of Andhra Pradesh and Chairman, UIDAI

IIDS has become a useful tool in enhancing the outreach of agriculture universities and Institutions. It enables farmers to interact directly with local agro-scientists in their native languages (currently Telugu in AP and Telanagana and Khasi and Garo in Meghalaya). The experts have access to knowledge and farmer database. It enables them to understand the farmers and appreciate their field problems in a better way - Know Your Farmer (KYF).

IIDS has been integrated with push based 'Text and Voice' message services under National Mobile Governance Initiative of MeitY. So far, 6878 text messages and 883 voice messages in local languages (Telugu, Khasi and Garo) have been pushed on various needs of the registered farmers. AKPS Mobile App has been implemented under UMANG platform of MeitY.

IIDS has been chosen as one of the winners for the prestigious 'Technology Sabha Award (Category – Enterprise Mobility)' by The Indian Express Group.

Deployments of IIDS during the year 2018-19 is as given below:

A. **Annapurna Krishi Prasaar Seva (AKPS):** IIDS is deployed as AKPS along with Acharya N G Ranga Agricultural University (ANGRAU) and Prof Jayashankar Telangana State Agricultural University (PJTSAU) in 22 districts of Andhra Pradesh (AP) and Telangana.

Progress made during FY 2018-19 is as follows:

Technical support for AKPS services continued for F.Y. 2018-19 on requests from ANGRAU and PJTSAU. During the year, 20,334 new farmers were registered for services and a total of 59,833 farmers were registered. 4,348 queries received from farmers on Agriculture, Animal Husbandry and Fisheries have been resolved by KVKs/DAATTCs Scientists/Experts through toll free number. Need based 63.42 lakh text and 20.34 lakh voice messages were sent by Krishi Vigyan Kendras (KVKs) and District Agricultural Advisory

and Transfer of Technology Centres (DAATTCs) to their respective farmers.

Dr. B. K. Murthy, Scientist 'G 'and Group Coordinator, MeitY visited one of AKPS centre at KVK, Amadalavalasa, Srikakulam district and interacted with beneficiary farmers (15). Farmers thanked IIDS team for the advisory services provided and suggested to provide additional information related to market rates and Government schemes through text/voice messages frequently to their mobiles.

B. **Mobile based Agro Advisory System for North-East India (m4agriNEI)**

DIC has signed an MoU with Government of Meghalaya (GoM) for implementation of IIDS with their integrated programme for Connecting Farmers to Market viz. 1917iTEAMS. GoM has established a 45 seater Agriculture Response Centre (ARC) at Shillong using DIC's IIDS2.0 platform. The existing communication infrastructure of DIC established at its Mumbai office is being used for programme implementation.

During the year, 3,096 new farmers from Meghalaya were registered under the project and with this the total no. of registered farmers has reached 16,741. 3,109 queries of the farmers were resolved by i1917iTEAMS. Need based 6.7 lakh text messages have been sent to farmers in Khasi and Garo dialects.

### 9.10.2.6 "Punarbhava™" (www.punarbhava.in) - Web portal for 'Divyangjan (Persons with Disabilities)'

The web portal facilitates all the information related to different disability issues at one place for Divyangjans, NGOs, professionals, policy makers, students, parents, community workers, parents and other stakeholders in the field of disability. The portal is accessible as per W3C guidelines. It also has a font resizer and color switcher options for accessibility. The information on portal is segregated under different sections, such

as, Disability Register, Legal Instruments, Resources, Careers, Assistive Devices, Blogs, Accessible Content, Latest News, Events, Employment Opportunities, Publications, Useful Links, National Institutes, and feedback etc. The portal is regularly updated and receives 12,000 average daily hits. The framework and design of the portal has been upgraded and made mobile compatible with the support of Department of Empowerment of Persons with Disabilities (PwDs), Government of India under its 'Awareness Generation and Publicity (AGP)' scheme.

### 9.10.2.7 "Punarjjani™" (www.punarjjani.in) – Web based bilingual (Hindi and English) tool to assist special teachers in assessment of children with intellectual disabilities (IDs)

Three standard methods widely used manually for regular assessment of children with MR in the age group 6-18 years viz. FACP (Functional Assessment Checklist Programming), BASIC-MR (Behavioral Assessment Scale for Indian Children with Mental Retardation), MDPS (Madras Development Programming System) have been digitalized and integrated. The tool assists special teachers in easy and quick assessment of children with IDs in structured way and hence saves

their time. Teachers can devote more time with children in developing their skills. 846 special teachers representing 501 special schools and 122.

Sarva Shiksha Abhiyan (SSA) blocks from around 150 cities/towns of 28 States/UTs throughout the country have been trained and provided access to the tool. The progress made during the year is as follows:

- The tool was presented and demonstrated during Accessible India Campaign and Unique Disability ID Card (UDID) meeting of District Welfare Officers of Maharashtra State Chaired by the State Commissioner for Persons with Disabilities (PwDs),

