



Annual REPORT

2022-23





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सत्यमेव जयते

**MINISTRY OF ELECTRONICS & INFORMATION TECHNOLOGY
GOVERNMENT OF INDIA**



MeitY



सत्यमेव जयते

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Executive Summary



Digital India Programme is leading the transformation in India for ease of living and digital economy. Digital India proved its resilience during the pandemic and has laid the foundation for adoption of digital initiatives has accelerated in an unprecedented manner. Information and Communications Technology (ICT) emerged as a key means of resolving challenges caused by the pandemic and Digital India initiatives have served the people, businesses, and government in those tough times. In the post-pandemic world, the progress continues and the same is evidenced by over 40 crore average e-Transactions happening on daily basis and 7.8 billion monthly transactions over UPI worth ₹ 12.8 trillion on December 31, 2022.

India's digital adoption is at rapid pace. With expanded internet access to around 76 crore citizens, the world looks at India as one of the largest Internet user bases with the lowest Internet tariff. India is world leader in Digital Identities; world's largest Digital Identity Programme with 1.36 billion Aadhaar has helped poor to receive benefits directly in their accounts. This has led to disbursal of ₹ 27.76 lakh crore and led to savings of ₹ 2.2 lakh crore cumulatively till December 31, 2022.

MeitY has identified Public Digital Platforms as the main catalysts in the overall growth and transformational change in the economy. Digital platforms like Aadhaar, UPI, GeM, DigiLocker, DIKSHA, Co-Win, etc have demonstrated the transformational potential of nationwide digital platforms. The Ayushman Bharat Digital Health Mission has been launched as a nationwide digital platform in healthcare. The Government is working on key sector Healthcare, Education, Agriculture, Logistics etc. and proposes to develop nationwide sectoral platforms weaving together multiple existing and new projects with central support in key sectors of the economy.

The year 2022-23 witnessed the launch of several new transformational initiatives such as MyScheme (as eligibility based service discovery platform), MeriPehchaan (as National Single Sign-On Platform), India Stack Global (as a repository of India Stack solutions), GENESIS (Gen-Next Support for Innovative Startups Programme), among others, by the MeitY.

Electronics hardware industry is the world's largest and fastest growing industry and is increasingly applications in all sectors of the economy. The domestic production of electronic items has increased from ₹ 3,17,331 crore (USD 49 billion) in 2016-17 to ₹ 6,40,810 crore (USD 87.1 billion) in 2021-22, growing at a Compound Annual Growth Rate (CAGR) of 15%. India's electronics production is expected to reach USD 300 Billion by 2026. Production Linked Incentive schemes for Phones, IT Hardware and Electronic Components have been successful in attracting global champions while providing a fillip to domestic companies and making them national champion companies with global aspirations. India Semiconductor Mission has been launched to enable India's emergence as a global hub for electronics manufacturing and design.

India is recognised as a global hub for IT services and has emerged as the world's 3rd largest start-up ecosystem, having 100+ unicorns. Emerging technologies like 5G, Internet of Things, Advance Data Analytics, Artificial Intelligence, Cloud computing, Augmented and Virtual Reality, 3D printing, robotics and blockchain etc. will redefine the future of technology led transformation. Several Centres of Excellence have been setup to promote innovation in these areas. Efforts are also on to enable Indian IT professional attain world class skills in these technologies through a Future Skills Programme.

The Annual Report 2022-23 of MeitY highlights the achievements of Digital India, the contribution of MeitY and its organisations namely CCA, UIDAI, CERT-In, NIC, CDAC, SAMEER, C-MET, ERNET, NIC, NeGD, STQC, NIELIT, STPI, STQC, DIC, NIXI etc. The report showcases India's position in the digital revolution as a country, having resilient digital infrastructure, delivering quality digital services, thereby, empowering common citizens digitally and in affordable, developmental, and sustainable manner.

Vision

Mission

Overview of MeitY

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

- **e-Government** : Providing e-infrastructure for delivery of e-services.
- **e-Industry** : Promotion of electronics hardware manufacturing and IT-ITeS industry.
- **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.
- **e-Learning** : Providing support for development of e-Skills and Knowledge network.
- **e-Security** : Securing India's cyberspace.
- **Inclusion** : Promoting the use of ICT for more inclusive growth.

- **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.
3. Promotion of Digital Transactions including Digital Payments.²
4. Assistance to other departments in the promotion of E-Governance, E-Commerce, E-Medicine, E-Infrastructure, etc.
5. Promotion of Information Technology education and Information Technology-based education.
6. Matters relating to Cyber Laws, administration of the Information Technology Act, 2000 (21 of 2000) and other IT related laws.
7. Matters relating to promotion and manufacturing of Semiconductor Devices in the country excluding all matters relating to Semiconductor Complex Limited (SCL), Mohali.³

¹ Modified vide Amendment series no.243 dated 15.10.1999, 257 dated 21.12.2001, 300 dated 26.02.2012 and 327 dated 16.07.2016.

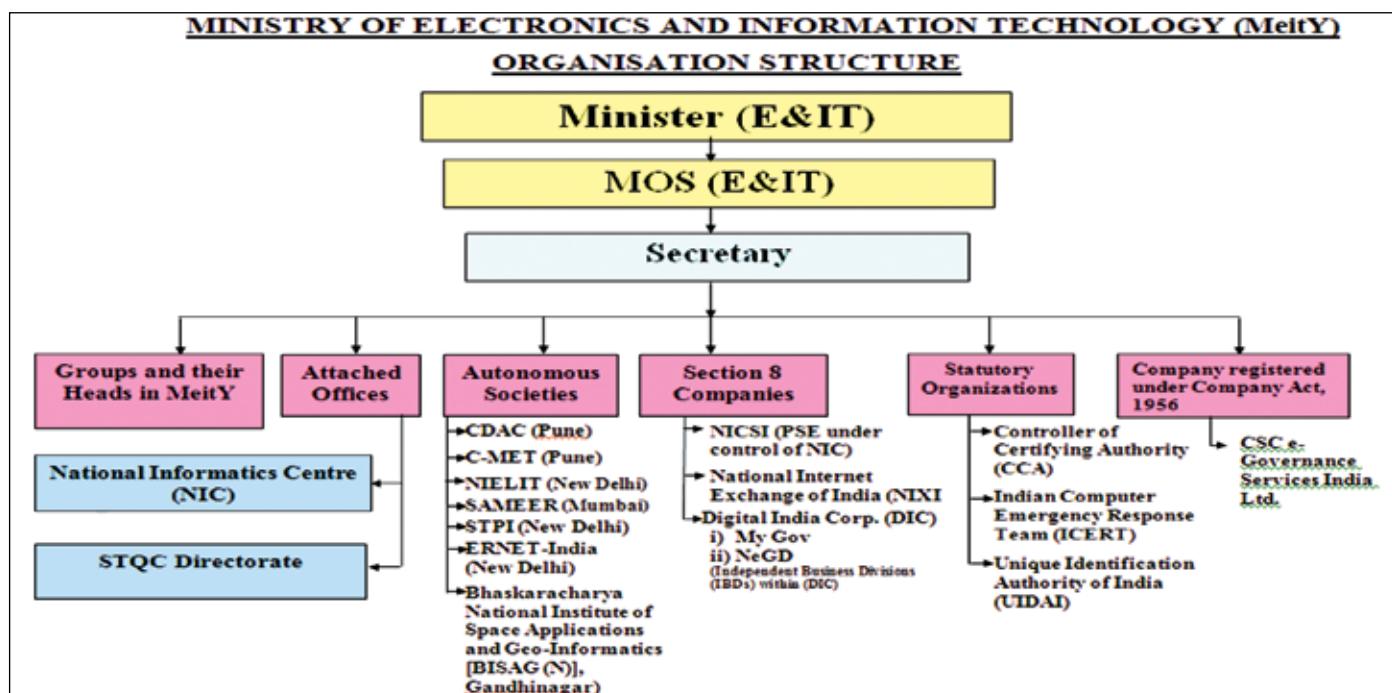
² Inserted vide Amendment series no. 332 dated 13.02.2017.

³ Inserted vide Amendment series no. 279 dated 01.03.2005 and further modified vide no. 322 dated 17.03.2016.

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

1.6 Organisation Structure:

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



10. Promotion of Standardisation, Testing and Quality in IT and standardisation of procedure for IT application and tasks.
11. Electronics Export and Computer Software Promotion Council (ESC).
12. National Informatics Centre (NIC).
13. Initiatives for development of Hardware/Software industry including knowledge based enterprises, measures for promoting IT exports and competitiveness of the industry.
14. All matters relating to personnel under the control of the Ministry.⁵
15. Unique Identification Authority of India (UIDAI).⁶

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).

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., Common Service Centre (CSC) e-Governance Services India Ltd. under its charge to carry out the business allocated to the Ministry).





2 Digital India

Programme - Services

Digital India, a flagship programme of Government of India, aims to transform India into a digitally empowered society and knowledge economy. 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 This programme pulls together many existing schemes. The programme targets to provide digital services, digital access, bridge the digital divide, language divide and thereby, ensure digital inclusion, financial inclusion, and digital empowerment. The targets are sought to be achieved with the power of technology that is affordable, developmental, sustainable, and inclusive. The vision is centred on three key areas, namely Infrastructure as Utility to Every Citizen, Governance & Services on Demand and Digital Empowerment of Citizens.

Vision of Digital India: To transform India into a digitally empowered society and knowledge economy

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

- High speed internet as a core utility
- Cradle to grave digital identity - unique, lifelong, online, authenticable
- Mobile phone & Bank account enabling participation in digital & financial space
- Easy access to a Common Service Centre
- Shareable private space on a public cloud
- Safe and secure Cyber-space

Vision Area 2 : Governance & Services on Demand includes :

- Seamlessly integrated across departments or jurisdictions
- Services available in real time from online & mobile platform
- All citizen entitlements to be available on the cloud
- Services digitally transformed for improving Ease of Doing Business
- Making financial transactions electronic & cashless

- Leveraging GIS for decision support systems & 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

To ensure focus on each of the above vision areas and implementation in time bound manner, nine pillars along with digital initiatives were identified under the Digital India Programme :

- Broadband Highways
- Universal Access to Mobile Connectivity,
- Public Internet Access Programme,
- e-Governance – Reforming Government through Technology,

- e-Kranti – Electronic Delivery of Services,
- Information for All,
- Electronics Manufacturing – Target NET ZERO imports,
- IT for Jobs, and
- Early Harvest Programmes.

To realise the vision, vision areas and nine pillars, several digital initiatives have been rolled out. Some of the major initiatives are as follows:

2.1 Digital Infrastructure

2.1.1 Digital Identity

2.1.1.1 Aadhaar: An efficient and targeted Service Delivery Platform

Unique Identification Authority of India (UIDAI) has been mandated to empower every resident of India with a unique identification number and provides 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 for a resident obtained through the process of de-duplication involving biometrics.
- Number does not contain any intelligence.
- Scalable technology architecture
- Open source technologies

Aadhaar, being a unique digital ID, provides a powerful platform for authenticating a resident anytime and anywhere, 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.

2.1.1.2 e-Pramaan: Single Sign-On

e-Pramaan is a standards based National e-Authentication framework, which facilitates authentication and security of users accessing various government services on mobile and fixed platforms. It is a unique mechanism

providing unified log-in facility through Single Sign-On (SSO) for national as well as state level applications in an integrated manner. e-Pramaan offers multi-factor authentication using (password, OTP, digital certificate and biometrics), with additional features comprising configurable chaining of authentication factors, website authentication, Aadhaar-based user identity verification and PAN-based identity verification.

e-Pramaan is a comprehensive framework designed to work in tandem with projects like Aadhaar. It aims to consolidate disparate identity documents across government departments including driving license, PAN, voter ID, etc. under a single digital profile. This will instill confidence amongst departments to impart more and more data sensitive services to rightful users. The Single Sign-On feature provides registered users a single window access to all government services minimising their efforts in maintaining multiple usernames and credentials.

- Developed and notified standard on e-Pramaan;
- Providing Single Sign on (SSO) facility with strong multi-factor authentication with flexible chaining. Integrated with PAN, Aadhaar and Driving license as identity providers.
- Provides service as well as solution on commercial basis. Currently, 335 services of 2 Central Departments, 8 States/UTs & 1 PSU integrated with 29.17 Cr. transactions.

2.1.1.3 Online e-Sign (e-Hastakshar)

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. Using this, an Aadhaar holder can electronically sign a form/document anytime, anywhere, using device such as Personal Computer or Laptop or Mobile.

- 12 agencies namely, eMudhra Ltd., C-DAC, Safe script, (n) Code Solutions, Verasys, IDSIGN, NSDL e-Governance Infrastructure Ltd., Panta Sign,

CSC, CDSL Ventures Ltd, Raj COMP Info Services Ltd. and Capricorn have been empanelled to offer e-Sign Services.

- Total 34.14 Crore e-Sign issued by all ESPs. Out of these, 3.90 Crore e-Sign issued by CDAC (i.e. under e-Hastakshara project).
- 9 outreach programs have been conducted by CDAC for e-Sign proliferation in the year 2021 with various Central/State Government organizations.
- Currently 143 agencies are leveraging e-Sign 2.1 Production service.
- The services are being leveraged by various departments/applications such as National Informatics Centre (NIC), DigiLocker, Centre for e-Governance Karnataka Government, Directorate General of Human Resource Development (DGHR), Ministry of Railways, Principal Controller of Defense Accounts, Central Board of Secondary Education and Gujarat State Warehousing Corporation, Department of IT, Sikkim, Employee Provident Fund Organization, India Post Payments Bank, UTI Infrastructure Technology and Services Limited, Jammu & Kashmir UT, Department of Panchayati Raj & Rural Development of Andhra Pradesh Government, Uttar Pradesh Forest and Wildlife Dept. etc.

2.1.1.4 Aadhaar Data Vault (ADV) as a service

While using Aadhaar services of UIDAI, if any service/application requires to store Aadhaar number in their application, the same should be stored in encrypted format in a separate system 'Aadhaar Data Vault (ADV)'. In order to facilitate the same, this project has been initiated. Major objective of the project is to enhance infrastructure enhancement to cater various requirements of Departments.

- ADV integrated with Election Commission of India and Assam Finance Department.
- Total transaction : 72.14 Cr.

2.1.1.5 MeriPehchaan [National Single Sign-On (NSSO) platform]

To access various Government services and portals, citizens have to use different IDs and passwords which

they need to remember. Many times, it becomes very difficult to remember these IDs and passwords for citizens. In order to address this concern, NSSO with the three SSOs at back end, namely Jan-Parichay (from NIC), e-Pramaan (from CDAC), and DigiLocker (from NeGD), have been integrated (www.meripehchaan.gov.in). NSSO provides Single-Sign-On (SSO) along with Password, OTP, Digital Certificate and Biometric (fingerprint/iris) as configurable authentication factors. For citizens, it eliminates the need to repeatedly prove their identities to different applications and hold different credentials for each application.

- Currently 4900+ services of various Ministries/States have been integrated with NSSO. Key services include EPFO, COWIN, DigiLocker, eShram, Mizoram DICT, Service Plus, mSevanam, MyGov, S3Waas, Bihar State Services, DIT Sikkim, QSim etc. Over 37.50 Crore transactions have taken place on the meripehchaan platform.
- State level SSOs have also started getting integrated with MeriPehchaan.

2.1.2 State Wide Area Network (SWAN)

The Scheme for establishing Statewide Area Network (SWAN) across the country was approved to connect all State/UT Headquarters up to the Block level via District/sub-Divisional Headquarters, in a vertical hierarchical structure with a minimum bandwidth capacity of 10 Mbps per link. Each of the State/UT could enhance the bandwidth up to 34-100 Mbps between State Headquarters (SHQ) and District Headquarters (DHQs) and upto 8-10 Mbps between District Headquarters (DHQs) and Block Headquarters (BHQS) depending upon the utilization.

- Presently, SWANs have been made operational in 34 States/UTs. The States/UTs SWAN in the UT of Ladakh is under implementation. SWAN has been integrated with NKN in 30 States/UTs at SHQ level and more than 540 at the district level to provide the high bandwidth.
- Increasing digitisation amongst states has led to higher utilization of bandwidth. Presently, 30 States/UTs are utilizing around 70-72 % of bandwidth of the existing link capacity. To monitor the performance

of SWANs, the Ministry has mandated positioning of Third-Party Auditors (TPAs) in the States/UTs.

2.1.3 State Data Centre (SDC)

Under the SDC scheme, Data Centres were planned to be established in all the States/UTs to consolidate services, applications, and infrastructure to provide efficient electronic delivery of Government to Government (G2G), Government to Citizen (G2C) and Government to Business (G2B) services.

- As on date, 30 SDCs have been declared operational including 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, Punjab, Uttarakhand, and Assam
- 22 SDCs are Cloud enabled.

2.1.3.1 National Data Centre in North-East Region (NDC-NER) project

Ministry of Electronics and IT approved the project for setting up of “National Data Centre in North-East Region (NDC-NER)” at Guwahati, Assam. This Project is being implemented by National Informatics Centre (NIC) over a period of five and a half years. The NDC-NER is proposed with the following key features-

- NDC-NER building cost is for Ground plus 5 floors with facility creation for 200 racks (G+3) of DC and Cloud infrastructure (IT and Non-IT). 4th and 5th floor shall be built and reserved for future expansion.
- It would provide a robust, highly available & significantly scalable infrastructure with adequate redundancy to enable Government to render efficient delivery of citizen services.
- It will have Security Operation Centre (SOC), Network Operation Centre (NOC) and Centre of Excellence (CoE) for Application Security.
- It will act as Disaster Recovery site for various applications hosted in other data centres in the region.

2.1.3.2 Enhancement of National Informatics Centre (NIC) National Cloud Services

NIC has been providing Data Centre/Cloud services to the Government at Central and State level to ensure Government services internally and for citizens.

- Under NIC cloud services more than 21,000 virtual servers have been allocated for various e-Governance applications to more than 1470 Ministries/users and over 5000 websites of the Government are being served through NIC cloud.

MeitY has approved a proposal of NIC for enhancement of ongoing NIC National Cloud Services being offered from National Data Centres over a period of 3 years. The project is being implemented by NICSI. The project is proposed with the following key features-

- **Cloud Infrastructure Capacity :** This will enable the provision of around 14,000 medium/small sized virtual servers over the period of three years. This infrastructure will provide additional Block/Unified/ Object/Software defined raw storage of over 36 Petabytes.
- **Cloud Management solution :** It will ensure increase automations of function to enhance quality of services, which will result in better adoption of Cloud services and reduce the overall manpower requirement.
- **Improvement in Cyber Security Posture :** It would help NIC to manage various cyber security aspects of the cloud infrastructure.
- **Workshop/Training of Cloud Services :** Workshops/trainings of core teams of Government Ministries/Departments which enables the users for utilization/managing and monitoring of cloud services

2.1.4 GI Cloud (Meghraj)

MeghRaj initiative is intended to deliver ICT services over cloud to all the Departments/Ministries at the Centre and States/UTs. Some of the major benefits of GI Cloud are listed below :

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

- Enable conversion of CAPEX to OPEX regarding IT Infrastructure services.
- 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 Megh Raj include:

- Setting up of State and National Clouds
- Setting up of an e-Gov Appstore
- Empanelment of Cloud Service Providers
- 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 1,592 applications of Government Departments. NIC Cloud can be accessed using the following link: <https://cloud.gov.in/>
- The e-Gov Appstore under GI Cloud can be accessed using the link <http://apps.gov.in/>.
- MeitY has empanelled 19 Cloud Service Providers. The status of the audit and the contact details of the empanelled CSPs can be accessed using the link <https://www.meity.gov.in/content/gi-cloud-meghraj>

2.1.5 National Knowledge Network (NKN)

National Knowledge Network (NKN) is an innovative, cutting-edge, robust and secured network, which provides a centralized multi-gigabit high-speed digital connectivity backbone for research & educational institutions and Government Organisations spread across India.

NKN was approved in March 2010 by Cabinet Committee of Infrastructure (CCI) to be implemented by National Informatics Centre (NIC) over a period of 10 years at a total outlay of INR 5,990 Crore. Subsequently, duration of NKN was extended up to 31st March 2021, then up to 31st March 2022, and subsequently up to 31st March

2023 by the competent authority. The approval for the next phase of NKN is in its last leg.



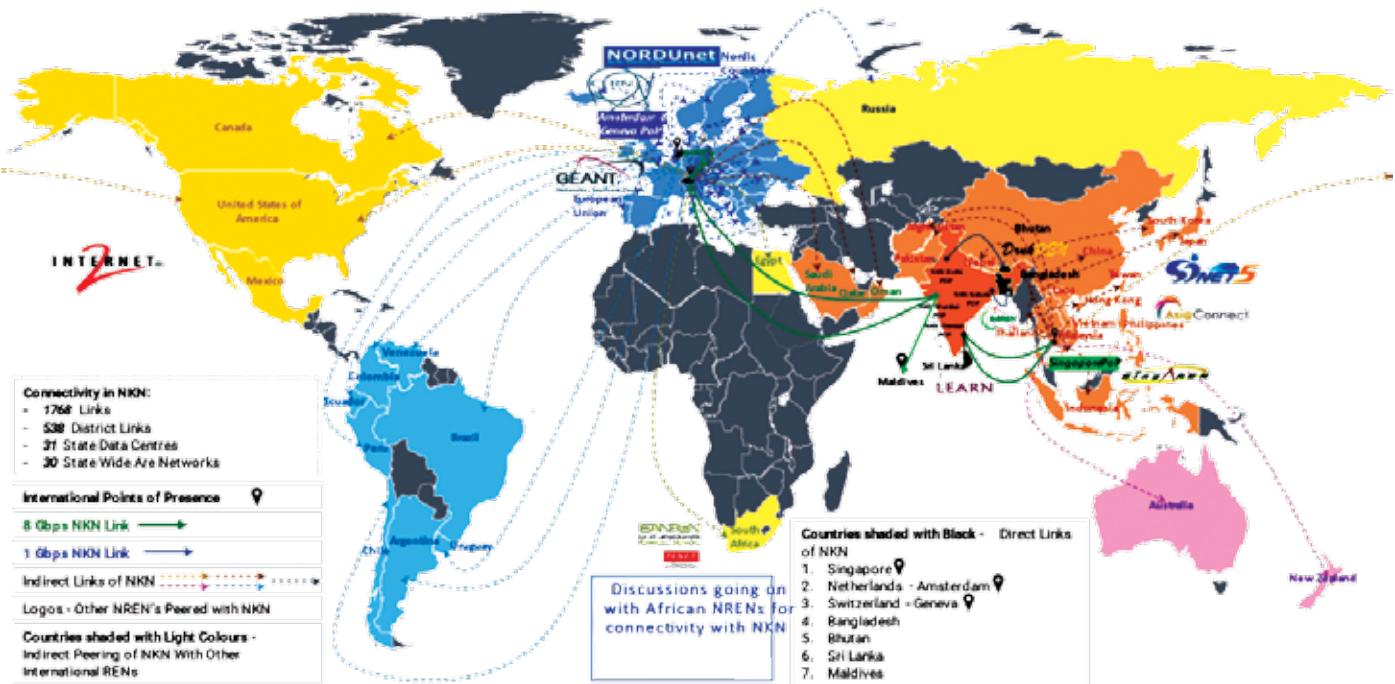
NKN Status(as on Oct 2022)

- Under NKN, connectivity has been extended to 1766 institutions
- Outreach includes 543 district links under NKN covering 492 districts across India
- NKN has 31 Points of Presence (PoPs) in various State Capitals (including 7 Super Core PoPs)
- Network strength of NKN comprises of high speed (10G) core backbone with uniformly spread 94 core links across the country
- In its progressive outreach, NKN has provided 10G bandwidth to 49 Edge links covering 38 Institutes

NKN Status: International Reach

- NKN has been significantly expanding its global reach by establishing 3 International PoPs at Singapore, Amsterdam, and Geneva (CERN).
- For increasing its Global outreach, NKN has peered with other National Research and Education Networks (NRENs) such as Asi@connect in Asia Pacific, CERN and GEANT in Europe, SingAREN in Singapore, Internet2 in USA, LEARN in Sri Lanka, BdREN in Bangladesh, DrukREN in Bhutan and NORDUnet for Nordic countries.
- As per the vision of Hon'ble prime Minister of India, to bolster sub-regional collaboration among SAARC and BIMSTEC countries, NKN has already expanded its connectivity to Bangladesh, Bhutan, Sri Lanka, and Maldives.

COLLABORATIONS AT GLOBAL LEVEL



2.1.6 Mobile Seva Platform

Mobile Seva is an innovative initiative aimed at mainstreaming mobile governance in the country by enabling all government departments and agencies at the centre, state and local levels to deliver services through mobiles through various channels such as SMS, IVRS, USSD and mobile apps. It is a centrally hosted cloud based mobile enablement platform which allows departments to expeditiously start offering their services through mobile devices anywhere in India, without having to invest heavily in creating their separate mobile platforms.

Mobile Seva Appstore/mSeva Appstore, a part of the Mobile Seva platform, is India's indigenous Government AppStore. It enables all government departments/agencies (central, state as well as local levels) and the private sector entities in the country to host their mobile applications providing citizen centric services.

Achievements (as on 17 December 2022):

- Over 4,390 accounts of departments have been integrated with the platform and availing service with authenticity.

- Over 4,956 Cr Push SMS sent by the departments integrated with the platform.
- Total 1083 m-apps developed and hosted live on Mobile Seva Appstore for different platforms. More than 8.97 crore apps downloaded till now.
- Most popular apps like UMANG, Aarogya Setu, BHIM, Digilocker and many more are now available on Mobile Seva Appstore. Covid-19 related application namely nCov-Starak, MbPT Suraksha, have been uploaded.

2.1.7 Geographic Information System (GIS)

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).

Some of the key features of NCoG based applications include:

Following are the key achievements on NCoG till 31st October 2022:

- **Total number of Applications:** 659
- **Total number of Web applications:** 595
- **Total number of Mobile applications:** 64
- **Number of Central Ministries/Departments/ Agencies:** 35
- **Number of States/UTs:** 20

Bhaskaracharya National Institute for Space Applications and Geo-informatics {BISAG (N)}

BISAG (N) has been set up to undertake technology development & management, research & development, facilitate national & international cooperation, capacity building and support technology transfer & entrepreneurship development in geo-spatial technology.

2.1.8 Public Internet Access Programme including Wi-Fi in Universities

Wi-Fi has become a universal expectation among universities/institutions for students, faculty and staff as well as visitors/guests. Wi-Fi connectivity is a high-speed wireless access to Internet/Intranet resources on anytime anywhere basis across the campus.

Wi-Fi at Patna University

MeitY has initiated a project for setting up a model Wi-Fi enabled campus network at Patna University as a Proof of Concept with tier-3 architecture upgraded to 10 Gigabit Fiber optic redundant backbone. This shall improve delivery of student-centric services, employee performance and efficiency and provide real-time access to information. This project has been initiated in March 2021 with an outlay of Rs.753.01 lakh for a duration of 3 years.

Strengthening of ICT Infrastructure in Himachal Pradesh University, Shimla

A project for Strengthening of ICT Infrastructure in Himachal Pradesh University, Shimla has been started. The project has been initiated in July 2021 with an outlay of Rs.1.5 crore. Installation of infrastructure for On Screen Evaluation System has been completed and the system

is functional. The work of setting up Wi-Fi network in the University is in progress.

Alternate technology using Optical Wireless Communication

Optical Wireless Access Network for Rural and Urban Communication

MeitY has initiated a project “Optical Wireless Access Network for Rural and Urban Communication” in October 2019 with an outlay of Rs.139 lakh. The objective of the project for rural communication is to provide digital connectivity to the last mile user in rural areas by complementing investment made by the Government of India in energy-efficient infrastructure. The implemented technology will utilize the existing solar cells or photodiodes as data receivers. Last mile bidirectional access of 10 Mbps for rural areas is being developed.

2.2 Governance and Services on Demand All Services through online & Mobile

2.2.1 Implementation of ‘Interactive Information Dissemination System (IIDS)’ with ICAR

The objective of IIDS is to show case IIDS model for adoption and promote as a new ‘Brand’ with ICAR for replication across India. The project is being implemented by Digital India Corporation (DIC) and Indian Council of Agricultural Research (ICAR) in collaboration with Krishi Vigyan Kendra (KVKs) and other Research Institutions of ICAR. At present, 288 KVKs are onboarded against the target of 204 KVK along with 1238 KVK scientists under the project. Further, 24,05,490 farmers have been registered covering 6 states i.e., Madhya Pradesh, Uttar Pradesh, Maharashtra, Bihar, AP & Telangana.



2.2.2 Sign Language Accessibility for e-Governance Services

National Policy on Universal Electronic Accessibility policy released by MeitY in 2013 and the Right of

Persons with Disabilities Act, 2016 recognize the need to eliminate the discrimination based on disabilities and to facilitate equal access to electronics & ICTs. The project being developed by CDAC Trivandrum in collaboration with Amrita Vishwa Vidyapeetham, Kollam, aims at providing accessibility of e-Governance services, with use case of UMANG which provides numerous services of various government departments on single platform, to differently abled persons as currently these services are not accessible to them.

Achievements

- Background modelling of ISL alphabets and numerals: A-Z, 0-9 has been completed;
- Videos of FAQ/ Q&A from selected UMANG services, Videos for form entry, COWIN portal completed. Instructional videos for 86 dialogues completed

2.2.3 'eGOVMMCASES – Development of Multimedia Cases with teaching notes on e-Governance Initiatives'

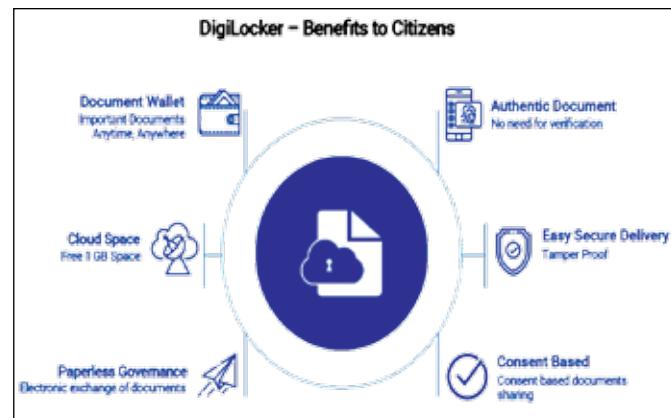
Considering importance of case and fact based learning, this project has been initiated wherein the key is to develop 20 multimedia cases on different e-governance initiatives of Government of India by providing a comprehensive summary of the project's background and its current status & make it available on a web-based platform. Out of these 20 cases, at least 8 cases would be targeted to publish at Harvard Business Publishing.

Achievements

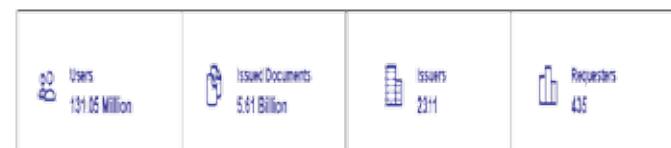
- List of projects for developing the case study has been approved.
- Data collection and case writing is in process.

2.2.4 Digital Locker

Targeted at the idea of paperless governance, DigiLocker is a platform for issuance and verification of documents & certificates in a digital way, thus eliminating the use of physical documents.



Achievements:



More than 60 crore educational documents are accessible to students nationwide.

- Ministry of Finance amended the Prevention of Money-laundering (Maintenance of Records) Rules, 2005 to facilitate the acceptance of digital Know Your Customer (KYC) documents through DigiLocker. Similarly, RBI, SEBI, and IRDAI have announced the acceptance of DigiLocker-issued documents as part of the Know Your Customer (KYC) process.
- DARPG has urged all Ministries/Departments, including their attached/subordinate offices, autonomous/statutory entities, PSUs, etc., for delivering citizen services to integrate with DigiLocker for issuing documents to citizens.
- UGC designated DigiLocker as the technology partner for the implementation of Academic Bank of Credits on 13 May 2022 and has notified for the acceptance of DigiLocker certificates on Sept. 12, 2022.
- Pharmacy Council of India issued a letter on 14 September 2022 for the implementation of DigiLocker; Further, National Medical Council issued a letter on 23 September 2022 for the implementation of DigiLocker in medical institutions and many more.

2.2.5 Reimbursement of training fees under Scheduled Caste Sub Plan & Tribal sub Plan

National Institute of Electronics and Information Technology (NIELIT) is implementing the Development Action Plan for Scheduled Caste (erstwhile Scheduled Caste Sub-Plan) for Scheduled Castes and Scheduled Tribe Component (erstwhile Tribal Sub-Plan) for Scheduled Tribes. The programme is a Direct Benefit Transfer (DBT) on-boarded scheme under which free training is being provided to the SC/ST candidates in various formal, non-formal and IT literacy courses at NIELIT and its centres.

- From the F.Y.2007-08, a total of 0.63 lakh candidates from the Scheduled Caste community and 1.88 lakh candidates from the Scheduled Tribe community have been trained under the programme.
- During the F.Y.2021-22, a total of 3,023 Scheduled Caste and 11,733 Scheduled Tribe Candidates benefitted under the Fee reimbursement programme.

Whole of the Government Initiatives

2.2.6 Electronic transaction Aggregation and Analysis layer (eTaal-2.0)

eTaal (URL: <https://etaal.gov.in>) portal is an electronic dashboard for providing a real-time aggregated view of eServices being delivered across different States and levels of Government.

As part of the scope of eTaal 2.0, the performance of the eServices is measured on quantitative terms and the performance amongst the States is measured based on eTransaction count per thousand population.

The key objectives of the eTaal 3.0 portal are to measure qualitative aspects of eService delivery for efficient performance comparison across Central Ministries/ States/ UTs/ Smart Cities and to integrate and display regional comparison of eServices and eTransactions up-to district level. It would be a display single comprehensive view for status of eServices across all states

Achievements (As on 11thNov, 2022):

- More than 46,152.16 crore e-transactions have been recorded since launch of eTaal portal

- 4,032 e-Services have been integrated since launch of eTaal portal

2.2.7 Implementation of National Data Highway (NDH)

To realise the ‘Policy on Open Application Programming Interfaces (APIs)’, a platform called ‘API Setu’ has been developed.

Achievements

- Number of published APIs: 1935,
- Number of publishers: 982
- Number of Consumers: 326
- More than 58.76 Cr transactions up to September 2022 in FY 2022-23
- Key publishers: PAN, Driving License, Registration of Vehicles, COVID Vaccination Certificate, CBSE etc.
- Key consumers: eSanad, NABARD, Centre for e-Governance, Karnataka, Department of Higher Education, Haryana etc.
- Notable use cases of the platform
 - University of Delhi uses API Setu to check the academic credentials of CBSE students applying to the University on real time basis.
 - Karnataka State Police utilizes API Setu to check candidates' class X and XII marks while applying for a job. With this step, the overall recruiting period has been cut in half.
 - e-Sanad is an application of Ministry of External Affairs used to verify the educational qualifications of students asking for admission to overseas universities. e-Sanad now has access to over 18 school boards via a single application. API Setu has removed the need for duplicate integrations with each board, saving a significant amount of money and effort.

2.2.8 PRAGATI 2.0 (Proactive Governance and Timely Implementation)

PRAGATI is a unique integrating and interactive platform through which Hon'ble Prime Minister monitors the implementation of various government schemes,

grievances, state and central related projects & programmes, by directly interacting with all stake holders through Video conferencing on a single platform.



Deliverables/Achievements of PRAGATI Project:

- The following VVIP Video conferencing sessions were successful organized by using technical infrastructure of PRAGATI.
- Using the PRAGATI video conferencing infrastructure Government of India has reviewed more than 366 (Central/States) Projects worth around Rs 13.14 Lakhs Crores, 73 programmes/ Schemes of various Ministries/Departments and 18 Sector Grievances. Hon'ble Prime Minister has chaired 40 PRAGATI video conferencing sessions till date.