Government of Maharashtra in Pune.
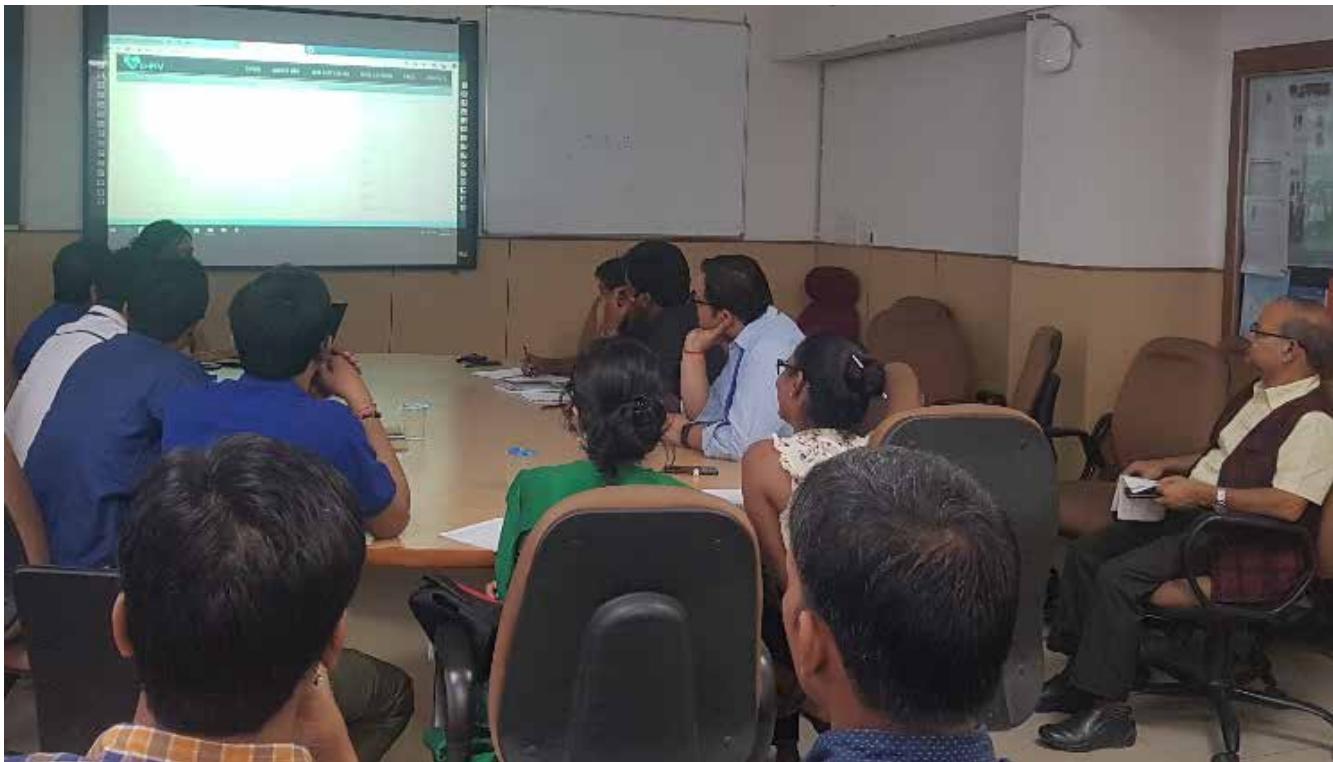
- A presentation on tool was made before Selection Committee for National Awards for Empowerment of PwDs.

- The tool was exhibited during 'Empower 2018 (An Assistive Technology Conference)' organised by IIT-D in Sonipat (Haryana).

- The tool won 'Digital Leaders Award for Excellence' from Express Computers (The Indian Express Group).

### 9.10.2.8 Centralized System for Heart Rate Variability (cHRV) Analysis System

The project is being executed in collaboration with AIIMS, New Delhi with objective to make HRVA technology available at remote places to digitally empower healthcare professionals across the country. HRV is an important human body performance indicator



cHRV User Interface and Statistics

IBRO Workshop on cHRV
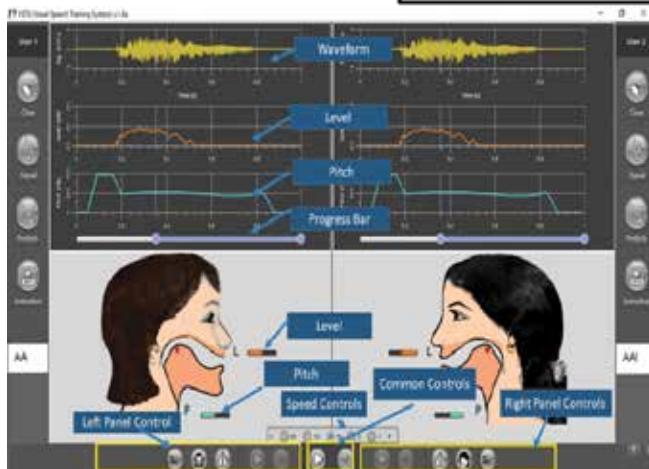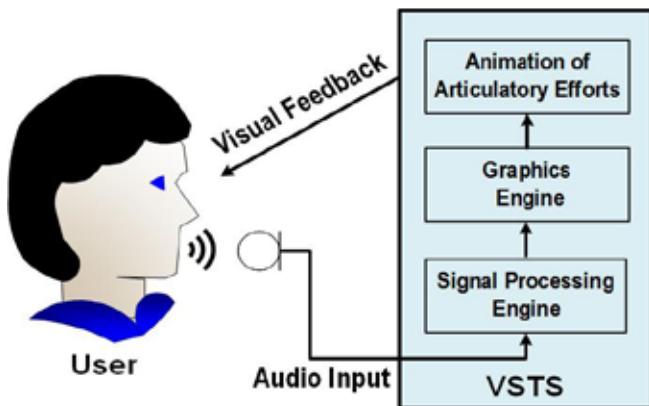
to assess the role of autonomic nervous system fluctuations in healthy individuals and patients. It offers prognostic information independent of and beyond that provided by traditional risk factors. Centralized HRV empowers medical community through reproducible and collaborative research platform developed using Open CPU and R. The system creates database on HRV and associated health for benchmarking, clinical utility and policy making.

During the year, the system has been customised with additional features viz. Inter and Intra Institutional Consultation and Data Sharing, Multiple Data File Analysis, HRV Trends of Individual and Patients, Optimization of HRVinR Package etc. The application is running on a DIC server in its Mumbai office. So far 20 medical organisations have registered across the country. Project proposal on Centralized HRV Analysis System and Building National Level Database was presented in the Working Group on Medical Electronics and Health Informatics of MeitY on 25th May 2018.

cHRV application was demonstrated in the Workshop on Autonomic Function Testing in the 5th National Conference of Association of Physiologists of India, Pramukhswami Medical College, Karamsad, Gujarat during 26th to 29th Sep 2018 and in the International Brain Research organisations Workshop by AIIMS New Delhi during 15-31 October 2018.

### 9.10.2.9 Visual Speech Training Software (VSTS) for children with Hearing Impairment (HI)

VSTS is a computer-based speech training system which uses information obtained by speech signal analysis to provide a visual feedback of efforts involved in speech production. It has been developed to be used as a speech training aid to assist in acquisition of correct articulatory efforts by children with HI and second language learners. It can also be useful to speech therapists and speech training professionals as an analysis and diagnostic tool. The software has been developed in collaboration with IIT Bombay with support from MeitY.

During the year, the system has been customised and devised VSTS v.1.6 and VSTS v.1.6a with additional features viz. User Interface Enhancement, Speech Signal Acquisition and Recording, Audio-Visual Animation, Image Editor, Code Conversion MATLAB to Java etc.



VSTS at YMCA's School of the Deaf, Pune

Presentation/demonstration of VSTS v.1.6a was made on August 23, 2018 in the Accessible India Campaign and UDID meeting of District Welfare Officers of Maharashtra State chaired by the State Commissioner, Persons with Disability (PwDs), Government of Maharashtra in Pune. Deployment of VSTS and Punarjjani across the State is being considered by the State Commissioner. VSTS application was showcased in the 'EMPOWER 2018'– Assistive Technology Conference organised by Indian Institute of Technology, IIT Delhi in Sonipat.

### 9.10.2.10 Information Technology Research Academy (ITRA)

ITRA is an enabling programme initiated by MeitY to help build a national resource for advancing the quality and quantity of R&D in Information and Communications Technologies and Electronics (IT for brevity) and its applications in IT and related institutions across India. Implementation of the five year 'ITRA project' with a total outlay of ₹148.83 crore was entrusted to DIC in Nov 2010. ITRA is operating as a division of DIC.

ITRA is designed to produce a large numbers of IT researchers who are well equipped with the latest IT knowledge, educated in relating classroom knowledge to developing solutions, trained to spot problems amenable to IT solutions, motivated to identify societal problems in IT and other domains, and exposed to mechanisms for converting lab solutions to working prototypes. ITRA activities are aimed at a major increase in the national capacity of producing PhDs who could become faculty in academic institutions and address the needs of the industry and society at large. ITRA uses the following mechanisms for enhancing the quality of R&D at institutions:

a) Eminent experts are invited to nurture R&D teams in emerging areas and collaborate with ITRA institutions/faculty

b) Fellowships, awards, professorships, etc., are given to recognize performance

c) Researchers are exposed to state-of-art facilities, best practices and mentorship

d) Programmes are formulated to promote creativity and innovation through nurturing societal sensitivity

e) Mechanisms are defined to transfer deserving technologies developed by the teams to companies, etc.

ITRA has so far taken up projects in three focus areas, viz.

i) "Mobile Computing, Networking and Applications (ITRA-Mobile)";

ii) "IT based Innovations in Water Resources Sustainability (ITRA-Water)"; and,

iii) "IT based Transformations in Indian Agriculture and Food (ITRA-AgandFood)

### ITRA–Mobile:

ITRA in the research area ITRA-Mobile targets applications of IT in healthcare, transport and disaster management. ITRA-Mobile projects are running in 31 institutions, involving 64 faculties and 98 Ph.D. students.

During FY 2018-19, ITRA-Mobile research community has published 12 research papers in conferences and journals of international repute; number of courses were developed/modified and several workshops were conducted at associated institutions.

ITRA-Mobile teams are working on 11 proof of concept (PoC) prototypes and technologies having potential for commercialization (start-ups or ToT). PoC teams were invited at various venues to showcase their technology to domestic and international investors and other potential stakeholders where these technologies were highly appreciated. Three startup companies have been registered out of the 17 technology prototypes viz. "SALCIT Technologies Pvt. Ltd.", "Formative Resilience Know-How Private Limited (ForkIT)" and "NexConnect".



ITRA-Technology Prototype 'Surakshit': Knowledge dissemination to CISF fire fighters at Alloy Steel Plant Durgapur, West Bengal



ITRA-Technology Prototype 'Surakshit': Cyclone Disaster Mock Drill, Sandeshkhali, Sundarban, West Bengal

### ITRA-Water:

ITRA in this research area is focusing on the multifaceted challenge of sustainable access to water for all sectors. ITRA-Water projects are running in 23 institutions, involving 33 faculties and 38 Ph.D. students.

During FY 2018-19, ITRA-Water research community has contributed to research publications in conference/journal of international repute making them count to more than 96 till date; a number of courses were developed/modified and several workshops were conducted at associated institutions. A monsoon

school was conducted at IISc Bangalore during July 2017, where eminent experts from India and abroad, along with other participants from SAARC countries participated.

ITRA-Water teams are working on five proof of concept (PoC) prototypes and technologies having potential for commercialization (start-ups or ToT). PoC teams were invited at various venues to showcase their technology to domestic and international investors and other potential stakeholders where these technologies were highly appreciated. A weather/rainfall forecasting technology developed by IIT Gandhinagar under ITRA-Water Project M2M is being successfully used by IMD (India Meteorological Department) Government of India and is launched on their website.

**ITRA-AgandFood:**

ITRA in its third research area ITRA-AgandFood aims to create collaborative, multi-institutional, inter-disciplinary teams to catapult the state of agriculture and food in India using IT, into a new orbit of productivity. Two R&D team projects on various aspects of pigs and goats in North East India, were initiated at 14 institutions comprising 45 researchers. Amongst multiple achievements of the ITRA-AgandFood projects, following are some technologies to name a few:

- An android application named SwineApp covering all the aspects of pig husbandry practice was developed and launched at Google Play Store.

- A multi-purpose restraining tool for goats and pigs developed and applied for patent

- A low cost retinal imaging system has been developed for capturing retinal image of goats

- Breed identification was successfully carried out for both pigs and goats by using Tensor Flow Neural Network for large dataset.

- Income generation for the goat farmers has been initiated by UBKV West Bengal through formation of Goat Farmers' Federation in Cooch Behar District.

**New focus areas:**

Based on the recommendations of Secretary MeitY, ITRA is in the process of initiating new focus area related to food safety, cyber security, IoT etc.; where collaborative, multi-institutional, inter-disciplinary teams would be dealing with the ground problems of the areas.

### 9.10.2.11 Visvesvaraya PhD Scheme for Electronics and IT

MeitY has entrusted DIC with implementation of Visvesvaraya PhD Scheme to enhance the number of PhDs in Electronic Design and Manufacturing (ESDM) and IT/IT enabled Services (ITeS) sector. The objective is to support 3,000 additional PhDs students (1,000 full time + 2,000 part time) in ESDM and IT/ITeS and to support 200 Young Faculty to encourage and recognize their work in research and technology development.

**Status of the implementation of the Scheme:**

- 1,076 full-time and 700 part-time PhD seats have been allocated so far to 95 academic institutions in 27 states and 3 UTs in India where 954 full time and 213 part-time PhD candidates are enrolled

- 154 'Young Faculty Research Fellowship (YFRF)' awarded.