2.2.9 MyScheme

myScheme is a National Platform that aims to offer one-stop search and discovery of the Government schemes. The platform helps the citizens to find the right Government schemes for them. It also guides on how to apply for different Government schemes. The myScheme portal may be accessed at <https://www.myscheme.gov.in/>

and mobile App may be downloaded from <https://play.google.com/store/apps/details?id=in.gov.negd.myscheme>. The present status is as follows:

S. No.	Title	Present status
1	Web and Mobile Application	Launched on 04.07.2022
2	Schemes Added	150 (27 Ministries/ Depts.)
3	States/ UTs Onboarded	2 (J&K and Tripura)
4	Languages Supported	2 (Hindi and English)
5	Scheme Search & Discovery Module	LIVE
6	Monthly Average Users	230K+

2.2.10 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.

Achievements

- Currently 61 applications (51 Apps, 8 Components and 2 Web services) are uploaded on eGov App Store and 19 applications have been funded for productization under the outlay of the project
- Important guidelines on Application Development & Re-engineering have been prepared in consultation with various Govt. & Private agencies (CGG, CDAC, NIC & industry experts) and published.
- AppStore Portal has been upgraded to a new version with improved performance and upgraded framework, and increased functionality.

2.2.11 India portal

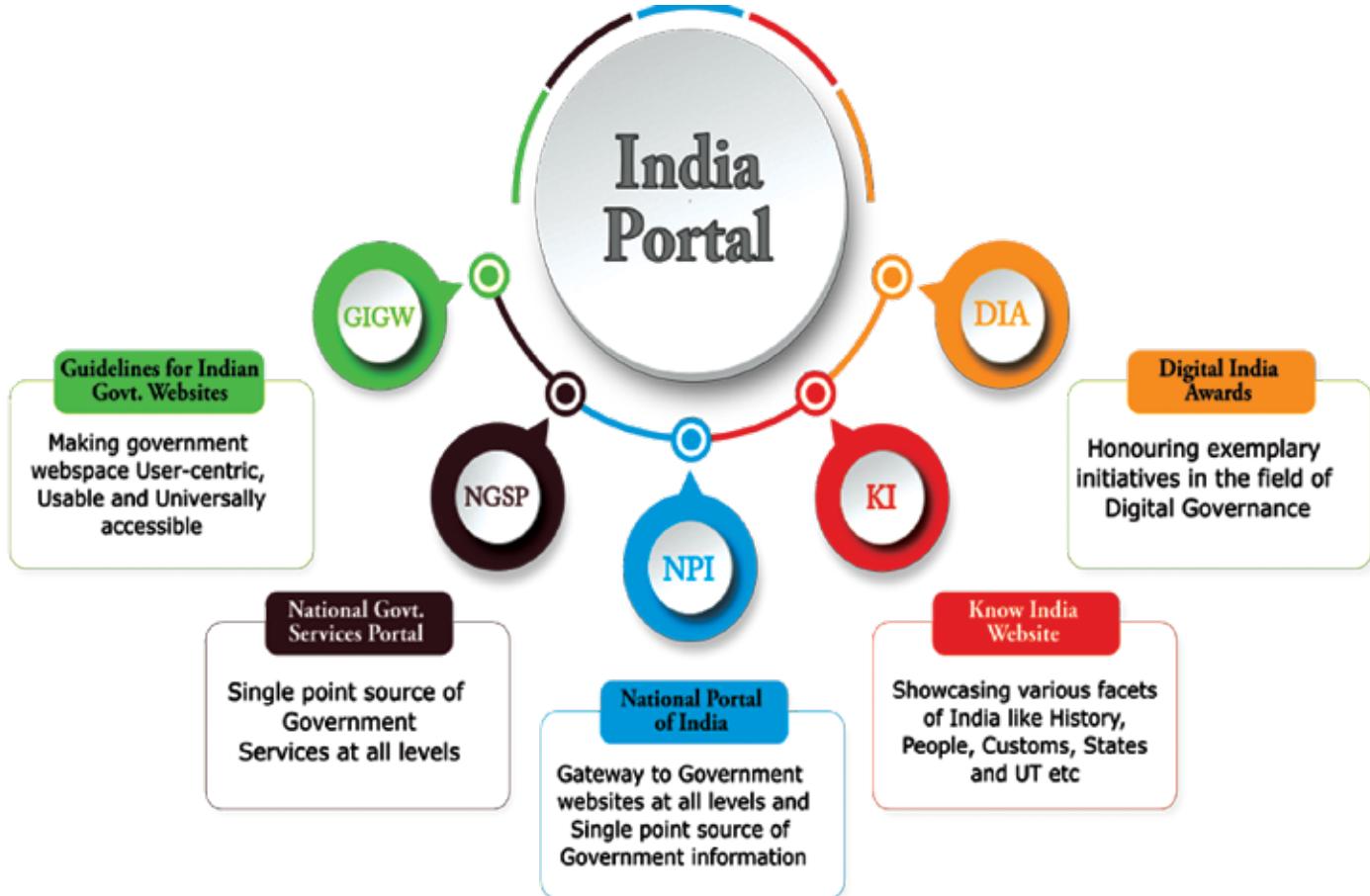
India Portal provides a 'single-window access' to information and services that are electronically delivered from all Government departments, institutions and organisations. It is a gateway of Indian Government websites at Centre, State and District levels. The portal

is also integrated with MyGov and Data Portal to present the citizen engagement activities and open data across various sectors.

The India Portal has over 2.9 million visitors per month (6.7 million-page views) and 6.14 lakh registered users. Till date, India Portal has published ~23100 metadata. India Portal is also a platform for the promotion of various Government initiatives/ events such as:

Digital India Awards (<https://digitalindiaawards.india.gov.in>)

Digital India Awards under the ambit of India Portal have been instituted to acknowledge the exemplary initiatives in digital governance. Government entities at the Centre, State, district and local levels and Indian missions abroad are eligible to participate in the awards.



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

To facilitate the availability of online services that are provided by various Government entities from one platform, in a citizen centric manner under categories like health and wellness, education and learning, money and taxes etc, the National Government Services Portal has been developed. The portal lists 12098 services that can be searched by categories and has over 2.2 million visitors each month.

Guidelines for Indian Government websites (<https://guidelines.india.gov.in>)

GIGW were formulated under the India Portal project and have been helping achieve the objective of making the Indian Government websites Usable, User-Centric and Universally Accessible. The first version of Guidelines for Indian Government Websites (GIGW) was released in 2009. Subsequently, with the change in technology and user needs, a new version of the guidelines was proposed and came 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. GIGW has also been adopted by DARPG and included in the Central Secretariat Manual of Office Procedure (CSMOP).

Know India (<https://knowindia.india.gov.in>)

This website showcases India's profile, its unique and rich culture & heritage, National Identity Symbols, States/UTs/Districts etc. The microsites on Republic Day and Independence Day celebrations are a part of this website.

2.2.12 India Enterprise Architecture (IndEA)

To facilitate better governance to citizens and enable whole of government approach, policy integration and use of big data analytics is required. These trends require breaking of sectoral barriers and silos and re-architecting the Digital Government and Digital Ecosystem. Keeping in view the above facts, MeitY formulated India Enterprise Architecture (IndEA) Framework along with its Adoption Guide. The vision of IndEA is "to establish best-in-class architectural governance, processes and practices with optimal utilization of ICT infrastructure and applications to offer ONE Government experience to the citizens and businesses".

The India Enterprise Architecture (IndEA) project has been initiated with target to do blueprinting and pilot implementation at 2 Central Ministries/Departments and 2 States/UTs have been targeted. Major objective of the project is to raise maturity of existing e-Services to Level IV i.e. Connected Services (ref. United Nations e-Service Maturity Model), simplify processes, enhance enterprise security, make use of latest technology, facilitate information based decision making while driving efficiency, cost benefits, sharing and reuse. Role of MeitY is to provide technical and advisory support and concerned Ministry/State would be the owner of their respective platform.

Achievements

- Meghalaya Enterprise Architecture (MeghEA) Blueprinting has been completed and its pilot implementation has been implemented in the State Finance Department. Its pilot implementation, comprising e-Proposal system, now automates

all of Meghalaya's departments and directorates' sanctions and administrative approvals, and delivers government services with desired outcomes to all citizens and other stakeholders across the state in an integrated and seamless manner. In government departments, it eliminates 75% of physical files. It has been awarded the prestigious UN Award – World Summit on the Information Society Forum (WSIS) Prizes 2022.

- India Enterprise Architecture Framework has been evolved and upgraded as India Digital Ecosystem Architecture, for which, stakeholder consultations have been held.
- EA blueprints and technical support has been enhanced to 6 ministries/domains/platforms, which are: Health, Agriculture, Education, Tourism, Urban Development, Skill & Employment.
- Under 'India Digital Ecosystem for Agriculture (IDEA)', the concept note has been prepared and pilot implementation for unique farmer ID exercise has been done by NIC.
- 'National Digital Education Architecture (N-DEAR)' document has been recently launched by the Hon'ble PM. Necessary technical and PMU support was provided by NeGD, MeitY. The blueprint exercise for Department of Higher Education (DHE) called NDEAR-HE is in advanced stage of preparation.
- For National Digital Health Blueprint (NDHB) and Ayushman Bharat Digital Mission (ABDM), NeGD is providing technical support. NeGD also facilitated policies on Sandbox & Data Management and implementation of e-Health Locker.
- Under 'Skill & Employment', meetings of the Working Group under the Chairmanship of Additional Secretary, MoLE and focus groups (Unnati, MSME) have been held for development of public national platform for 'skills and employment'. The working group report is to be presented to the task force.
- IndEA Repository has been established to store all the project documents, guidelines, e-learning material, architectural building blocks, reference architectures, model domain architectures,

standardized templates, cases studies, best practices, lessons learnt, tools and artefacts etc. for use of Government Departments and Agencies.

- Under 'Awareness and Capacity Building', session have been conducted for 14 States along with 3 Nation-wide webinars and a film has been prepared to explain the concept of IndEA.

2.2.13 Initiatives and projects of MeitY related to Accessibility

- MeitY is implementing a project- Knowledge & Resource Centre for Accessibility in ICT (KAI) to develop accessibility standards and procurement guidelines for hardware & software through CDAC, Pune.
- ERNET India is executing a project funded by Department of Empowerment of Persons with Disabilities (DEPwD), MSJE (GOI) to develop 917 websites of State Government to make them accessible to Divyangjan as per standards Government of India Guidelines for websites (GIGW) and Web Content Accessibility Guidelines WCAG2.0. As of now 724 websites have been developed and made accessible.
- BIS has set up a committee- LITD 35 which is entrusted with the finalization of ICT Accessibility standard and its notification thereupon MeitY and CDAC has formulated the draft Accessibility Standards, Guidelines for ICT products and solutions.
- MeitY along with BIS has published Accessibility Standards IS 17802 (Part-I & Part-II).
- 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 ICT's product and services by differently abled persons.
- MeitY is funding a project "Development of Common Minimum Framework (CMF)" for making 100 Government websites accessible. As of now, 95 websites have been made accessible. The project is being implemented by NIC.

- A platform "S3WaaS- Secure, Scalable and Sugamya Website as a Service" is a website development framework based on SaaS (Software as a Service) model hosted on the National Cloud of NIC. S3WasS has been built with an objective to empower the district administration to generate, configure, deploy and manage secure scalable and accessible website for publishing district specific information and services without much effort and technical knowhow.
- STQC Directorate has setup testing infrastructure for accessibility compliance as per guidelines of Government of India Guidelines for Websites (GIGW).

2.2.14 User experience for Government (Websites & Apps) UI/UX 4G

Project named "User Experience for Government Websites & Apps (UX4G)" aims to examine GIGW compliant Government websites/ apps, identify areas of improvement in UI/UX, create a framework and guidelines to help Government Departments to adopt better UI/UX, develop libraries of GIGW compliant ready to use, reusable Web Components, sensitize them and extend necessary technical hand-holding support on use of web components for improving the quality of UI/UX.

2.2.15 Secure Email Service for Government of India

E-mail forms the backbone for all e-Governance initiatives and is the primary mode of communication in the Government. NICSI/NIC is the Implementing Agency for providing email service along with 24x7x365 support to the Government, both at the Centre and State. Email Service is one of the pillars under the Early Harvest Program of Digital India. Currently the service has a userbase of approximately 31 lakh and has aims to provide the service to 50 lakh users in the Government.

2.2.16 National Scholarship Portal

National Scholarships Portal (NSP) is an end to end integrated unified portal for all scholarship schemes offered by Central Ministries/Departments and states. NSP offers hassle-free services to all stakeholders like

online scholarship application submission, tracking by student's verification by institute and final disbursement of scholarships amount directly into a student's bank account. This new unified system creates brings transparency by avoiding duplication and ensures timely disbursement.

Objective of the project:



Impact: NSP Statistics for AY 2021-22

- Central Ministries/State On-boarded: 28
- Schemes Onboarded: 114
- Beneficiaries: 1.93 Crores
- Scholarship Disbursement: Rs 8,487 Crores

Commutatively, in last Seven Academic years (2015-16, 16-17, 17-18, 18-19, 19-20, 20-21, 21-22) approximately 9.45 Crores applications received and Approx. Rs 22,652 crores disbursed to over 5.4 crore beneficiaries.

2.2.17 Open Government Data 2.0

Ministry of Electronics & Information Technology (MeitY) under the aegis of National Data Sharing and Accessibility Policy (NDSAP) initiated Open Government Data (OGD) Platform India (<https://data.gov.in>), to share government

data with its citizens. The Platform has been set-up and managed by the National Informatics Centre (NIC).

First phase of the OGD project was launched in October 2012. After successful delivery of the first phase; second phase of the project – Open Government Data 2.0 - Micro Services Based Architecture Leveraging Cloud Technology has been initiated from May 2020.

As on 12th September, 2022 OGD India has 5,85,921 dataset resources, 12,917 catalogs contributed by more than 250 Ministry/Departments, 2,791 Visualizations created, 1,72,696 Application Programming Interfaces (APIs) created, 570 Chief Data Officers. Datasets on OGD has 32.15 million times viewed and 9.45 million times downloaded. More than 1,71,830 APIs are available for users.

2.2.18 Digital Economy and Digital Payment Division

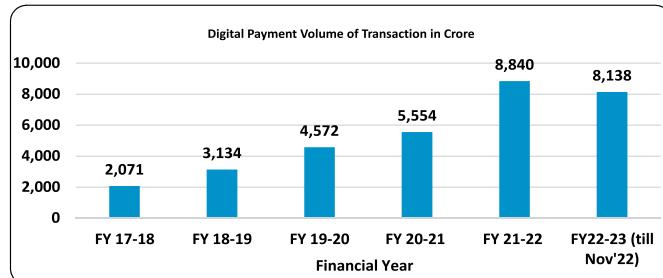
Promotion of digital payments ecosystem is an essential aspect of digital India programme and has the potential to transform Indian economy by extending inclusive financial services.

Digital Economy and Digital Payment Division, Ministry of Electronics & IT (MeitY) has been working with all

concerned stakeholders including Banks, Payment Service Providers (PSPs), Ministries/Departments, States/UTs, and Regulators for promotion of Digital Payments across the country.

Growth of Digital Payment Transactions

Digital payments have significantly increased in recent years, as a result of coordinated efforts of the Government with all stakeholders. The total transaction volume increased from 2,071 crore in FY 2017-18 to 8,840 crore in FY 2021-22. (Source NPCI, RBI).



Digital Payment Volume has increased from 2,071 Crore in FY 2017-18 to 8,840 Crore in FY 2021-22, at a CAGR of 43.74 %

(Data for FY 2022-23 is upto 30th November 2022)

Payment Infrastructures (in Lakh)

Payment System Infrastructures	Sep-21	Sep-22	Growth (in %)
BHIM-UPI QR Codes	1,205.19	2,164.30	79.58
Bharat QR Codes	43.74	48.64	11.20
POS	49.77	70.35	41.35

Source: RBI

Steps Taken for promotion of Digital Payments

- Incentive scheme for promotion of RuPay Debit cards and low-value BHIM-UPI transactions (P2M) - Under the scheme, the acquiring banks were incentivised by the Government by way of paying percentage of value of RuPay Debit cards transactions (P2M) and low-value BHIM-UPI transactions (upto ₹ 2,000) (P2M), for a period of one year, w.e.f. April 01, 2021, with financial outlay of ₹ 1,450 crore.
- Coordination with Banks - Banks are given Targets for Achieving Digital Payment Transactions and Onboarding of Merchants on Digital Payments

Acceptance Infrastructure. Banks are conferred with awards to recognize their efforts in achieving the targets.

- Coordination with Ministries/Departments and States/UTs - Issues related with digital payments faced by Ministries/Departments and States/UTs, are taken up with regulatory authorities for resolution.
- New Products and Services –
 - UPI 123 PAY** was launched on Mar 08, 2022, to provide the facility of easy digital payments through UPI to feature phone users, in a safe and secure manner.
 - UPI Lite** – For enabling offline UPI payments for promotion of digital payments in rural and remote areas UPI Lite has been designed with On-Device wallet functionality for UPI users.
 - UPI on Credit Card**- Linking of RuPay Credit Cards to UPI have been approved, and will provide a seamless, digitally enabled credit card lifecycle experience for the customers.
 - Single-block-and-multiple debits on UPI** - Single-block-and-multiple debits functionality has been introduced in UPI, which will significantly enhance the ease of making payments.
 - BBPS scope enhancement** - Earlier BBPS was available only for bill and recurring payments. Scope of BBPS has been enhanced to include all categories of payments and collections, both recurring and non-recurring in nature.
 - Internationalization of UPI and Rupay** - In order to promote India's digital payment network RuPay overseas, NPCI entered into a strategic partnership and has several agreements with multiple international partners and payment networks.
 - A MOU (Memorandum of Understanding) along with NDA (Non-Disclosure Agreement) has been exchanged between NPCI International Payments Limited (NIPL) which is looking after the promotion of BHIM-UPI & Rupay cards at Global level with Lyra net-

work, which is a digital payment processor headquartered in France to undertake discussions to gain acceptance for UPI powered apps across the Lyra Network in France.

2.2.19 e-Governance Standards and Guidelines

MeitY has set-up an institutional mechanism under Digital India to evolve/adopt standards in e-Governance under the project titled 'e-Governance Standards and Guidelines'. Key objective of this project is to develop/adopt ICT standards/guidelines/frameworks for effective and efficient implementation of e-Governance projects.

Achievements

- Working Groups (WGs) for formulation of guidelines in five areas namely, 'Online learning and examination system', 'Anonymization of data', 'Zero Trust Architecture', 'IoT Devices' and 'Mobile device security' have set-up wherein 4 WGs have submitted draft reports. For two draft reports, public feedback is in progress as the same has been published on standards' website and sent to Ministries/States for feedback.
- 3 State level workshops have been conducted on already notified standards/guidelines/frameworks.
- After testing and security audit of newly developed website, it has been made live.

Emerging Technology based services

2.2.20 Unified Mobile Application for New-Age Governance (UMANG)

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

Achievements

- UMANG has been developed as a single mobile platform to deliver major Government services with Core Platform integrated with DigiLocker, PayGov, Rapid Assessment System (RAS) etc.
- UMANG has about 1,643 services (799 – Central and 814 State Govt. services) from 300

departments of Central Government departments and Government departments of 34 States/UTs along with 20,197 services of Bharat Bill Payment Services (BBPS) and many more are continuously being on-boarded. About 4.75 Crore users are registered with UMANG and more than 320 crore transactions have taken place on UMANG.

- 393 services of DBT (Direct Benefit Transfer) have been made live on UMANG during this period.
- UMANG has partnered with CSC e-Governance Services India to facilitate delivery of UMANG services in an assisted mode

2.2.21 Conversational AI platform for delivery of UMANG/Government Services

This is AI based service delivery project for integration with existing UMANG services being deployed by NeGD. The main object of the project is to get the Government services delivered easily and on the other hand enable Government departments to deliver their services through this new technology. The said platform aims to benefit both the citizen as well as departments.

Achievements

- Voice and Chatbot are functional.
- 19 services are live till date i.e EPFO, CRIS- NGET, Co-Win, etc.

2.2.22 AI-based predictive analytics of visitors to Public Places

This is analytics based public specific platform being developed by BHU, Varanasi. The aim is to develop a hardware-software combined prototype for AI-based data capture, processing, and analytics. It involves image processing, data acquisition, IoT, machine learning and predictive analytics. Collected data will be stored, pre-processed, and analysed by using state-of-the-art AI and machine learning techniques. Analytical outcomes will help in making strategies and taking decisions for effective people management and better user experience.

Achievements

- AI based sophisticated computational approaches developed for people counting, age and gender determination.

- The developed computational models are deployed in real world settings and results verified and validated.
- Analytics dashboard under development for descriptive and predictive analytics
- IVR for Feature phone will go live by end of Nov 2022.

2.2.23 Adaptive Assistive System for the Moderate Mentally Disabled Children

The project aims to benefit moderate mentally disabled children and it involves developing a system that will help moderate developmentally disabled children in their daily routine activities such as basic self-care, healthcare, safety, and communication.

Achievements

- Design and development of framework is in progress.
- After visiting the special schools and brainstorming session, list of topics has been finalized for which content is to be developed.

2.2.24 Development of a Machine Learning Based System to Assist Medical Practitioners

To design and develop machine learning based system, which will suggest possible treatment, advice and diagnosis, based on patient demographics (age, gender, location), seasons, symptoms, examination, history of present illness, and past treatments. The suggestions will be ranked by probability of outcome to indicate the confidence of the system in the suggested value against the input fields.

Achievements

- Data collected from 4 Hospitals
- Designed templates, mobile app, web interface
- Dashboard developed for Health Analytics Engine
- Anonymous data used for complaints, Investigations, diagnosis, and drugs
- Two novel algorithms developed
- Integrated system and field deployment with HMIS of the proposed solution in one hospital
- Open API developed for integration and access by other applications.

2.3 Digital Empowerment

2.3.1 MyGov

It is the largest citizen engagement platform in the country. It provides two-way communications between citizen and government. As on 17 December 2022, it has 2.7 crore users and has facilitated 13 lakh task submissions and 53 lakh comments on discussion threads. It also facilitates Hon'ble PM's Maan Ki Baat. 18 State level instances of MyGov have also been made operational. It is also available at the whatsapp through MyGov Helpdesk (+91-9013151515).

2.3.2 Digital India Bhashini

An Independent Business Division (IBD), Digital India Bhashini Division (DIBD) has also been set up under Digital India Corporation (DIC) to anchor the Mission Bhashini activities and to nurture the language technology ecosystem especially involving startups.

Bhasha Daan

One platform, multiple crowd sourcing initiatives-Seeks Contributions to build an open repository of data to digitally enrich your language

Suno India - Enrich your language by typing the audio that you hear

Bolo India - Enrich your language by donating your voice

Likho India - Enrich your language by translating text

Dekho India - Enrich your language by typing the text you see

Major statistics

Universal Language Contribution API (ULCA) Models

Total ULCA Models

Translation	ASR	TTS	OCR	Transliteration	Language Detection
133	55	62	59	42	1

Deployment of Language AI models:

- Department of Administrative Reforms and Public Grievances (DARPG) for Centralized Public Grievance Redress and Monitoring System (CPGRAM) : For translating the regional language based grievance into the concerned officer's specific language and then making the official reply available in the regional language.
- Department of Health - e-Sanjeevani : To enable Speech to Speech translation between the Doctor and Patients using the BHASHINI's ULCA Models.
- NeGD- UMANG : Enabling the Chatbot service in different Indian Languages
- NeGD - APISetu : For listing ULCA APIs on the APISetu platform for wider visibility of the Indic Language based models.
- National Payments Corporation of India (NPCI)- Gas Booking : Making Phone based Gas booking system more intelligent, by automatically understanding the user's speech using the BHASHINI's ULCA Models and then processing the booking.

2.3.3 India BPO Scheme and North-East BPO Scheme

MeitY is working towards the vision of Digital Inclusion and to create new opportunities in the digital economy North-East BPO Promotion Scheme (NEBPS) and India BPO Promotion Scheme (IBPS) were initiated in 2015 and 2016 respectively 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 5,000 seats under NEBPS were planned. The duration of IBPS was up to 31.03.2019 while NEBPS was up to March 2020 to invite new bids, however disbursement of financial support may continue beyond this period. Under IBPS, Seat distribution to States and UTs was based on population as per 2011 Census. The outlay of the Scheme is Rs.493 crore (IBPS) and Rs.50 crore (NEBPS).

2.3.4 Future Skills PRIME

MeitY in collaboration with National Association of Software and Service Companies (NASSCOM) has initiated a programme titled Future Skills PRIME (Programme for Re-skilling/Up-skilling of IT Manpower for Employability) aimed at re-skilling/ up-skilling of IT professionals in 10 new/emerging technologies namely Artificial Intelligence, Robotic Process Automation, Augmented/Virtual Reality, Internet of Things, Big Data Analytics, Additive Manufacturing/ 3D Printing, Cloud Computing, Social & Mobile, Cyber Security and Blockchain. The programme aims at up-skilling/ re-skilling 4.12 lakh beneficiaries (4 Lakh Professionals, 10,000 Government Officials and 2,000 Trainers) in these technologies.

The full version of FutureSkills PRIME platform was launched on 29.10.2021. Under the programme, as on 08.12.2022, a total of 10,72,082 candidates have signed-up on the portal, 4,60,692 candidates have enrolled in various courses, out of which 1,56,056 candidates have completed their course(s). Further, the Resource Centres (Lead/ Co-Lead Centres), have so far trained 7207 Government Officials and 606 Trainers.

2.3.5 Open Forge

A collaborative application development platform called OpenForge has been developed to support the developer community. As on 18 December 2022, 2170+ projects and 10,200+ developers are onboarded at the platform. 3.76 lakh Git push has been supported. Major Digital India initiatives using Open Forge are as follows: DigiLocker, UMANG, RAS, GeM, etc.

2.3.6 Direct Benefit Transfer (DBT)

Direct Benefit Transfer (DBT) 2.0 DBT Bharat portal (www.dbt-bharat.gov.in) has been designed and developed for capturing DBT related information and monitoring progress in the country. This Portal functions as an aggregator for transactional level data and related progress of all DBT applicable schemes implemented by Government of India and respective State / UT. It also ranks Schemes, Ministries/Departments and States/UTs on various DBT related parameter to promote a healthy competition among the stakeholders and to fast track the DBT implementation in the country.

2.3.7 Common Service Centres (CSC-2.0: A Way Forward) Project

MeitY has implemented the network of Common Services Centres (CSC) for delivery of public services to every citizen in assisted mode. The CSC scheme envisages setting up of at least one CSC in each of 2.50 lakh Gram Panchayats (GPs) across the country, for delivery of various Government-to-Citizens (G2C) and other citizen centric e-Services to citizens. It is a self-sustainable entrepreneurship model which is run by Village Level Entrepreneurs (VLEs).

As on October 2022, total 5,21,225 CSCs are operational across all states & Union Territories of the country, out of which, total 4,14,766 CSCs are operational at Gram Panchayat (GP) level. More than 400+ services across the country are being delivered through CSCs (CSC SPV Portal) to the citizen across the country.

2.3.8 Capacity Building

Capacity Building scheme under Digital India programme envisions building adequate and relevant capacities at all levels in the Government. The objective is to develop a holistic understanding on visualising, conceiving, and delivering projects. The scheme was initially approved in 2008 with training & knowledge sharing initiatives and technical manpower support to bridge the relevant skill-sets and expertise in managing large IT/ e-governance projects and to develop an appropriate institutional framework to handle the capacity building requirements of the State. In 2015, the scheme under Digital India programme was continued under phase-II that included special focus on Central Line Ministries introducing new components for maximum outreach; bringing flexibility, continuity in learning through technology led platforms (LMS & KMS); and to handle the capacity building requirements of States/UTs and Central Line Ministries with an appropriate institutional framework.

A total of 12,411 participants are trained through 139 training programmes.

National e-Governance Division (NeGD) has commissioned Learning Management System (LMS) and Knowledge Management System (KMS) under Capacity Building scheme II in March 2017. Both portals

are designed to build capacities of the government officials with technology enabled skills and knowledge, and envisaged to support the “Mission Karmayogi Program” to provide necessary capabilities in line with IT Future Skills. LMS platform provides e-learning solutions and discussion groups to the government officials at the central and state level. A variety of e-content is currently available on the NeGD LMS.

Progress in LMS/KMS:

	Till 31 st March 2021	Till Sept, 2022	Growth
LMS/KMS onboarded department	81	108	(+)33%
LMS/KMS registered users	78368	267782	(+)242%
Online training through LMS/KMS	2934	9713	(+)231%

2.3.9 eGreetings Portal and Sampark 2.0

eSampark is a mechanism to connect the government directly with citizens across India by running mailer, outbound dialling, and SMS campaigns. The platform is used for sharing informational and public service messages.

Till date 3438 Campaigns conducted around 587332434 emails sent, 4471260 number of bulk SMS has also been disbursed through eSampark.

2.3.10 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.

Project “Rollout of Online Labs (OLabs) for schools”

It is 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. There are total

173 experiments available on the OLabs portal using interactive Simulators and Videos etc. These 173 lab experiments are covering various subjects viz. Physics -54, Chemistry -46, Biology -36, Maths -25, and English -12. The OLabs contents are available in four languages viz. English, Hindi, Marathi and Malayalam and available in the public domain as www.olabs.edu.in.

“OLabs NextG : Next Generation Online Labs (OLabs) for schools”

Project: OLabs NextG: Next Generation Online Labs (OLabs) for schools by CDAC Mumbai jointly with Amrita University Kerala is being implemented for 3 years.

2.3.11 Language Computing

National Language Translation Mission

The National Language Translation Mission (NLTM), namely, Mission BHASHINI [BHASH A Interface for India] has been formulated to transcend the language barrier for digital access. The National Language Translation Mission has started in March 2022 as a three-year mission with the vision of harnessing natural language technologies to create a diverse ecosystem of contributors, partnering entities and citizens for the purpose of transcending language barriers, thereby ensuring digital inclusion and digital empowerment in an AatmaNirbhar Bharat. The further details can be seen at <https://bhashini.gov.in>

Enriching Telugu Language Wikipedia and other Indian Languages

In Enriching Telugu Language Wikipedia and other Indian Languages project, IIIT Hyderabad (<https://indicwiki.iiit.ac.in>), till date has achieved the set goal (400,000 lakh pages) and created 6 lakh pages (600,000) in various domains such as Biological Sciences, Medical Sciences, Astrology, Technology, Travel, Culture/Art, Sports, and Infotainment in Telugu. It is continued to explore even more domains. The unique contribution of the project is creating a system consisting of processes, platform and technology which enables human-bot interaction resulting in generating high-quality encyclopaedic content.

The URLs for the IIITH Sandbox –Telugu - <https://tewiki.iiit.ac.in/>; Hindi - <https://hiwiki.iiit.ac.in/>

2.3.12 Web Standardization Initiative

The vision of Web Standardization Initiative (WSI) is to enable Indian language requirements in Web technologies Standards of World Wide Web Consortium (W3C), Unicode, Bureau of Indian Standards (BIS) etc. through the formulation of Draft Recommendations, Guidelines, and Gap reports in consultation with stakeholders, Language and Technology experts. These are being implemented through time bound and technologically focused projects by academia/ industry/ R&D institutions/Industry bodies.

2.3.13 Knowledge and Resource Centre for Accessibility in ICT

MeitY is implementing a project- Knowledge & Resource Centre for Accessibility in ICT (KAI) to develop accessibility standards and procurement guidelines for hardware & software through CDAC, Pune.

Various activities and the policy decisions taken for implementation of the RPwD act 2016, in FY 2021-22 are.

ERNET India is executing a project funded by Department of Empowerment of Persons with Disabilities (DEPwD), MSJE (GOI) to develop 917 websites of State Government to make them accessible to Divyangjan as per standards Government of India Guidelines for websites (GIGW) and Web Content Accessibility Guidelines WCAG2.0. As of now 724 websites have been developed and made accessible.

BIS has set up a committee- LITD 35 which is entrusted with the finalization of ICT Accessibility standard and its notification thereupon MeitY and CDAC has formulated the draft Accessibility Standards, Guidelines for ICT products and solutions.

MeitY along with BIS has published Accessibility Standards IS 17802 (Part-I & Part-II).

2.3.14 Awareness and Communication for Digital India

Awareness and Communication (A&C) is an integral component of Digital India. A&C performs the crucial role of generating and raising the level of awareness about Digital India, related services and service delivery channels amongst diverse stakeholders across the country.

Main objectives of A&C activities are:

- Expand visibility of Digital India Programme & its projects and services, with emphasis on outreach to Tier 3 & 4 towns and rural pockets of the country for welfare of citizens including their social, economic & education empowerment
- Create Awareness and wide publicity including event-based publicity etc., through various media- social media, radio, TV, print, outdoor media & activities around Government of India Schemes and Digital India services
- Inform, Educate, Communicate & Sensitize citizens about usage & benefits of services & schemes
- Expand reach of Digital India programme globally

Major Achievements (April 2021 onwards)

- **Digital India Week 2022:** To celebrate the unprecedented digital transformation in the country, Digital India Week was organised from July 4-9, 2022 in physical format in Mahatma Mandir, Gandhinagar as well as in virtual mode via the India Stack Knowledge Exchange program. A grand exposition names 'Digital Mela' was set up at the Mahatma Mandir in Gandhinagar, Gujarat was attended by over 50,000 visitors, interested to learn about the latest innovations and technologies from the Emerging Tech Pavilion showcasing AR/ VR, Drone Technologies, Robotics to Women in Tech, Digital Payments, Fintech to R&D Pavilion exhibiting the latest in medical electronics, additive manufacturing, 3D printing, semiconductor and nanotechnology, high computing processors among others etc.
- **Launch of Responsible AI for Youth:** The Program was designed to reach out to students from Government schools pan India and provide them with an opportunity to become part of the skilled workforce in an inclusive manner. The program impacted 52,628 students across 35 States and UTs, empowering youth with necessary AI skillsets, who had limited or no access to the latest technologies and resources. To continue the momentum of this inclusive AI Skilling program, and with the aim to build AI-readiness among the next

generation, The Hon'ble Minister for Electronics and IT, Railways and Communications launched Responsible AI for Youth 2022, on July 30, 2022.

- Digital India Bhashini Campaign on Social Media
- Launch of National Strategy on Additive Manufacturing
- National Girl Child Day Campaign on Digital India Social Media handles
- Digital India Republic Day Video
- FOSS for GovTech Roundtable
- AI Pe Charcha
- **Campaigns on Social Media:** Azadi Ka Amrit Mahotsav, Har GharTiranga Campaign, Digital India Achievements @75, Digital India ne kissea apkoo azaadi dilayi, Digital India Bhashini Campaign in 11 languages, Digital Payments Campaign in multiple languages
- **Physical Events:** Azadi Ka Amrit Mahotsav Launch Events, India International Trade Fair (November 14 -27, 2021), Digital India and MyGov Stall
- **AZADI KA AMRIT MAHOTSAV**
- **SemiconIndia: Future Design** roadshows across the country
- **Digital India Conference of IT Ministers; Oct 1-3, 2022, Pragati Maidan, New Delhi**
- **FIT India Run**
- **YUVAi- Youth for Unnati and Vikas with AI**

2.4 Digital India Initiatives in other Ministries supported by MeitY

Technology has played a key lever in the rationalization of good governance by ensuring rapid execution of public policies across the length and breadth of the country while upholding the transparency, accountability, and trust amongst the citizens. NIC platforms and services are being offered in different domains like Agriculture, Education, Health and Family Welfare, Transport, Finance, Law and Justice, Social Welfare & Skill Development, Home Affairs, Food & Public Distribution etc., through multiple delivery points thereby providing rich benefits of enterprise mobility and accessibility.