- The PhD scholars are pursuing research in the emerging technology areas viz. Big Data, Blockchain, Machine Learning, Artificial Intelligence, Internet of Things, Cloud Computing, Cyber Security, Mobile communication, 5G communication, Quantum Computing, VLSI Design, Medical Electronics, Biotechnology, etc.

- 1,633 Research Papers have been published by the Research Scholars

- 84 PhD candidates have attended international conferences

- The 2nd review workshop "Technical Planning and Evaluation Meet and Workshop" of the 128 awardees of YFRFs of the Visvesvaraya PhD
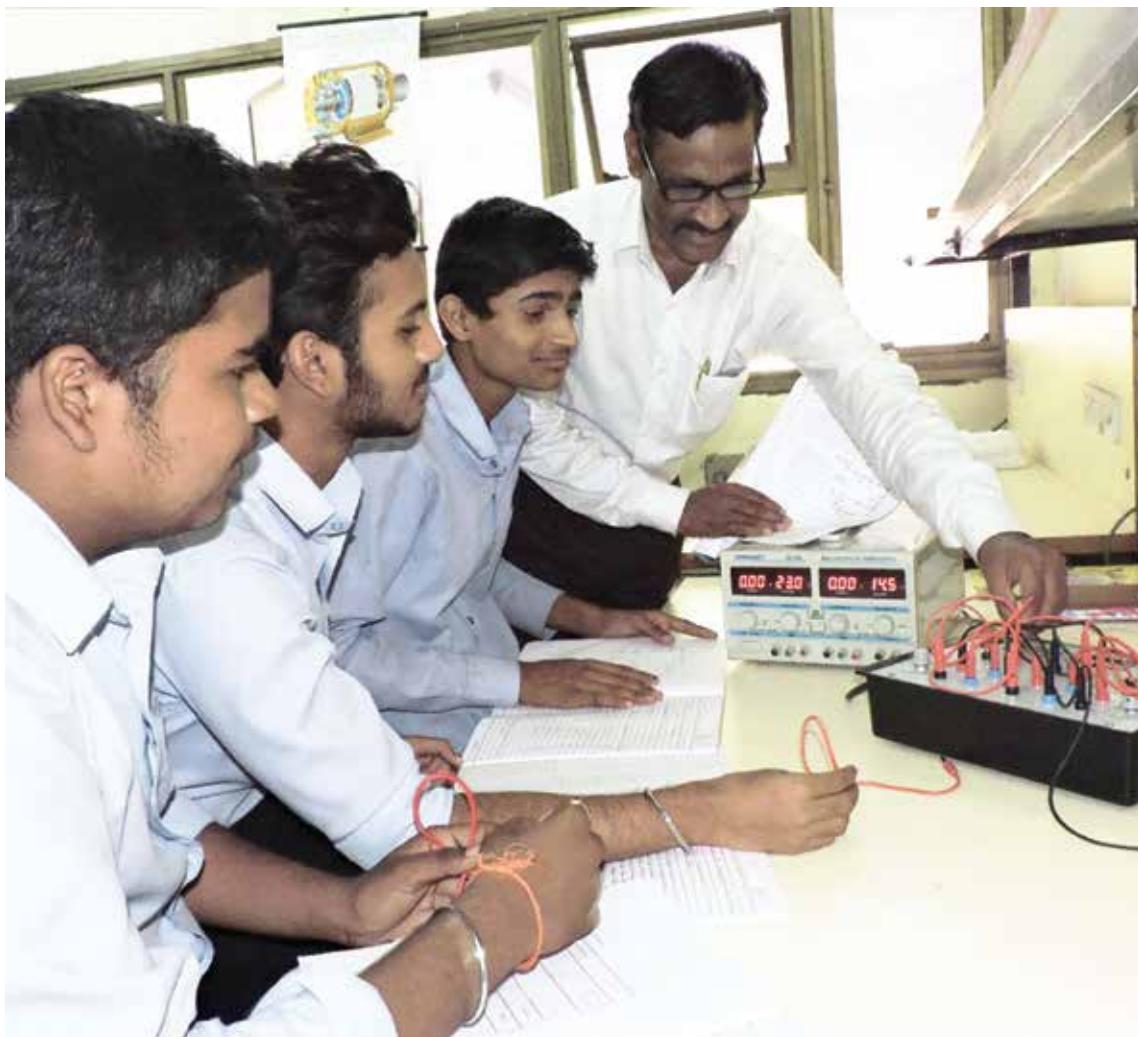
Programme was held on 28th–29th May 2018 at IISc Bangalore. 89 Awardees of Young Faculty Research Fellowship attended the workshop who formed research groups as per their areas of research.

- **4th Research Workshop for the PhD Scholars** was held at MNIT Jaipur during 13th - 15th Sep 2018:

  - 176 PhD candidates from 47 institutes submitted abstracts of their research works. With the help of awardees of YFRF under the scheme, 17 PhD Research Fellows out of 176 PhD candidates were shortlisted. These shortlisted PhD fellows were invited along with their guides to present their work in the workshop.

- Research Papers of Visvesvaraya PhD Scholars were published in 2 exclusive issues of CSI Transactions on ICT Journal published by Springer during the year March 2018 and June 2018.

- Portal http://phd.medialabasia.in

  - It is used for monitoring of the scheme, news/alerts etc.

  - Research Scholars and YFRFs are encouraged to upload the details in the portal after due verification by Nodal Officer/Institution.

  - Portal is being enhanced to facilitate fund release process and communication with institutions.

# Chapter 10
# Other Matters



## 10.1 Use of Official Language Hindi in official work

In order to promote the use of Hindi in official work in the Ministry, a Monthly Incentive Scheme has also been started in addition to Annual Incentive Scheme for Noting and Drafting in Hindi. Under this Incentive Scheme, there are five prizes of ₹500/- each and officers/employees writing at least 2,000 words in Hindi during the month can participate in this Incentive Scheme.

Hindi Pakhwada was organised by the Ministry during September 2018. During this period, many competitions were held and winners were awarded. Prize money of the awards has been enhanced substantially to encourage participation.

Committee of Parliament on Official Language visited C-DAC, Mohali and NIC, Mumbai to carry out the inspection regarding implementation of official language policy and use of Hindi in official work in these offices.

To ensure the implementation of official language policy in the offices under the administrative control of this Ministry, official language inspection was done at STPI, Mohali; NIELIT, Mohali; ETDC, Mohali and SAMEER, Mumbai.

During the period under report, various important Ministerial documents like Annual Report, Performance Budget, Outcome Budget, various Cabinet Notes,

Notes for Parliamentary Standing Committee, Parliamentary Question-Answers, Demand for Grants, follow-up action reports, monthly report for Cabinet and miscellaneous documents were translated from English to Hindi.

## 10.2 RTI Matters

There is a  RTI Cell in the Ministry, which is the central receiving point for RTI applications/appeals and responsible for overall coordination in respect of RTI matters of MeitY and its organisations. MeitY and its Attached/Subordinate Offices/Societies are separate Public Authorities in terms of Section 2 (h) of RTI Act, 2005.  Each of these Public Authorities have its own. Central Public Information Officers (CPIOs)/Appellate Authorities (AAs).  For any information relating to these organisations, applications need to be submitted to the concerned Public Authorities as per provisions of RTI Act, 2005.   All Public Authorities have also hosted relevant inputs/documents on their respective websites, as required under Section 4 of the RTI Act. The relevant contents are reviewed and updated periodically by the concerned Public Authorities.

During the year 2018-19, 2084 RTI applications (1,703 online and 381 physical) were received in this Ministry. 121 numbers of appeals (92 online and 29 physical)

also received during the year 2018-19. The applications received were related to MeitY and organisations under it. Aadhaar, Cyber Law, Social Media, Digital Payment, e-Governance, online gaming and internet websites were the main subjects on which large number of RTI applications received during the year 2018-19.

## 10.3 Public Grievances
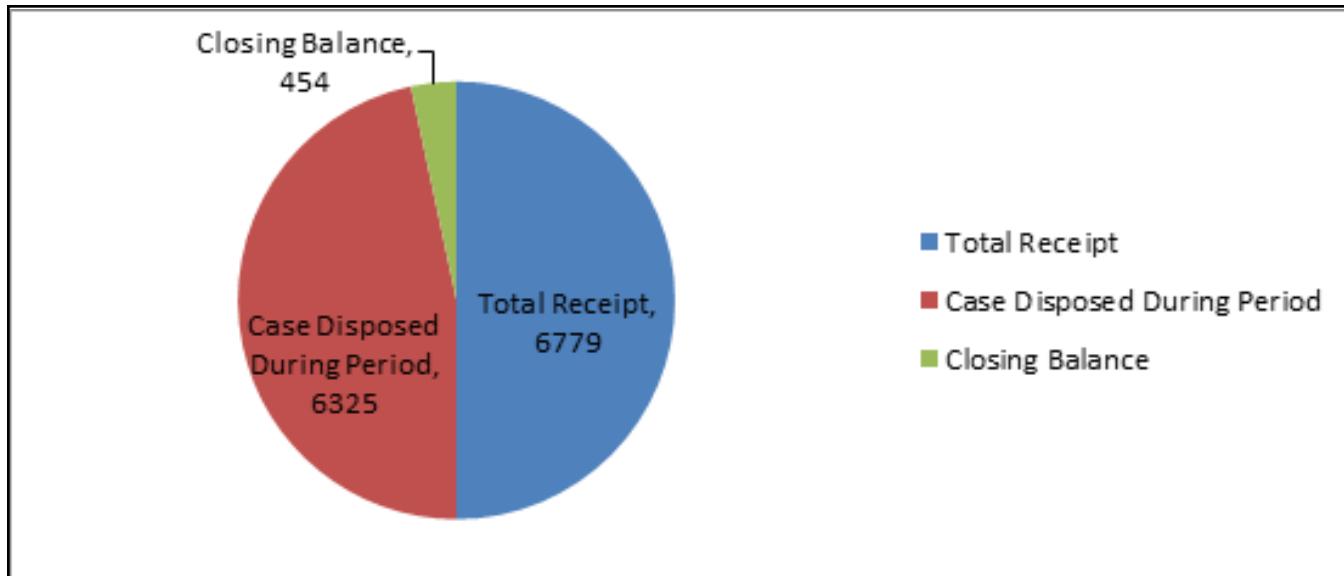
Similar to RTI Cell, there is Public Grievances Cell in MeitY headed by Director (Public Grievance).

The grievances received in PG Cell through CPGRAM portal and also offline mode were mainly relate to the following:

a)  CSC
b)  Digital India/e-Services
c)  Social Media
d)  Cyber Security
e)  NIC
f)  My Gov
g)  Digital Payment
h)  Aadhar

During the year 2018-19, 6,779 grievances were received and out of these, 6,325 were disposed of. Detailed information for this year in tabulated form is shown below:

| Grievance Source | Brought Forwarded | Receipt During Period | Total Receipt | Case Disposed During Period | Closing Balance |
|---|---|---|---|---|---|
| DARPG | 26 | 369 | 395 | 376 | 19 |
| Local/Internet | 298 | 3,977 | 4,275 | 4,026 | 249 |
| Pension | 2 | 31 | 33 | 30 | 3 |
| PMO | 67 | 1,902 | 1,969 | 1,789 | 180 |
| President Secretariat | 16 | 91 | 107 | 104 | 3 |
| **Total** | **409** | **6,370** | **6,779** | **6,325** | **454** |

Pie Chart showing the details of grievances received during 2018-19.

## 10.4 Information and Documentation Centre (Library)

MeitY has a spacious well planned library viz Information and Documentation Centre (I&DC), with an inventory of books and journals. It uses RFID based Library Management System to manage issue and return of Books/Journals. I&DC also provides various other services like inter-library loan facility to the officials of the Ministry through DELNET (Developing Library Network) and also arranges books from libraries of various other organisations. Services are also provided to the retired officials of the Ministry and trainees who undertake projects in the Ministry.

The Information and Documentation Centre possesses approximately 30,100 books on various subjects, including Electronics, Computer, IT, Computer Languages, Fiction. The Centre also has some books on Hindi and English literature. I&DC procures on an average 50 books and approximately 50 journals per annum. Currently, e-books service (Books 24x7) is also made available to the authorized users.