Digitizing Core Sectors for Sustainable National Development

2.4.1 Agriculture & Food Processing

2.4.1.1 PM KISAN- Pradhan Mantri KisanSAMman Nidhi

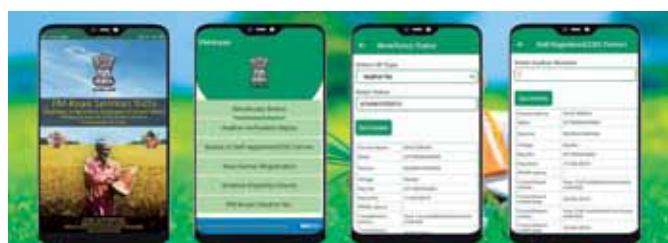
Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) portal by NIC provides an end-to-end technology solution for transferring the funds directly into the accounts of the farmers identified by States/UTs. Under PM-KISAN Scheme, a direct payment of Rs. 6000 per year is being transferred in three equal instalments of Rs. 2000 every four months into the bank accounts of eligible landholding farmers' families using technology solution PM-KISAN portal.



The Hon'ble Prime Minister of India, Shri. Narendra Modi transferred benefit amounting to Rs. 16,000 Crores+ to 8 Crores+ Farmers in a single click of button on 17th Oct 2022.

2.4.1.2 PM KISAN Mobile App

PM Kisan Samman Nidhi Mobile App Dashboard



PM KISAN e-Services	Status
Registration of beneficiaries	12.64 Crores
Farmers Benefitted	Approx. 12.07 Crores (Received at least one instalment)
Aadhar Verification from UIDAI	Approx. 11.00 Crores
Mobile App	Approx. 1.31 Crores + downloads
Self-Registration through CSCs	Approx. 1.05 lacs
Grievance Redressal & Management System.	Queries Received at online system: 14.46 lacs + Reply Sent: 13.85 lacs queries
NIC SMS gateway integrated	Queries under Process with states: 61 thousand Approx. 12 cores SMS/ OTP sent

2.4.1.3 Integrated Fertilizer Management System

It has facilitated to build a truly progressive ecosystem for fertilizer production, supply chain and subsidy disbursement management in the country. The total fertilizer subsidy is likely to touch a record Rs. 2.50 lakh crore in the current 2022-23 fiscal. iFMS supports new interventions namely Registration of Mixture Manufacturers, Reasonableness of MRP of P&K Fertilizers, PM Kisan Samruddhi Kendras (PMKSK), One Nation One Fertilizer and Nano Urea.

2.4.1.4 Kisan Rath

Kisan Rath is a mobile app developed by NIC to facilitate farmers/traders hire transporters for transporting Agri-produce. Kisan Rath app ensures smooth supply linkages between farmers, warehouses, FPOs, APMC mandis, intra-State & inter-State buyers, and helps in reduction of food wastage by timely transport. As of now, more than 4.89 lakh + farmers, 1.01 lakh+ traders, 3,127 FPOs, 27,000+ Service Providers have been onboarded. Kisan Rath has received more than 9,000 load requests.

2.4.1.5 PGS-India (Participatory Guarantee System of India) Portal

PGS-India (Participatory Guarantee System of India) is a decentralized organic farming certification system that is locally relevant, emphasizes the participation of stakeholders including producers and consumers and operates outside the frame of third-party certification.

PGS-India Web Portal

2.4.1.6 SAMPADA Suite

Central Sector Scheme – Pradhan Mantri Kisan SAMPADA Yojana (Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters) is being implemented by the Ministry of Food Processing Industries (MoFPI). NIC has developed a web-based application suite named “Sampada Portal” (<https://sampadamofpi.gov.in>) for various schemes.

2.4.1.7 PMFME Portal

Government of India has decided on an All India centrally sponsored scheme – “Prime Minister’s Formalization of Micro food processing Enterprises (PMFME)”. A national level portal (pmfme.mofpi.gov.in) has been developed under NIC’s supervision which has automated the complete workflow starting from registration, generating a DPR and submission of application for grant by various micro food processing enterprises, evaluation of the applications by the District Level Committee/ Ministry, forwarding application to bank for sanction of

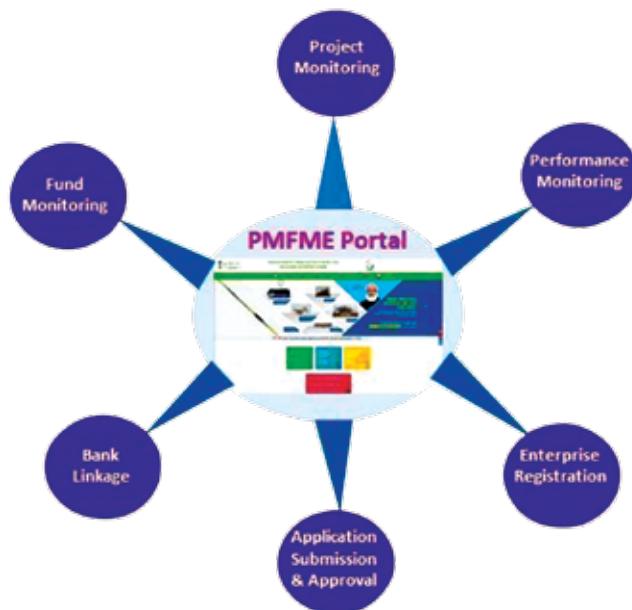
loan, sanction of loan by bank, sanction of grant by the Ministry, providing training and handholding support for upgradation of skills and technical knowhow, providing branding and marketing support, getting financial support from other such schemes of the Central/State Government etc.



2.4.2 Health & Family Welfare

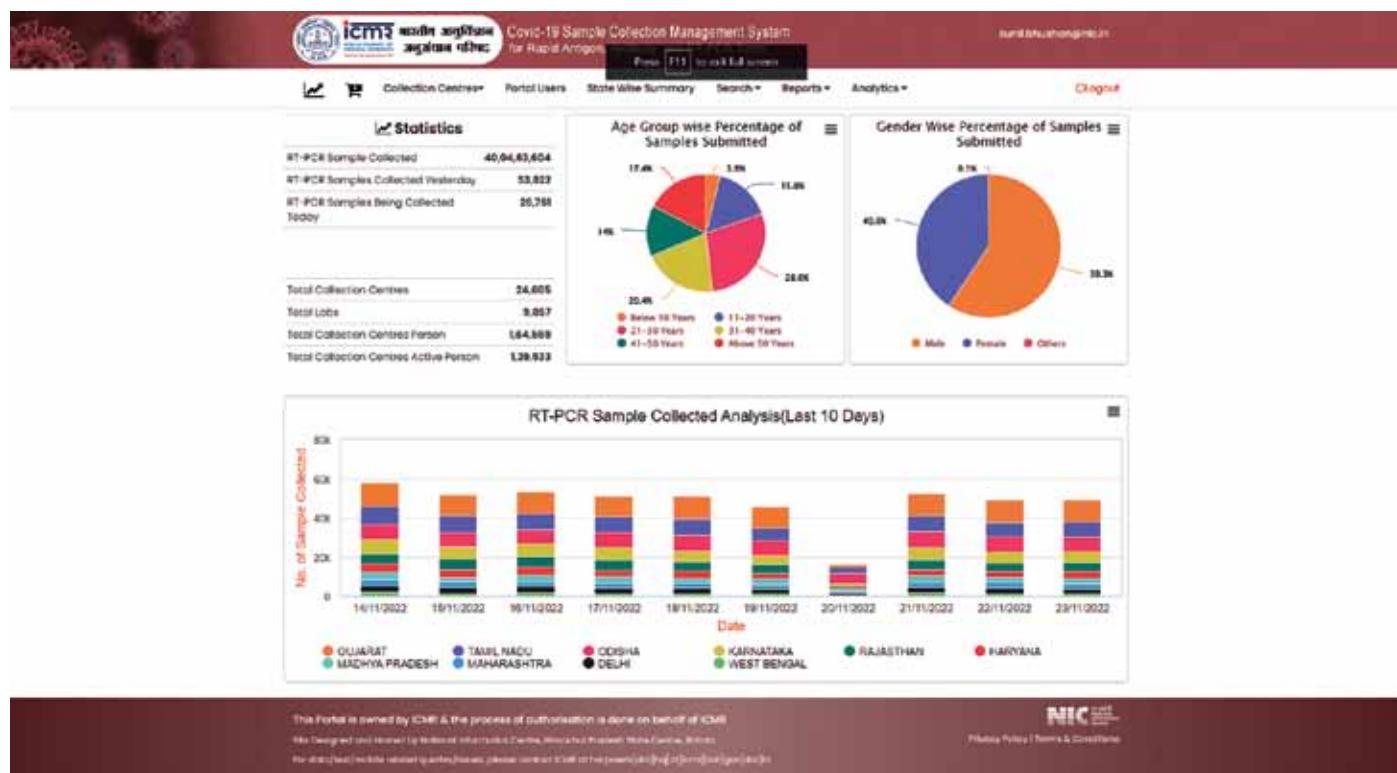
2.4.2.1 AarogyaSetu

AarogyaSetu is a mobile application launched by the Government of India on 2-April-2020, to aid the COVID-19 efforts of the Government. The App works based on contact tracing method and helps the Government in identifying, monitoring, and mitigating the spread of COVID-19 across the country. AarogyaSetu app is being migrated from tracing app to Ayushman Bharat Digital Mission (ABDM) building blocks enabled Health App for the citizens. Features like Ayushman Bharat Health Account (ABHA) creation, viewing of Health Record, eSanjeeviniOPD tele-consultation etc. have already been made available in it. Full integration of ABDM building blocks including Unified Health Interface (UHI) is underway.



2.4.2.2 Covid-19 Sample Collection Management System (RT-PCR/RATI Mobile App)

The Rapid Antibody Test and Reverse Transcription Polymerase Chain Reaction (RT-PCR) were the first two tests started in India during the onset of the pandemic. It was decided to provide the solution in shape of mobile apps so that Geo location of the sample collection can also be ensured. The software has been implemented in 31 of the total 37 States/ UTs.



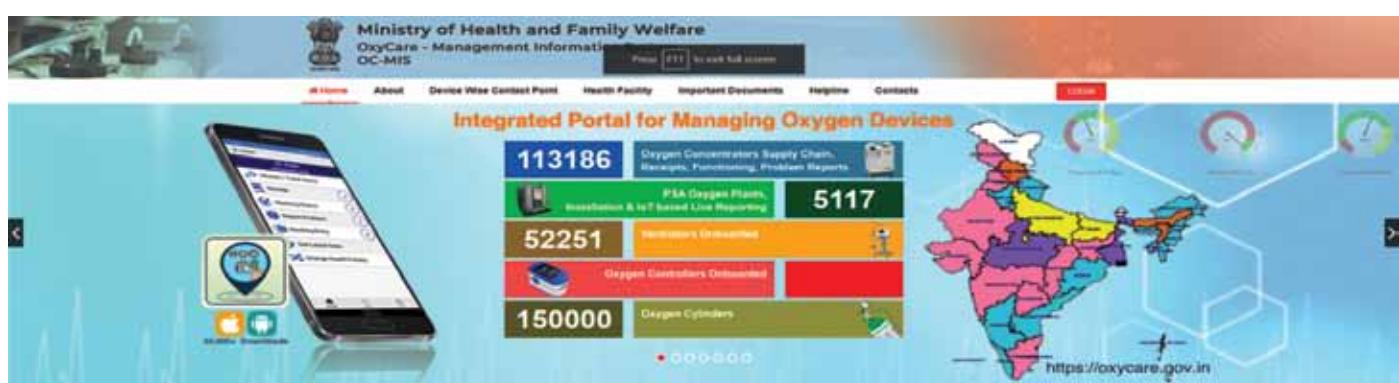
(<https://covid19cc.nic.in>)

2.4.2.3 OxyCare – Management Information System

To fast-track the availability of Medical Oxygen in Health facilities, an IT enabled Management Information System called OxyCare has been developed to track each oxygen device for providing better services to the patients. As of now, Oxygen Concentrators (OCs), Oxygen Cylinders, Ventilators and PSA Oxygen Plants are being monitored using this system. Secure QR Code has been placed on each Oxygen Device, which is read by mobile app to facilitate various tasks in a secure and fast manner. The OxyCare Management Information System (OC-MIS) has been empowered with allocation, distribution, supplies, receipt, installation, maintenance, online monitoring of purity, flow, and pressure in case of PSA Plants. The solution comprises of Mobile Apps, OxyCare and Oxy-Engineers apps developed on Android and iOS platforms. The software has been implemented in all 37 States/ UTs

(ABDM) building blocks like ABHA creation, linkage with Health Record and its sharing. QR Code based Queue Management System has been introduced with its integration with ABHA using Personal Health Record (PHR) App.

#	Key Performance Indicator	Total Numbers
1	No. of Hospitals onboarded on e Hospital	1,095
2	No. of Transactions using e Hospital	30,72,63,526
3	No. of Hospitals onboarded on ORS	552
4	No. of Appointments using ORS	67,23,049
5	Average Daily Transactions using e Hospital	4,50,000
6	No. of Hospitals on QMS	15
7	No. of Token Generated	30,430
8	No. of Hospitals complied to ABDM	518
9	No. of ABHA ID Created	3,01,135
10	No. of Health Records Linked	5,49,165



Welcome to OxyCare – Management Information System (OC-MIS)

When any patient gets a severe COVID-19, the oxygen levels in the body can get low. To keep your oxygen levels at the normal range, patient needs to be given medical oxygen. Medical oxygen can be made available through various devices like oxygen concentrators, PSA Oxygen Plants, Compressed Gas Cylinders and Liquid Medical Oxygen etc. Central Government, State Government and various other organizations are procuring these medical oxygen devices and providing to Health Facilities so that Covid19 patients can be provided whenever it is required.

To fast-track the availability of Medical Oxygen in Health facilities, an IT enabled Management Information System called OxyCare has been developed to track each oxygen device for providing better services to the patients. As of now, Oxygen Concentrators (OCs) and PSA Plants are being monitored using this system. Secure QR Code has been placed on each Oxygen Device, which is read by mobile app to facilitate various tasks in secure and fast manner. OxyCare Management Information System (OC-MIS) has been empowered with allocation, distribution, supplies, receipt, installation, maintenance, online monitoring of purity, flow and pressure in case of PSA Plants.



<https://oxycare.gov.in>

2.4.2.4 e-Hospital Project/Online Registration System (ORS)

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. eHospital and ORS has been integrated with Ayushman Bharat Digital Health

2.4.2.5 Collaborative Digital Diagnosis System

eCollab DDS is a web based comprehensive Teleradiology solution which enables the transmission of images such as X-rays, CTs and MRIs from one geographical location to another which can be viewed and interpreted by Radiologist for diagnosis or consultation purposes.

eCollab DDS has been enabled with Artificial Intelligence for Chest X-Ray images. The AI will predict the presence/

absence of 11 Radiological Detection features and Tuberculosis which will aid the Radiologist for reaching a better diagnosis.

Collab DDS Online Radiological Services (CORS) provides a web interface among different health communities for resolution of Radiological and Dental problems. CORS has been successfully deployed and implemented for the state of Karnataka. Around 9000 cases have been registered so far by the remote health facilities.

2.4.2.6 Central Government Health Scheme

Central Government Health Scheme is providing comprehensive medical care to the Central Government employees and pensioners enrolled under the scheme. Almost 41.96 lakh are enrolled for CGHS health services in 480 Wellness Centers (WC) across 76 cities. The beneficiaries can now access their CGHS plastic card through DigiLocker and mobile app as well. Key enhancements in the application includes automation of issuing of Medical/Fitness certificate, new module for Lab and investigations, bringing data of pensioners of Air India in CGHS application, inclusion of Jan Aushadhi medicines in the formulary etc.

<https://cghs.nic.in>

2.4.2.7 Reproductive & Child Health (RCH)

Reproductive and Child Health (RCH) is an innovative name-based system to capture information on all RCH related services including family planning, maternal health, Child health and immunization and to monitor performance at all levels (National, State, District, Block, PHC and Sub Centre level). RCH has been integrated with Ayushman Bharat Digital Health Mission (ABDM) for Milestone 1 and Milestone 2 activity. In Milestone 1, provision of creating and linking of ABHA (Ayushman Bharat Health Account) with RCH ID is provided for all new and existing EC and PW beneficiaries registered in RCH. So

far more than 3.22 Lakh RCH IDs have been linked with ABHA. Out of this figure, approximately 1.96 Lakh ABHA have been created using RCH platform. In Milestone 2, health records (care contexts) of beneficiaries are being shared with PHR app of ABDM. Currently, approx. 22

Lakh Care contexts have been successfully linked with ABDM.



<https://rch.nhm.gov.in>

2.4.2.8 NHM-PMS (National Health Mission - Progress Monitoring System)

National Health Mission Progress Monitoring System is an application developed for allocating, managing, monitoring, and updating the physical and financial progress for various health schemes from top to grassroot level.

2.4.2.9 Sickle Cell Disease Control Programme



<https://sickle.nhm.gov.in>

Sickle Cell is a suite of applications developed for National Sickle Cell Disease Control Programme to improve care of all Sickle Cell Disease patients for their better future and to lower the prevalence of the disease through multi-faced coordinated approach towards screening and awareness strategies. At present, the application

is launched in 17 States and UTs where the disease is most common. The programme targets around 7 crore persons in three & half years-1 Cr in 1st year then 2 Crore screening per year (up to 2025-26).

2.4.3 Finance

2.4.3.1 Public Financial Management System (PFMS)

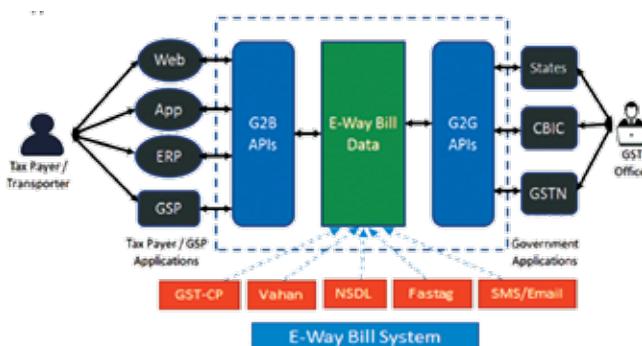
PFMS aims to develop integrated digital finance network of Central, State Governments and the agencies of State Governments. It plans to provide financial management platform for all plan schemes, a database of all recipient agencies, integration with core banking solution of banks handling plan funds, integration with State Treasuries and efficient and effective tracking of fund flow to the lowest level of implementation for plan scheme of the Government.