The Ministry is spearheading an intra-ministerial initiative

viz the Library Consortium, Ministry of Electronics and Information Technology (MeitY). Consortium of the Ministry (MeitY Consortium) comprises users from the National Informatics Centre (NIC), C-DAC, NIELIT, SAMEER, C-MET, STQC Directorate, STPI, CCA, ERNET India, C-DOT. The Ministry provides an online access to various e-resources i.e. IEEE Journals/Transactions/Proceedings, IEE Journals/Proceedings, ACM digital library and ISO Standards to its users through MCIT Library Consortium.

## 10.5 Parliament Matters

During the year 2018-19, 203 Parliament Questions in Lok Sabha (14 Starred & 189 Unstarred) and 116 Parliament Questions in Rajya Sabha (18 Starred & 98 Unstarred) were admitted and handled by the Parliament Section. These were mainly related to Digital Payments, National e-Governance Plan, Cyber Security, Aadhaar, Digital India Programme, Misuse of Social Media, Internet of Things, Data Protection and Privacy, Cyber Security, National Policy on Electronics, Electronics Manufacturing, Hacking incidents of Government Websites, National Policy on Information Technology,

Employment to Youth, Cloud Technology, Investment in IT Sector, e-Literacy, Development of e-Skills, Internationalized Domain Name, Super Computers, Internet Related Polices, E-Governance at Grass root Level, National Digital Literacy Mission (NDLM) Programme, PMGDISHA, Online Child Sexual Abuse, Public Procurement Policy, Wafer Fabrication Facility, Performance of Schemes launched by Government, Money Spent by UIDAI, Circulation of Fake Clips, Vulnerabilities in App used in smartphones, Status of IBPS, GDPR, MSIPS, Momo Challenge game, UMANG App, Strengthening of internet security and Prevention of Cyber Crime.

- Department related Parliamentary Standing Committee on Information Technology has laid following reports on the Table of Lok Sabha : -

  i) Action Taken by the Government on the Observations/Recommendations of the Committee contained in their Forty-sixth Report (Sixteenth Lok Sabha) on 'Demands for Grants (2018-19)'' relating to the Ministry of Electronics and Information Technology on 2nd January, 2019.

  ii) Review of National Digital Literacy Mission (NDLM)-Problems and Challenges relating to the Ministry of Electronics and Information Technology on 8th January, 2019.

  iii) Action Taken by the Government on the Observations/Recommendations of the Committee contained in their Fifty-third Report (Sixteenth Lok Sabha) on 'Expansion of Rural BPOs and challenges faced by them' relating to the Ministry of Electronics and Information Technology on 2nd January, 2019.

- The Parliamentary Standing Committee on Information Technology has selected the following subjects for discussion during the year 2018-2019.

  i) Digital India Programme

  ii) Review of National Digital Literacy Mission (NDLM) – Problems and Challenges

  iii) Citizens' data security and privacy

  iv) Digital Payment and Online Security measures for data Protection

  v) Review of functioning of Unique Identification Authority of India (UIDAI)

- The following Annual Reports of Societies of the Ministry of Electronics and Information Technology have been laid on the Table of the House (Lok Sabha and Rajya Sabha):-

  i) C-DAC - 6th February 2019 (Lok Sabha) and 8th February, 2019 (Rajya Sabha)

  ii) C-MET - 6th February 2019 (Lok Sabha) and 8th February, 2019 (Rajya Sabha)

  iii) NIELIT - 13th February, 2019 (Lok Sabha)

## 10.6 Gender Empowerment/Prevention of sexual harassment of women at work place

One case of sexual harassment has been received for examination by ICC MeitY.

## 10.7 Activities undertaken for the benefit of Differently abled Persons "Punarbhava™" (www.punarbhava.in) - Web portal for 'Divyangjan (Persons with Disabilities)'

The web portal facilitates all the information related to different disability issues at one place for divyangjans, NGOs, professionals, policy makers, students, parents, community workers, parents and other stakeholders in the field of disability. The portal is accessible as per W3C guidelines. It also has a font resizer and color switcher options for accessibility. The information on portal is segregated under different sections, such as, Disability Register, Legal Instruments, Resources,

Careers, Assistive Devices, Blogs, Accessible Content, Latest News, Events, Employment Opportunities, Publications, Useful Links, National Institutes, and feedback etc. The portal is regularly updated and receives 12,000 average daily hits. The framework and design of the portal has been upgraded and made mobile compatible with the support of Department of Empowerment of Persons with Disabilities (PwDs), Government of India under its 'Awareness Generation and Publicity (AGP)' scheme.

**Accessibility India Campaign: Development/ renovation of Government/State Government websites to make them accessible for Persons with Disabilities (PwD) as per GIGW/WCAG. 2.0 (A, AA level)**

For details may please see 9.4.4 of Chapter 9.

**Visual Speech Training Software (VSTS) for children with Hearing Impairment (HI)**

Computer-based speech training system which uses information obtained by speech signal analysis to provide a visual feedback of efforts involved in speech production. It has been developed to be used as a speech training aid to assist in acquisition of correct articulatory efforts by children with HI and second language learners. It can also be useful to speech therapists and speech training professionals as an analysis and diagnostic tool. The software has been developed in collaboration with IIT Bombay with support from MeitY. Details are availabe at paragraph 9.10.2.9 of Chapter 9.

**Initiatives on Accessibility**

A National Policy on Universal Electronic Accessibility was formulated by Ministry of Electronics and Information Technology (MeitY) and it was notified on October 25, 2013. Details are availabe at paragraph 2.4.3. of Chapter 2.

## 10.8 Details related to the Vigilance cases

Vigilance Unit, Ministry of Electronics and Information Technology (MeitY) is the nodal Unit for handling all vigilance matters of the MeitY and the societies under its administrative control. This unit is headed by a Joint Secretary who functions as Chief Vigilance Officer (CVO) and is appointed by the Central Vigilance Commission (CVC). He is assisted by a Deputy Director and one Section headed by a Section Officer. The CVO looks into the vigilance matters of all organisations under MeitY. Although, the autonomous societies under MeitY have their own CVOs, their appointment and the overall functioning of vigilance matters of these organisations vest with the CVO, MeitY. Each of the Attached/Subordinate Offices under MeitY have their own vigilance set up in their respective organisations who work in close coordination with the Vigilance Unit of this Ministry.