Centrally Sponsored Schemes - As on date, 5094 CSS schemes have been on-boarded on PFMS. Out of 19.44 lakhs agencies enrolled in PFMS for CSS schemes, 15.14 lakhs have been onboarded for SNA scheme. Further, 79 external systems are integrated with PFMS for SNA DBT payments or for sharing DBT MIS data of payments made by them. 47 external systems are integrated with PFMS for SNA REAT payments or for sharing REAT MIS data of payments made by them.

Central Sector Schemes - As on date, 174 CS schemes have been on-boarded on PFMS for EAT and 5 for DBT.

2.4.3.2 e-Way Bill

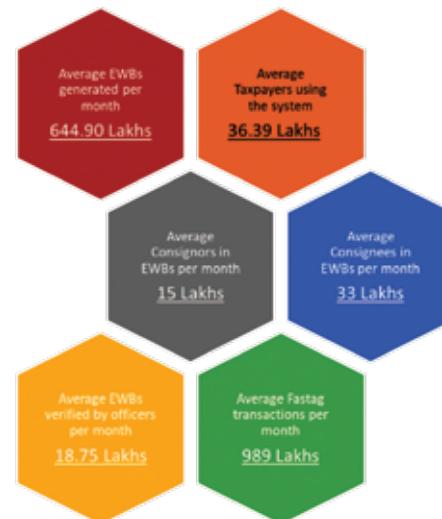
e-Way Bill (EWB) mechanism is put in place to ensure that goods are transported in accordance with GST laws and tax is paid for the supply of goods. e-Way Bill is an electronic document which gives details regarding the movement of goods and needs to be carried by transporters for any consignment exceeding Rs.50,000.



The application facilitates operations on e-Way Bill through multiple modes like Web, Mobile, SMS, API and Offline tool. E-Invoice system is seamlessly integrated with e-Waybill system for generating e-Invoice along with e-Waybill.

E-way bill has been interfaced with Fastag-RFID and Vahan system to verify/monitor the movement of vehicles updated in e-Way Bill. RFID based EWB reports have helped the department officers in conducting effective vigilance on the roads.

The Comprehensive Analytics on e-Way Bill system for officers has helped in identifying fraudulent transactions by taxpayers.



2.4.3.3 GST Prime

GST Prime is an Analytical tool, developed by NIC, Karnataka for the GST officers. This has played an important role in improving the indirect tax collection of the State as well as of the Central GST. The officers of the Commercial Taxes department have been dependent on the application for their day-to-day activities in terms of monitoring the tax compliance, to identify and initiate appropriate actions against the non-filers of returns, identifying and highlighting the possible fraudulent activities carried out by taxpayers in order to evade taxes, establishing relations / possible links with other stakeholders in case of frauds, identifying and reversal of ineligible Input Tax Credit claims and having complete information on the taxpayers through the taxpayer profile etc.

DASHBOARD HIGHLIGHTS



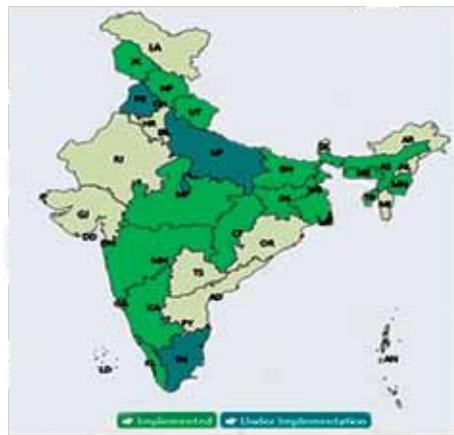
Risk based analytics helps the officers to identify the cases that can be taken for scrutiny, audit etc. The officers can focus on the logically shortlisted cases and hence increases the efficiency.

Using AI & ML, the Tax collection is being predicted which will help the department to plan strategies for improving the revenue collection.

2.4.3.4 e-Invoicing System

GST e-invoicing system is a system of reporting, the invoices being issued by the taxpayers to their customers, on the Government portal on near real time basis and obtaining a unique Invoice Reference Number (IRN). e-invoicing system is game changer in GST implementation. It has many advantages for businesses such as standardization, enhanced interoperability between various stakeholders- suppliers, recipient, transporters, Government and financial institutions, auto-population of invoice details in GST returns and e-way bill. It has also controlled the issuance of fake invoices

IMPLEMENTATIONS



How It Works



or claiming excess input tax credit and at the same time facilitating quick ITC credit to the genuine recipients.

Total Suppliers generating e-Invoice:

4.7 Lakhs

Total Recipients in e-Invoice:

97.6 Lakhs

2.4.3.5 e-Abgari

e-Abgari project is end-to-end supply chain management system of Beverage Alcohol, Medicinal Alcohol, Industrial Alcohol & Life Saving Narcotic Drugs in state excise sector enabling better regulation to minimize the social and public health import while safeguarding the revenue collection from excisable articles. Presently, 68

e-Services are being rendered in workflow-based manner for Grant & Renewal of Licenses, Packaged Liquor Brand Registration, Issuance of NOC/Permit/Passes for Import/Export/Transport, Real-time management of Spirit/Packaged Liquor Inventory and Excise Revenue, e-Chemical Examination Laboratory and management of Excise Offender Cases, Enforcement Activity.



Narendra Modi @narendramodi · Sep 28

I am delighted by the enthusiasm towards the PM Mementoes auction over the last few days. From books to art works, cups and ceramics to brass products, it is a whole range of gifts I have received over the years that are up for auction. pmmementos.gov.in/#/

Hon'ble PM's tweet about the PM Mementoes auction



2.4.3.6 Indian Customs Electronic Data Interchange System (ICES)

Indian Customs Electronic Data Interchange System (ICES) is implemented and running successfully at 257 locations pan India, the Indian Customs Electronic Data Interchange System (ICES) is an epitome of promoting Ease of Doing International Business with Efficiency, Transparency, Accuracy and Accountability.

2.4.3.7 eAuction India

eAuction India (eauction.gov.in) is a comprehensive platform for electronic auctions across State and Central Government departments has witnessed adoption by 19 States/UTs and few Central Government organizations, processing 36,591 auctions worth ₹ 13,450 Crores. Platform caters to Forward, Reverse, Single lot, Multi lot auctions.

2.4.3.8 PPP-India

Provides key information related to PPP initiatives in India and to share PPP best practices for PPP practitioners both in Government and the Private Sector. The website is a repository of Policy Documents, Government Guidelines, Model Documents, project Information, information on the Institutional Mechanisms for appraisal of PPP infrastructure projects, Schemes developed for financial support to PPP projects and Guidance Material and Reference Documents developed by the PPP Cell. The site www.pppinindia.gov.in also provides information on infrastructure projects implemented in India.

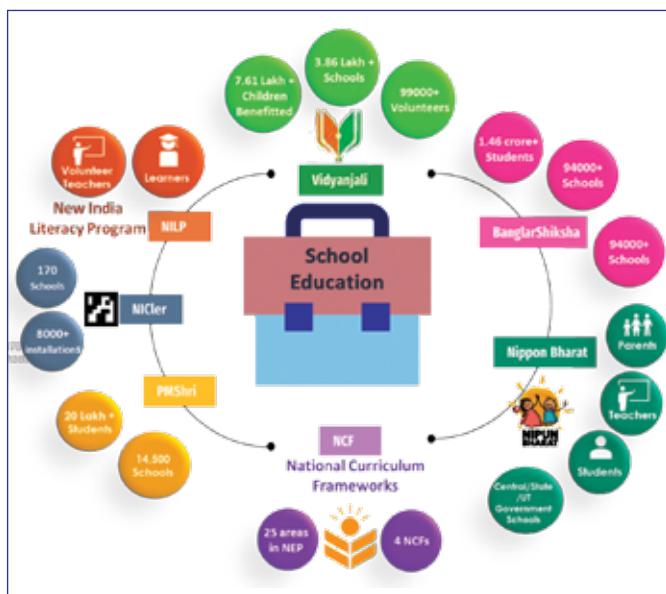
2.4.4 Education

2.4.4.1 School Learning and Management Platforms

- Vidyanjali solution is based on a volunteer program to strengthen the schools across the

country through community and private sector involvement in services/activities, assets/material/equipment etc. Over 7,61,330 children have been benefited through this program. To achieve universal foundational literacy and numeracy in primary school by 2025, Nipun Bharat Results Frameworks provides the platform to formulate for 5 Year's Perspective Plan of Diagnostics & Goal Setting, Academic Outcomes and Administrative Outcomes.

- The PM SHRI Platform, a new initiative to stimulate a safe learning environment in approximately 14,500 schools, will facilitate conducting the selection of schools at Preliminary stage, ease the overall process of creating data repository and reporting. A School Quality Assessment Framework (SQAF) and Physical and Financial Monitoring Framework will be developed specifying performance indicators to measure the outcome.



- Online Teaching, Learning and Assessment System (OTLAS) under NILP (New India Literacy Programme) is a solution that addresses the issue of adult Education in India by providing digital means to import and learn with the objectives like Identification of non-literate personnel (Learner), Voluntary Teachers (VTs) for educating non-literates. With integration of DIKSHA, it would enable online courses available for teaching,

VTs will be able to teach courses online. It will also enable assessment of Learner, Certification to Learner and VTs, Transition of a Learner from non-literate to literate category and Physical & Financial Monitoring. It aims to cover 25 crores illiterate adults in a period of 5 years.

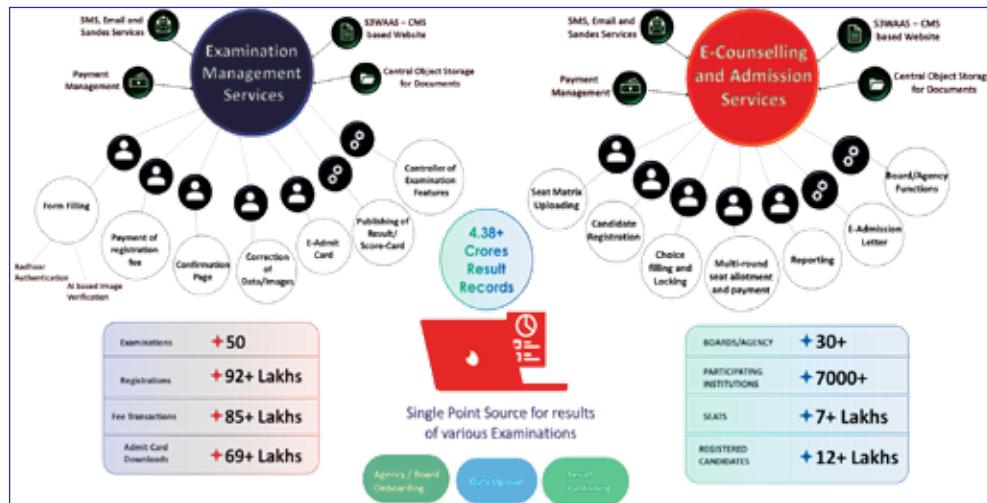
- NICler a cost-effective tool been developed by NIC to conduct multiple choice questions-based assessments where students are given NICler IDs in the form of printouts of ArUco markers which enables students to answer questions from at most 25 feet in a classroom.
- The National Curriculum Framework (NCF) an ICT intervention developed by NIC to create an outcome-based learning approach for an inclusive learning environment, covering Curriculum & Pedagogy, Cross Cutting Themes, and other important areas under NEP, 2020.
- The Banglar Shiksha Portal is a complete information management system for school education ecosystem, benefitting over 94,000 schools and over 1.46 crore students. As on December 2022, a Single Window solution for all Stakeholders of School Education Department which comprises of 5 major verticals like, Students, Teachers, Schools, Infrastructure, and Incentives, covering most of the activities involved in all the verticals.

2.4.4.2 Examination and Admission Services

Examination Management systems ensure secure and timely delivery and much needed accuracy in assessments/examinations. NIC has been successfully partnering with many national and state level examination bodies like NTA, CBSE, OJEE, WBJEE, etc. to provide pre and post examination services for entrance examinations such as JEE (Main), JEE(Advanced), NEET, etc.

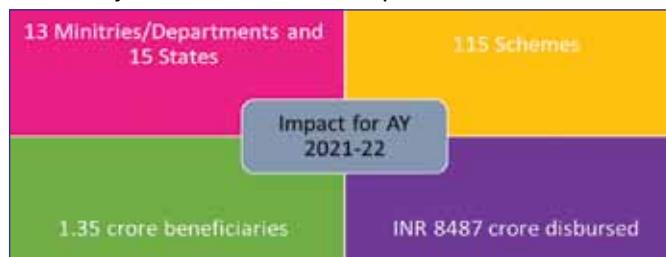
It also provides support for recruitment examinations such as in Allahabad High court, NHAI, DU, etc. Starting from Registrations, Form filling, payment, Answer Key Challenge, to Score/Rank Card Publishing; all activities that are required in the examination process have been made simple and accessible to all with the Examination Management Services Platform.

HSE-iExamS, VHSE-iExamS and CuBOS-SBTE solutions provide end to end Examination Management catering to over 9 lakhs students in over 2000 institutions in Kerala. Online Common Entrance Test (OCET) is an examination solution for entry into B. Pharmacy course, in Haryana

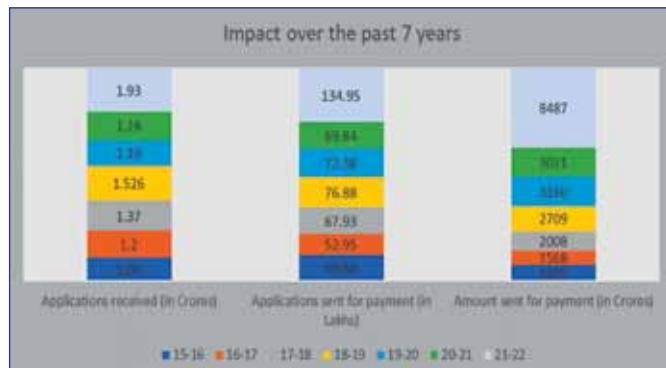


2.4.4.3 National Scholarship Portal

National Scholarships Portal (NSP) is an end-to-end integrated unified portal for all scholarship schemes offered by Central Ministries/Departments and states.



NSP Impact in AY 2021-22



NSP Impact in last 7 years

2.4.4.4 Schemes and Welfare Program Management

PM POSHAN formerly known as the Mid-Day Meal Automated Reporting & Management System (MDM-ARMS) is a Centrally Sponsored scheme for providing one hot cooked meal to all school children in Government and Government-aided schools. This multiple award-winning solution in Himachal Pradesh has been implemented in 17 States/UTs of the country have come on board covering 3.9 Lakhs and 9 Lakhs teacher as respondents.

Sabooj Sathi Portal facilitated distribution of bicycles to an estimated 40 lakh students studying in classes IX to XII in Government and Government Aided Schools and Madrasahs of the State under the Sabooj Sathi Scheme. It provided tracking,

management, monitoring and Supply chain Management services for effective implementation of the scheme.

Monetary benefits in the form of Uniform and Notebooks, as part of the **Samagra Shiksha Abhiyan** to over 90,000 primary and middle school students and merit in Chandigarh. A solution for merit and attendance-based scholarship disbursement to meritorious SC/ST/OBC and girl students in school.

2.4.4.5 Educational Institutes Information Management

NDEAR (National Digital Education Architecture) is a globally pioneering effort in education which will unify the national digital infrastructure to energize and catalyze the education ecosystem. It is federated, unbundled, interoperable, inclusive, accessible, evolving which aims to create and deliver diverse, relevant, contextual, innovative solutions that benefit students, teachers, parents, communities, administrators resulting in timely implementation of policy goals. NIC's focus is develop core registries for digital educational ecosystem.

UDISE+ (Unified District Information on School Education plus) is the largest database of school education in India,

covering approx. 15.1 lakh schools, 26.44 crore children and 96.96 lakh teachers with over 7.25 lakh registered users. Schools in UDISE are given a unique identifier: UDISE code. UDISE Plus ecosystem consists of multiple applications namely, School Directory Management, Annual Data Capture, Know your School, Data Sharing Platform, API platform, School GIS, and Dashboard etc.



The Performance Grading Index (PGI) provides insights on the status of school education in States and UTs including key levers that drive their performance and identify critical areas for improvement. PGI assesses states' performance in school education based on data drawn from UDISE+, NAS, Mid-Day Meal, etc. This year District PGI reports, and their respective dashboard have been released for each district.

All India Survey on Higher Education (AISHE) covers information about over 54 thousand higher education institutions (universities, colleges, and standalone institutions) with more than 3 crores enrolments and 15 lakh teachers. The system has been enhanced to capture the information online. Education Institute Directory as a Service (EIDeAS) has been conceptualized to provide a single source of truth for all kinds of educational institutes across various domains. The directory will serve as an Institute Registry to help in integration of institute information across domains.

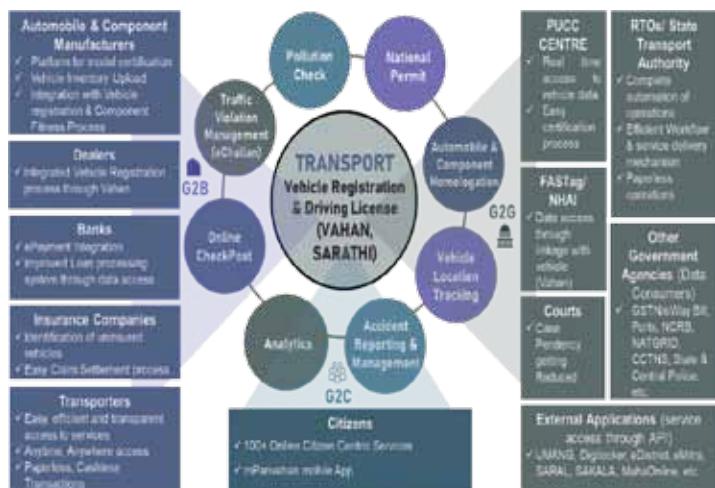
2.4.5 e-Transport

e-Transport MMP is an umbrella platform for facilitation of various transport services in a user-friendly manner. It has transformed the service delivery mechanism for vehicle registration, driving license, enforcement, taxation,

permit, fitness, and related activities through multitude of applications. 100+ online services complement the solution by facilitating document upload, ePayment, online appointment etc., some of which are completely contactless.

2.4.5.1 Growth as a Public Digital Platform

The e-Transport MMP has steadily evolved from primarily a medium for online RC and DL related services, to a comprehensive public digital platform. The integrated ecosystem comprises Automobile and component manufacturers, Fitment Centres, Car dealers, PUCC kiosks, Banks, Insurance Companies, Transporters, Private Fitness Centres, support agencies for Smart Card, HSRP, FasTag, Security agencies like Police, CCTNS/NCRB, NATGRID, along with eDistrict, CSC, UMANG, DigiLocker, etc. services, all connected to the common e-Transport platform through API and other mechanisms.



Features of e-Transport

2.4.5.2 mVahan

mVahan has been envisaged as a convenient mobile solution for managing various Vahan Services by Departmental Officers at the RTOs and other internal stakeholders like Dealers. The current version, available in android platform, facilitates several processes including automation of Vehicle Inspection and Fitness, facilitation of document upload by Dealer/RTO during vehicle registration and other services like processing requests for Change of Address etc.

2.4.5.3 Integration of eChallan with Intelligent Traffic Management System (ITMS)

Several states and smart cities have implemented Intelligent Traffic Management System (ITMS) to modernize the traffic management system. As part of this, advanced technologies/components like CCTV/ANPR cameras, Speed Guns, OSVD/RLVD devices, etc., have been installed to effectively monitor the traffic violations. The data captured by these systems have been integrated with the eChallan Traffic Enforcement Solution for issuance of challan notices to violators in a non-invasive manner. Additionally, there is integration with Virtual Court, which enables online settlement of violations, from online court referral to closure. Such integrated system has been implemented in 13 states & more than 3.5 Crore traffic violation notices have been issued through the system as on December 2022.

2.4.5.4 Bharat Series vehicle registration

To facilitate seamless transfer of vehicles across states, a provision for “Bharat series (BH-series)” is provided as per Gazette Notification G.S.R – 294 (E) issued by Ministry of Road Transport & Highways. NIC has incorporated the needful changes in the Dealer point module and provision has been provided to all states for Central issuance of BH series number from the portal.

2.4.5.5 Vehicle Recall Management System

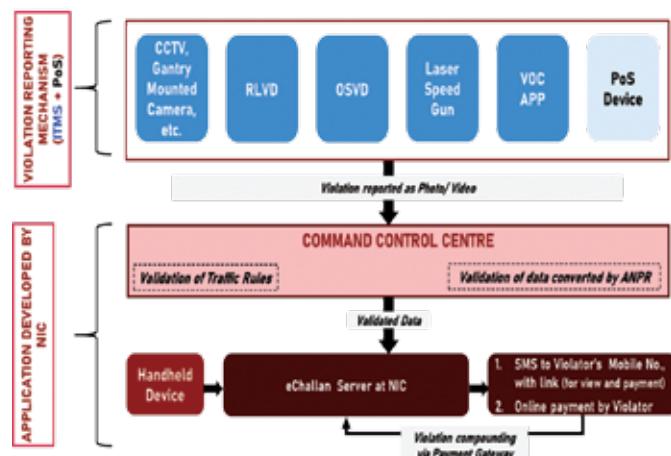
The recent notification by MoRTH (SO 1232(E)) envisages to streamline the vehicle recall process by the Manufacturers, by facilitating a robust online system with the technical support of NIC. To accomplish this objective, Vehicle Recall Management System is being facilitated to handle every aspect of vehicle recall, including Customer notification and response mechanism, Process Tracking, Compliance, and reporting, among other necessary stages of the cycle. It may also take care of recall events triggered by retrofitting requirements in vehicle(s). A portal has been launched, for digitization of the vehicle complaints and recall process, and to host multiple other functionalities including user registration, complaint registration, action taken by designated officers, etc.

2.4.5.6 All India Tourist Permit (AITP) module

NIC has developed a new module for providing this online service to all stake holders as per the MoRTH issued Gazette notification - G.S.R 166(E) dated 10th March 2021 regarding All India Tourist Permit (AITP) Rules, - <https://vahan.parivahan.gov.in/aitp/>. In this module a provision is provided to all states for Central issuance of AITP from the common portal. The module has been activated and come into force from 1st Apr 2021.

2.4.5.7 Vehicle Location Tracking & Emergency Alert System (VLTEAS)

Vehicle Location Tracking & Emergency Alerts System (VLTEAS) has been conceived by MoRTH for implementation across the country. The complete system is based on AIS-140 specification as notified by the Ministry defining the process for fitment of approved tracking devices in public service vehicles and setting up of VLTS Command and Control Centre (C&CC) at state level.



While the VLTD Maker application is operational in 20 states (Andaman & Nicobar Island, Arunachal Pradesh, Bihar, Chandigarh, Chhattisgarh, Delhi, Goa, Haryana, Himachal Pradesh, Jammu & Kashmir, Kerala, Maharashtra, Meghalaya, Puducherry, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand and Uttar Pradesh) and the Command & Control Centre is operational in States - Uttarakhand, Goa and Rajasthan (for ambulance only) and is under progress in States- Bihar, Punjab, Chandigarh, Mizoram and Haryana as on December.

2.4.5.8 Automatic Fitness Management System/Automated Testing System

The recently launched Automatic Fitness Management System (AFMS) will provide motor vehicle owners ability to book vehicle tests, view test results, apply for re-test and appeal against first test result. Automated Testing System (ATS) operators will be able to manage test bookings and generate test results.

2.4.5.9 Registered Vehicle Scrapping Facility (RVSF)

The Voluntary Vehicle Scrapping application provides motor vehicle owners to phase out new/old and/ or unfit vehicle seamlessly. It helps to boost the automotive sector and also provide checks on vehicular pollution. The application also encourages setting up of inspection and fitness Centers and scrap yards to judge the condition of vehicles and then subsequently scrap the vehicles.

2.4.5.10 Faceless, contactless, Aadhar-eKYC based services

NIC has transformed existing Transport services into Faceless/Contactless mode leveraging advanced technologies like Aadhaar Auth/eKYC, AI-based face recognition, eSign/ DSC, and other business process transformations. Online facility for filing application, making ePayment, uploading documents, taking appointments was already available for most of the services. The launch of Faceless Services is a quantum leap in the system as it facilitates complete elimination of RTO visit, freedom from standing in queues and hassles from middlemen.

As on December, this facility is provided on 53+ services and implemented in 17 states. This initiative has benefited all stakeholders like Citizen and RTOs by reducing RTO footfall and faster, hassle free delivery of services. A highlight of the system is the integration of the Artificial Intelligence based face recognition feature facilitated by NIC for authenticating the Learner License Test applicants.

2.4.5.11 Next Gen mParivahan Mobile App

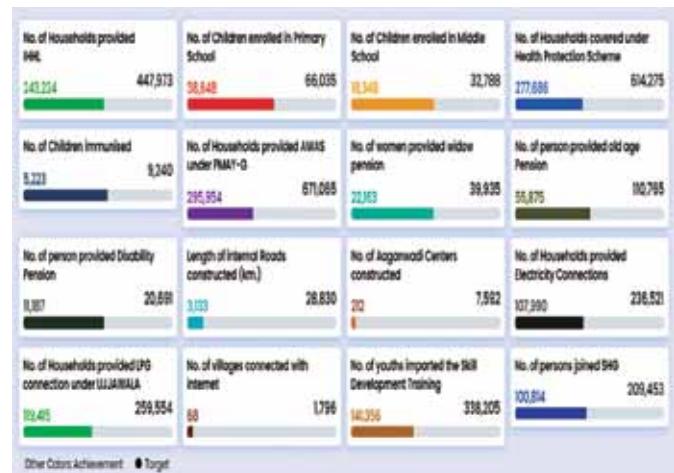
To facilitate greater convenience to the citizens and increase accessibility, a super app 'NextGen mParivahan' has been developed by eTransport Division of NIC by

encapsulating all the features, functionalities and related utilities pertaining to transport related services in a single-stop platform. The first version of the app with 25 online services and utilities has been developed and is now ready for release. The app is available on both Android and iOS.

2.4.6 Inclusive Development

2.4.6.1 Pradhan Mantri Adarsh Gram Yojana – PMAGY

The objective of PMAGY is to ensure integrated development of the selected villages having more than 50% SC population so that the disparity between SC and non-SC population is eliminated and the level of monitorable indicators is raised to at least that of the National average. The PMAGY-MIS facilitates the online monitoring of PMAGY scheme.



The scheme is being implemented in 19,104 villages of 529 districts and 24 states.

2.4.6.2 Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)

NREGA Mobile Monitoring System (NMMS App)

The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) is a flagship programme of Govt. of India to enrich livelihood security in rural areas by giving at least 100 days of guaranteed wage employment in a financial year to all the rural households whose members aged above 18 years and volunteer to do unskilled manual work. NREGAsoft a single window application for MGNREGA is tightly coupled

with Secure for estimation of works, GeoMGNREGA for geo tagging of worksite, JANMGNGREGA a citizen centric app to capture the feedback on worksites. Owing to the magnitude of the MGNREGA, these IT tools help in the day-to-day processing of registrations, e-muster attendance, payments, and progress. These MIS technologies have been customized for the successful pan-India implementation of the scheme in a transparent and accountable manner. MGNREGA has 31.31 Cr. registered workers, 15.5 Cr. active workers, total number of job cards issued 16.94 Cr. and total number of active job cards is 10.21 Cr as on December.



Fig: NMMS App Screen

Pradhan Mantri Awaas Yojana-Gramin (PMAY-G)

Management Dashboard : To achieve the objective of providing “Housing to All” by the year 2024, the Government of India rolled out the rural housing scheme, Pradhan Mantri Awaas Yojana-Gramin (PMAY-G) with effect from 1st April 2016. The program envisages the completion of 2.95 crore PMAY-G houses with all basic amenities by the year 2024. As on 21st October 2022, a total of 2.07 crores PMAY-G houses have been completed against the allocated cumulative target of 2.72 crore houses.

The Scheme is being implemented and monitored through end-to-end e-governance solutions like AwaasSoft and Awaas. AwaasSoft provides functionalities for data entry and monitoring of multiple statistics related to implementation aspects of the scheme. PMAY-G Management Dashboard has been launched for stringent monitoring of the implementation of the scheme.

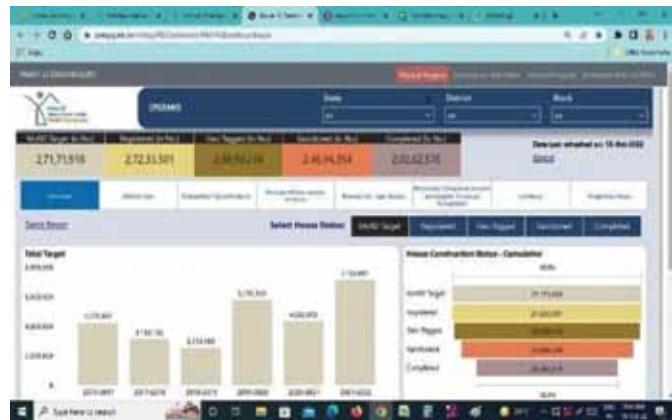


Fig: PMAY-G Management Dashboard (<https://pmayg.nic.in/netiy/PBIDashboard/PMAYGDashboard.aspx>)

2.4.6.3 Jal Jeevan Mission (JJM)

Jal Jeevan Mission aims that every rural household has drinking water supply in adequate quantity of prescribed quality on regular and long-term basis at affordable service delivery charges leading to improvement in living standards of rural communities. Key ICT initiatives are:

JJM IMIS : brings together all data, i.e., tap connection provided at households, Village Action Plans, District Action Plans, State Action Plans, Village level Water & Sanitation Committees details, etc.

JJM Dashboard : captures all essential monitoring parameters i.e., no. of FHTCs provided, changes after launch of mission, up to village level details, grievance redressal system, etc.

JJM WQMIS : all functional laboratories in the country are one click away from community so that anyone can identify the nearest water testing lab and can get their private water tested and get results digitally

Mobile app : enables data collection for Paani Samiti/VWSC, GPs and officials using mobile or laptop. The data will be regarding financial collection, progress of work, maintenance etc.

IoT Platform : to monitor Key Performance Indicators, and also ensure quick response, minimum service delivery outage, minimum water loss, etc.

JJM Training Portal : is meant to address the training management need of the National Jal Jeevan Mission.

JJM Website & Rashtriya Jal Jeevan Kosh (RJJK) Portal: Information about overall policy formulation, planning, financing, and coordination for JJM. RJJK portal enables individuals/ organizations to donate/ contribute to making provision of clean drinking water in village of their choice.

URL - <https://ejalshakti.gov.in/JJMreport/jjmraking.aspx>



2.4.6.4 Swachh Bharat Mission (Gramen)

Swachh Bharat Mission-Gramin in phase-1 had achieved the objective of Open Defecation Free (ODF) rural country in October 2019. Further to sustain ODF status and to have arrangements to manage solid and liquid waste in rural villages by 2025 SBM-Phase2 was launched on 1st April 2020.

The SBM phase-II programme focuses on transforming all ODF villages to ODF- Plus which sustains ODF status and having arrangement of solid, liquid waste management, display of IEC wall paintings & visual cleanliness of the village.

IT Tools of SBMG Phase-II (viz. SBM 2.0 mobile App, SBM-G MIS, SBM Portal etc) are used to capture information of solid and liquid management assets. The data is being reported through from the village level with geotagging of assets.

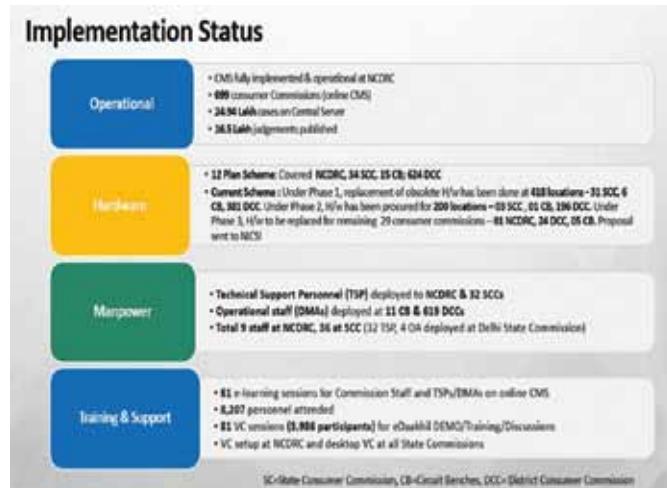
2.4.7 Consumer Affairs and Food & Public Distribution

2.4.7.1 Confonet

The scheme of 'Computerization and Computer Networking of Consumer Fora in the country, (CONFONET)' aims to digitalize the functioning of the

Consumer Commissions at all the three tiers throughout the country. The registration of complaints, recording of court proceedings, issue of notices, generation of cause lists, recording of judgements, record-keeping, and generation of statistical reports etc. are carried out through Online Case Monitoring application software.

More than 24 lakhs cases have been updated, various services for consumers / public like case status, case history, cause lists, judgements, display board, pull SMS have been developed. Dashboards have been developed for administrator and public. IVRS and CHATBOT facility have been introduced to know the Case Status.



CONFONET Implementation Status

2.4.7.2 eDaakhil

As an initiative of Department of Consumer Affairs, a web-based application software named "eDaakhil (<https://edaakhil.nic.in>)" has been developed by NIC. The portal empowers the consumers (who has any grievance w.r.t any deficiency in services or quality of Goods).



e-Daakhil Application features



Consumer Commissions in States/UTs where eDaakhi launched (in green)

2.4.7.3 Targeted Public Distribution System

The scheme on “End-to-End Computerization of Targeted Public Distribution System (TPDS) Operations” was introduced to modernize the TPDS operations and to bring transparency in the distribution of highly subsidized food grains across the country. The System is operated under the shared responsibility of the Central and the State Governments. Due to technological interventions in TPDS operations, a total of more than 4.74 Crore bogus / ineligible/ duplicate ration cards have been identified and weeded out by the States/UTs collectively during the period 2013-2022. RCMS applications have been integrated with DIGILOCKER, UMANG App, NHA – PMJAY, CSC, States Citizen Services Portals etc.

2.4.7.4 One Nation One Ration Card (ONORC)

India has the largest Public Distribution network in the world. To address various challenges such as leakages and diversion of food grains and create a Smart Public Distribution System, IM-PDS scheme was launched in 2018. The Key components of the IMPDS scheme are National Portability, Deduplication, creation of Central Repository and Data Analytics. The ONORC plan is one-of-its-kind beneficiary centric, and technology driven portability system of ration cards, empowering all NFSA beneficiaries, particularly migrant beneficiaries, to access the Targeted Public Distribution System (TPDS) and their entitled NFSA food grains from any Fair Price Shop (FPS) of their choice, anywhere in India, by using their same/existing ration card (number) or Aadhaar (number) with Aadhaar (biometric/OTP) authentication on an ePoS device installed at FPS. Starting with inter-state portability in just 4 States in August 2019, the ONORC plan has been enabled in all 36 States/UTs (across the country) covering around 80 Crore NFSA beneficiaries, i.e., almost 100% NFSA population in the country.

2.4.7.5 Common Registration Facility of Ration Cards (CRF) “Mera Ration Mera Adhikar”

Mera Ration Mera Adhikar - A Web based application to enable States/UTs to collect data of persons desirous of registering themselves for inclusion under NFSA, including migrants residing in other states

‘Common Registration Facility’ has been launched by Department of Food and Public Distribution on pilot basis for 11 States/UTs i.e., Assam, Goa, Lakshadweep, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Punjab, Tripura, and Uttarakhand to collect data of persons desirous of registering for inclusion under NFSA, including migrants residing in other states. Around 1,13,100 registrations have been received and channelized to the states till October 2022.