During the year 2018-19, a total number of 129 complaints were received in Vigilance Unit, MeitY out of which 56 complaints were received from Central Vigilance Commission and 73 complaints from different platforms including Prime Ministers' Office, Public Grievance Portal etc. The complaints received were related to MeitY and attached/subordinate offices and Autonomous Societies under MeitY mainly alleging favoritism/nepotism and corruption in recruitment, violation of CVC guidelines in tender process, misuse of official position, insubordination, harassment, bribery. The Vigilance Unit other than examining the complaints had also submitted monthly/quarterly and annually reports to CVC/Department of Personnel and Training (DoPT) in a time bound manner.

The complaints received were perused and those relating to concerned CVOs or of administrative nature were forwarded to the respective organizations. 12 major complaints were investigated/examined in Vigilance Unit including 4 cases received from Central Bureau of Investigation (CBI)/State Inquiry.

The complaints/cases were examined and processed in Vigilance Unit mainly in consultation with CVC/ Department of Personnel & Training (DoPT)/Ministry of Law and Justice. In 3 cases Disciplinary Authority had recommended initiation of disciplinary proceedings for Major Penalty under Rule 14 of CCS(CCA) Rules 1965 and one case has concluded with the Disciplinary Authority imposing a suitable penalty on the Charged Officer. The other two cases are ongoing. On being convicted and sentenced by CBI Court followed by appeal, cases of 2 officers have been processed under Rule 19(1) of CCS(CCA) Rules, 1965 and Major Penalty of Compulsory Retirement/Removal from service have been imposed upon these officers. In another case, CBI had requested for sanction of prosecution of an officer which was examined and with the approval of the Disciplinary Authority and in consultation with CVC the request for sanction of prosecution was denied. Further, in 2 cases, Disciplinary Authority recommended initiation of Disciplinary proceedings for Minor Penalty under Rule 16 of CCS(CCA) Rules, 1965 and one officer has been censured. Consultation with CBI was also done for preparation of the Agreed list and list of Officers of Doubtful Integrity.

In order to mitigate potential risk of corruption Vigilance Unit of MeitY arranged vigilance seminars/training programmes in the offices under the administrative control of this Ministry situated in various parts of the country and also conducted token inspection of records from time to time. These programmes were arranged for the benefit of all concerned to prepare the best practice chart at all the levels to bring about change in work culture and work ethics and to develop transparency and minimize discretionary power. At these meets besides their vigilance functionaries, other officers/staff of these units were also invited in order to create vigilance awareness amongst all. In the year 2018 for sensitizing the officers of MeitY and its organizations the officers of Vigilance Unit visited offices under MeitY like Software Technology Parks

of India (STPI)- Thiruvananthapuram and Software for Applied Microwave Electronics Engineering & Research (SAMEER)-Chennai, Electronics Test and Development Centre (ETDC)-Jaipur and Centre for Development of Advanced Computing (CDAC)- Hyderabad. Officers of Vigilance Unit also associated themselves in the vigilance investigation teams/committee setup to conduct the preliminary inquiry of the complaint pertaining to corruption charges of officers working in one of the organizations of MeitY and submitted the report to CVO/CVC.

During the year Vigilance Awareness Week was observed from 29th October, 2018 to 3rd November, 2018 in MeitY as well as other organisations under MeitY with the theme "Eradicate Corruption-Build a New India". In MeitY, a 'Pledge' as drafted by CVC was administered by Additional Secretary on 29th October, 2018 to all officers/staff of this Ministry. During the Vigilance Week, officers of Vigilance Unit visited Indian Computer Emergency Response Team (ICERT HQ) and SAMEER, Chennai to create vigilance awareness and to develop transparency in the day to day official work.

CVO, MeitY took a meeting with all the CVOs of societies and Vigilance Officers of all Attached/Subordinate Offices under MeitY in 2018 through a video conference wherein various aspects relating to vigilance matters were discussed. CVO informed that decision in a matter may not be taken only on the prevailing past practices/ instances but should be made to the extant rules and regulations of Government of India. It was also advised that guidelines/instructions issued by CVC/Department of Personnel and Training(DoPT) from time to time to curb corruption must be followed scrupulously.

Other than these, a total of 143 Folders on Annual Property Returns of officers/officials of MeitY were scrutinized with a view to check possession of assets disproportionate to known sources of income, non-intimation of transaction of property and necessary

directions were conveyed to the concerned authorities.

Besides, in order to improve systems and procedures to reduce and eliminate corruption and discretion, instructions on preventive measures on recruitment/procurement/postings-transfers were issued by Vigilance Unit, MeitY at various intervals of time. In its routine functioning, more than 250 requests for grant of vigilance clearance were received from MeitY and its organisations and were disposed of.

## Summary of Important Audit Observations

| SI. No. | Year | No. of Paras/PAC reports on which ATNs have been submitted to PAC after vetting by Audit | Details of the Paras/PA reports on which ATNs are pending | | |
|---------|------|---|---|---|---|
| | | | No. of ATNs not sent by the Ministry even for the first time | No. of ATNs sent but returned with observations and Audit is awaiting their resubmission by the Ministry | No. of ATNs which have been finally vetted by audit but have not been submitted by the Ministry to PAC |
| 1. | 2002-03 | | Nil | - | Nil |
| 2. | 2003-04 | | Nil | - | Nil |
| 3. | 2004-05 | | Nil | - | Nil |
| 4. | 2005-06 | | Nil | - | Nil |
| 5. | 2006-07 | | Nil | - | Nil |
| 6. | 2007-08 | | Nil | - | Nil |
| 7. | 2008-09 | | Nil | - | Nil |
| 8. | 2009-10 | | Nil | - | Nil |
| 9. | 2010-11 | | Nil | - | Nil |
| 10. | 2011-12 | | Nil | - | Nil |
| 12. | 2012-13 | | Nil | - | Nil |
| 13. | 2013-14 | | Nil | - | Nil |
| 14. | 2014-15 | | Nil | - | Nil |
| 15. | 2015-16 | | Nil | - | Nil |
| 16. | 2016-17 | | Nil | - | Nil |
| 17. : | 2017-18 | | Nil | - | Nil |

| Ministry of Electronics and Information Technology Annual Plan 2019-20 | | |
|---|---|---|
| Sl. No. | *Scheme/Non-Schemes* | *Budgetary Support (₹ in crore)* |
| **Non-Schemes** | | |
| **1** | **MeitY Secretariat** | **110.24** |
| **2** | **National Informatics Centre** | **1150.00** |
| **3** | **Regulatory Authorities** | **170.00** |
| 3.1 | Standardisation Testing and Quality Certification (STQC) | 120.00 |
| 3.2 | Cyber Security (CERT-In) | 42.00 |
| 3.3 | Controller of Certifying Authorities (CCA) | 8.00 |
| **4** | **Assistance to Autonomous and Other Bodies** | **1473.00** |
| 4.1 | Centre for Development of Advanced Computing (C-DAC) | 120.00 |
| 4.2 | Society for Applied Microwave Electronics Engineering and Research (SAMEER) | 90.00 |
| 4.3 | Centre for Materials for Electronics Technology (C-MET) | 30.00 |
| 4.4 | Media Lab Asia (MLA) | 6.00 |
| 4.5 | Unique Identification Authority of India (UIDAI) | 1227.00 |
| | **Sub-Total (Non-Scheme)** | **2903.24** |
| | | |
| **5** | **Digital India** | **3516.76** |
| 5.1 | Manpower Development | 400.76 |
| 5.2 | Electronic Governance (incl. EAP) | 450.00 |
| 5.3 | National Knowledge Network | 160.00 |
| 5.4 | Promotion of Electronics and IT Hardware Mfg (MSIPS, EDF and Manufacturing Clusters) | 986.00 |
| 5.5 | Promotion of IT/ITeS Industries | 100.00 |
| 5.6 | R&D in IT/Electronics/CCBT | 300.00 |
| 5.7 | Cyber Security Projects (NCCC and Others) | 120.00 |
| 5.8 | Promotion of Digital Payments | 600.00 |
| 5.9 | Pradhan Mantri Digital Saksharta Abhiyan | 400.00 |
| | **Sub-Total (Scheme)** | **3516.76** |
| | **TOTAL (SCHEME and NON-SCHEME)** | **6420.00** |

## EMPLOYEES' STRUCTURE
(Total and SCs/STs/PWDs as on 1st January, 2019)

| Group | Permanent/Temporary | Total No. of employees | SC | % of SC total employees | ST | % of ST total employees | Persons with disabilities | % of PWDs |
|---|---|---|---|---|---|---|---|---|
| Group A | **Permanent** (i) Other than lowest rung of Group A | 160 | 26 | 16.25% | 10 | 6.25% | 1 | 0.63% |
| | (ii) Lowest rung of Group A | 6 | -- | -- | 1 | 16.67% | 1 | 16.67% |
| | **Temporary** (i) Other than lowest rung of Group A | -- | -- | -- | -- | -- | -- | -- |
| | (ii) Lowest rung of Group A | 8 | 1 | 12.50% | -- | -- | 2 | 25.00% |
| Group B (Gazetted) | **Permanent** | 51 | 6 | 11.76% | 2 | 3.92% | 2 | 3.92% |
| | **Temporary** | -- | -- | -- | -- | -- | -- | -- |
| Group B (Non-Gazetted) | **Permanent** | 98 | 22 | 22.45% | 6 | 6.12% | 2 | 2.04% |
| | **Temporary** | 11 | 3 | 27.27% | -- | -- | -- | -- |
| Group C | **Permanent** | 142 | 41 | 28.87% | 11 | 7.75% | 5 | 3.52% |
| | **Temporary** | 48 | 4 | 8.33% | 3 | 6.25% | -- | -- |
| | **TOTAL** | **524** | **103** | **19.66%** | **33** | **6.30%** | **13** | **2.48** |

# LIST OF ABBREVIATIONS

| | |
|---|---|
| AEPS | Aadhaar Enabled Payment System |
| AI | Artificial Intelligence |
| BHIM | Bharat Interface for Money |
| BOSS | Bharat Operating System Solutions |
| BSNL | Bharat Sanchar Nigam Limited |
| C-DAC | Centre for Development of Advanced Computing |
| CFC | Common Facility Centre |
| CSC | Common Services Centre |
| CTDP | Comprehensive Telecom Development Plan |
| C2SD | Chip to System Design |
| DoT | Department of Telecommunications |
| DIC | Digital India Corporation |
| DSC | Digital Signature Certificate |
| EMC | Electronics Manufacturing Clusters |
| ERNET | Education and Research Network |
| FINTECH | Financial Technologies |
| FOSS | Free and Open Source Software |
| FSOC | Free Space Optical Connectivity |
| GeM | Government eMarketplace |
| HRD | Human Resource Development |
| IIFPT | Indian Institute of Food Processing Technology |
| IIT | Indian Institute of Technology |
| IoT | Internet of Things |
| JAM | JanDhan, Aadhaar and Mobile |
| NCoG | National Centre of Geo-informatics |
| NeGD | National e-Governance Division |
| NER | North Eastern Region |
| NERS | Nationwide Emergency Response System |
| NIC | National Informatics Centre |
| NIELIT | National Institute of Electronics & Information Technology |
| NLCPR | Non-Lapsable Central Pool of Resources |

| | |
|---|---|
| MHA | Ministry of Home Affairs |
| NKN | National Knowledge Network |
| MNRE | Ministry of New and Renewable Energy |
| MSDE | Ministry of Skill Development And Entrepreneurship |
| M-SIPS | Modified Special Incentive Package Scheme |
| ORS | Online Registration System |
| PFMS | Public Financial Management System |
| PMGDISHA | Pradhan Mantri Gramin Digital Saksharta Abhiyan |
| SDC | State Data Centre |
| SEZ | Special Economic Zone |
| SMDP | Special Manpower Development Programmes |
| SSDG | State Service Delivery Gateway |
| STPI | Software Technology Parks of India |
| SWAN | State Wide Area Network |
| MeitY | Ministry of Electronics and Information Technology |
| MDoNER | Ministry of Development for North Eastern Region |
| NEBPS | North East BPO Promotion Scheme |
| UIDAI | Unique Identification Authority of India |
| UMANG | Unified Mobile App for New- Age Governance |
| UPI | Unified Payment Interface |
| USOF | Universal Services Obligation Fund |
| USSD | Unstructured Supplementary Service Data |
| ZP | Zilla Parishad |

**Ministry of
Electronics &
Information
Technology**

**ANNUAL REPORT 2018-19**

**Digital India**
Power To Empower

**MINISTRY OF ELECTRONICS & INFORMATION TECHNOLOGY**
**Government of India**

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