MY RATION - MY RIGHT COMMON REGISTRATION FACILITY

- Any needy/left-out citizen can register for Ration Card under NFSA
- An individual can become a “Ration Card Mitra” to register for Ration Card on behalf of needy/left-out people
- Registration is available for other than home state also
- Representatives of Panchayats, Urban Local Bodies/Municipalities, or other recognized bodies of good repute can also become the “Ration Card Mitra” on invite basis
- Common registration facility is most useful for Homeless, Rag-pickers, Migrants, Special Abled, Deprived, Sr. Citizens, Domestic Helps



2.4.7.6 Central Food grains Procurement Portal (CFPP)

Government of India and State Governments procure food grains i.e., Paddy and Wheat during the two procurement seasons namely Kharif Marketing System (KMS) and Rabi Marketing System (RMS). State procurement portals have few threshold parameters (MTPs) to ensure that procurement operations are carried out with complete transparency and efficiency like Online Registration of Farmers, Farmer Land Record, Digitized Mandi/Procurement Centre operations, MSP Payments to farmers, CMR/Wheat Delivery Management and API Based Integration. NIC has developed the APIs for integration of Central Food Grain Procurement Portal (Central Server) <https://cfpp.nic.in> with respective procurement application of States.

Judgements, e-Copying for providing benefits of scalability and extensibility for managing in-out bound traffic. As on current date, the e-governance support extended and covers Live streaming of Constitutional Bench, SHCIL Payment Gateway, FASTER (Fast & Secure Transmission of Electronic Record), virtual Court Hearing, e-filing process re-engineering, SCI official Mobile App, Guided tour etc.

Recently, SCI initiative of live streaming of hearing of Constitutional Bench were also executed by NIC, where subscribers reached to more than 8 lakhs. Above services are designed and executed in such manner that respective stakeholders of SCI like Hon'ble Judges, Registry Official, Court Master, Journalists, Nodal Officer, Judicial Officer and Jail Authorities etc are catered for various required functionalities.

The screenshot displays the Central Food Grains Procurement Portal (CFPP) interface. At the top, it shows the Government of India logo, the Department of Food & Public Distribution, and the Ministry of Consumer Affairs, Food & Public Distribution. The main header is "Central Food Grains Procurement Portal". On the right, there is a logo for the Food Corporation of India, "Ensuring Food Security of Nation", and a "Log In" button.

The portal features several data tables:

- National Level Procurement:**

Procuring States	23
Reported States	12
Reported Districts	238
- Procurement:**

Farmers Registered	7,97,418
Farmers Benefited	3,61,636
Quantity Procured (MT)	63,34,383.70
MSP Benefited Farmers	68,683
MSP Payment Made (in Cr.)	1,730.36
- Procurement Centres:**

No. of Procurement Centres (Planned)	18206
No. of Procurement Centres (Transacted)	3,708
No. of Agencies (Planned)	58
No. of Agencies (Transacted)	21
- Farmers - Land Ownership Category:**

Category	Description	Count
Marginal	(Below 1 ha.)	2,34,782
Small	(> 1 ha. and < 2 ha.)	2,62,033
Semi-Medium	(> 2 ha. and < 4 ha.)	2,72,626
Medium	(> 4 ha. and < 10 ha.)	1,94,022
Large	(> 10 Ha.)	29,260
- Farmers - Cultivation Category:**

Cultivation Type	Count
Cultivating on Owned Land	7,28,784
Cultivating on Leased Land	1,59,065
Cultivating on Rented Land	98,549
Involved in Shared Cultivation	46,870

At the bottom, there is a section titled "State Procurement Portals" with links to various states: Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, and Assam. The NIC logo is also present at the bottom left.

2.4.8 Law & Justice

2.4.8.1 eGovernance Support to Supreme Court

The support to Supreme Court of India started with web hosting of official website i.e. <https://sci.gov.in> on NIC Cloud for citizen-litigants centric services like Cause List, Case status, Daily orders, Judgements, Vernacular

FASTER was inaugurated the former CJI on 31.03.2022 and since then all of release and bail orders are communicated over JCN (Judicial Communication Network) with read receipts. The email transmitted containing digitally signed judicial orders embedded with QR CODE and institutional signatures are sent to concerned nodal officers, judicial officers, and jail official. Mandatory use of 2FA for users.

2.4.8.2 Tribunals, Regulatory Bodies and Commercial Courts

Online Tribunals System of NIC is an ICT enabled initiative towards digital transformation of processes, workflows followed in tribunals through process re-engineering and providing a configurable automated system to cater needs of all its direct and indirect stakeholders.

The system is a cost effective, transparent, secured, accountable and 24* 7 available solution which is rolled out at various quasi-judicial bodies across the country and helped in enhancing productivity both qualitatively and quantitatively for speedy justice delivery.

The solution comprises of key components like e-Filing, Case Information System (CIS), Document Management System (DMS), Virtual Court Hearings (Hybrid Mode) and Digital Communication Alerts (SMS/Email) and has been adopted & implemented in various quasi-judicial bodies like NCLT, NCLAT, NGT, UPREAT, APTEL & COMMERCIAL COURTS and initiated in Tribunals like RCT, CGIT, SAFEMA etc. It has helped the tribunals in identifying and eliminating enormous footfall/traffic of stakeholders requiring physical presence, pillar to post running, manual exercises, huge paper-based records etc and making digitization more effective and efficient such that UPREAT running completely a paperless court and able to reduce case disposal time from few hundred days to just 60 days only.

The unique features like access to Lower Court Original Records, pleading Exchange round the clock, Offline and Online DMS, Personal Case Notes, Inter Bench Transfer Module, Case History and Timeline, Online issuance of Digital Signed QR embedded Notices/orders/Judgments, NICNET implementation through MPLS, Integrations with external systems like NeSL, MCA, Bharatkosh, SBI e-Pay etc has enhanced the tribunal judicial productivity, both qualitatively and quantitatively leading to support in delivery of speedy justice by reducing case disposal Average time, paper Consumption minimization of Man efforts, adjournments per case etc.

2.4.8.3 eCourts and Case Information System

e-Courts project has been planned by eCommittee,

Supreme Court of India by submitting National Policy and Action Plan for Implementation of Information and Communication Technology (ICT) in the Indian Judiciary – 2005. The project lays great emphasis on service delivery to litigants, lawyers, and other stakeholders. It involves the creation of improved ICT infrastructure in Courts, Video conferencing etc., and ensures optimum automation of judicial and administrative processes. The project has set up a consolidated nationwide judicial data warehouse with real time updates and availability, which is being used to provide citizen-centric services and inputs for policy making and decision support to the management.

Case Information System (CIS) is an application designed and developed by NIC for Indian Judiciary. It is implemented in High Courts and District & Subordinate courts of the country. Currently CIS version 3.2 is implemented in District & Sub-ordinate courts and CIS HC Version 1.0 is implemented in 23 High Courts in the country. Automated SMS and eMails are triggered to Advocate/Litigants on case events. Single unified portal <https://ecourts.gov.in> and eCourts services mobile app provides citizen centric services government like case status, cause lists and orders/judgements to stakeholders like litigants, advocates, police etc.

Current Statistics are -

- Services portal - around 20 Lakh (2.0 M) hits are recorded daily
- Mobile App (recorded more than 50 Lakh (5 M) downloads)
- SMS – Push/Pull (Around 3 Lakh (0.3 M) 35,000 SMS are sent daily)
- Automated eMail (Around 1.92 Lakh (0.1 M) emails are sent daily)

2.4.8.5 National Judicial Data Grid

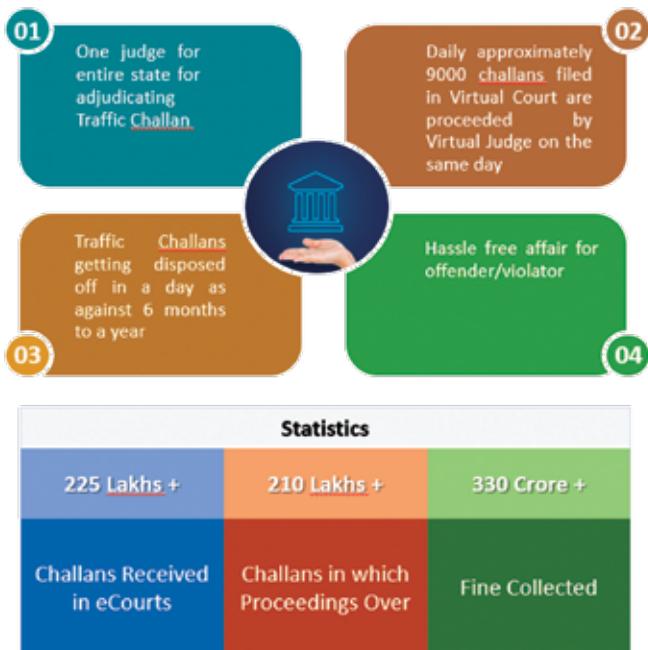
National Judicial Data Grid <http://njdg.ecourts.gov.in> is a consolidated nationwide judicial data warehouse which was set up with real time updates. NJDG provides statistics of pending and disposed cases in the country. It works as a monitoring tool to identify and manage the pendency of cases.

NJDG statistics

High Courts		
1	Number of High Courts	25
2	Pending cases available on NJDG	59,60,293
3	Disposed cases available on NJDG	3,46,05,586
Subordinate courts		
1	Number of Districts	677
2	Number of Court Complexes	3435
3	Number of Establishments	8284
4	Pending Cases available on NJDG	4,32,54,668
5	Disposed Cases available on NJDG	13,19,88,178
6	Total Cases available on NJDG	17,52,42,846
7	Total Orders (Interim and Final) available on NJDG	19,56,26,904

2.4.8.6 Virtual Courts

The concept of Virtual Courts is aimed at reducing footfalls in the courts by eliminating the physical presence of violator or advocate in the court. A virtual judge can preside over a Virtual Court whose jurisdiction can be extended to entire state and working hours may be 24x7. Neither litigant need to visit the court nor judge will have to physically preside over the court, thus saving precious judicial time.



2.4.9 Home Affairs

2.4.9.1 Interoperable Criminal Justice System (ICJS)

Inter-Operable Criminal Justice System (ICJS) is a national platform for enabling integration of the main IT system used for delivery of Criminal Justice in the country by five pillars namely :-

- Police (Crime and Criminal Tracking and Network Systems),
- e-Forensics for Forensic Labs,
- e-Courts for Courts,
- e-Prosecution for Public Prosecutors
- e-Prisons for Prisons.

The system is being built on the principle of 'one data one entry' whereby data is entered only once in one pillar and the same is then available in all other pillars without the need to re-enter the data in each pillar. It was mainly intended to make the Justice delivery system speedy and transparent. This is intended with the following objectives:

The Crime Data spectrum available with ICJS

CCTNS	Solution: Police domain is working at 17200 Police stations of 36 states. It has 6.41 Cr FIRs as on date.
CIS (e-Courts)	Solution: Court domain is working at District and Taluka Courts of 37 States / UTs. It has 12.69 Cr criminal cases of 3295 court complexes.
e-Prisons	Solution: Prison domain is working at 1259 prisons out of 1379 prisons covering 36 states with 1.62 Cr of Prisoner records, 2.3 Cr cases along with 2.25 Cr their visitors.
e-Prosecution	Solution: Prosecution domain is working at 598 Districts of 33 states with 1.65 Cr Case Proceedings, 3.61 Lakh Legal opinion, 99.94 Lakh Court Affairs and 54.12 Lakh DUTR entries.
e-forensics	Solution: Forensic domain is working at 117 FSL labs in the country spreading across the country with a database of 14.09 lakh record.

2.4.9.2 National Cyber Crime Reporting Portal

This portal is an initiative of Government of India to facilitate victims/complainants to report cybercrime complaints online. It caters to complaints pertaining to cybercrimes only with special focus on cybercrimes against women and children. Complaints reported on this portal are dealt by law enforcement agencies/ police based on the information available in the complaints. It is imperative to provide correct and accurate details while filing complaint for prompt action.

National Cybercrime Reporting Portal (www.cybercrime.gov.in) or any victim of financial cyber fraud can dial helpline number 1930.

Types of Portals:

- National Cybercrime Reporting Portal (NCRP) – For Citizen to report and track their Cybercrime complaints. (<https://cybercrime.gov.in>)
- National Cyberpolice Portal (NCPP) – Backend portal for LEAs and financial intermediaries to process the complaints. (<https://cyberpolice.nic.in>)

Features of online Portal:



Total 15 Lakh+ complaints have been registered and 175+ crore money has been saved through this online portal as on December 2022.

2.4.9.3 ePrisons

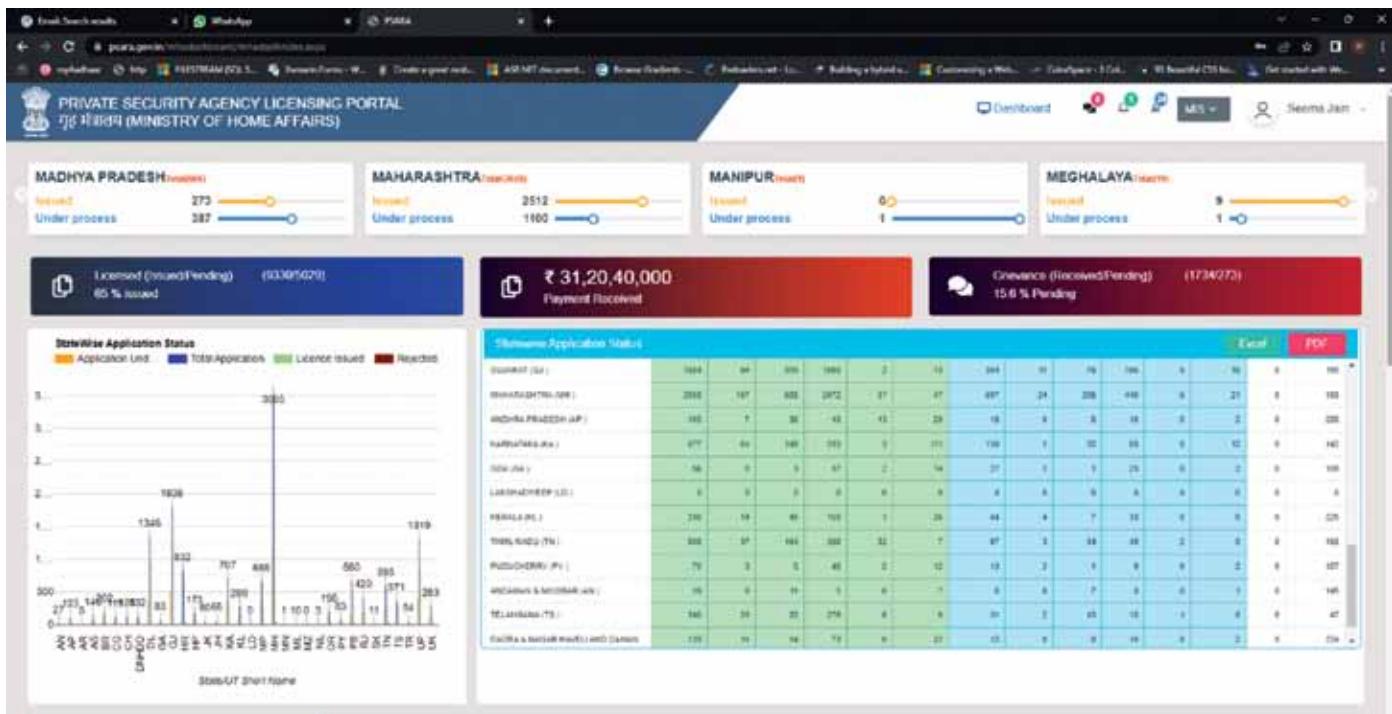
ePrisons is a comprehensive application which has developed over time by studying the working process of various prisons across the country and it covers the entire lifecycle of the prisoner. It is an internationally acclaimed product implemented not only in all states of India but also internationally.

This product is highly configurable as per the needs of the state prison department and caters not only to the entire lifecycle of the prisoner but also caters to various needs of the prison authorities. There are around 65 modules under the umbrella of 7 Major applications in the application for serving the purpose at various level of the government. New modules are also integrated into the application as per the best practices requested from states and available to any state which desires to roll out such features.

Total Statistics	On Average Daily basis
1. Coverage: 36 States	1. Population: 6,10,171 per day
2. Prison Inmates: 1.62 crore	2. Admissions: 2500 per day
3. Visitors: 2.25 crore	3. Release: 2500 per day
4. Cases/FIRs Cases: 2.25 crore	4. Visits: 15000 (1-3 visitors per visit) per day VC Based eMulakat – 8000 per day
	5. Court Hearing: 4000 (Both Physical and VC) Parole: 300-400 per day
	6. Bailed out: 1000-1200 per day

2.4.9.4 Private Security Agency-License (PSA-License) Portal

Private Security Agency-license (PSA-Licence) portal is a single window Portal (<https://psara.gov.in>) for new/renew of Private Security Agency license to run their businesses, required under the Private Security Agencies Regulation Act 2005 for all the Stats/UTs of India. The Portal is for Pan-India usage including general public, beneficiaries are private security industries, State/UT Governments and citizens including ex-personnel of CAPFs for second career opportunities. Portal is available in 14 Indian languages and implemented in all the States/UTs of India except West Bengal.



MHA Monitoring Dashboard

2.4.10 Social Welfare

2.4.10.1 PM CARES

PM CARES for children IT platform was envisaged as a one stop solution for bringing all the aspects of child welfare of children covered under PM CARES for children scheme (children who lost both or surviving or single parent to COVID from 11th March 2020) in one place - financial assistance, boarding & lodging, healthcare, scholarship & educational support. 9042 applications were received on the portal from across the country till December 2022. The entire process of recommendation and approval was online to ensure transparency and traceability. Details may be seen at <https://pmcaresforchildren.in/>

2.4.10.2 Track Child and Khoya-Paya Portal

In the year 2022-23, the missing children portal has been integrated with the Crime and Criminal Tracking Network and Systems (CCTNS). It will not only remove duplicate efforts done by police officials at ground level but also the tracking of the missing children will be possible in lesser time.

Moreover, this year, around 700 Railway Protection

Force (RPF) posts have been onboarded in the Track Child system. So now, the information of the children who are recovered at different railways stations can be input directly by RPF officials and restoration and other care and protection services would be delivered as soon as possible.

From April 2022 to mid-October, information of 30,492 missing children and 26,062 found children at various locations has been entered in the system and out of total, 25,007 children have got traced and matched.

2.4.10.3 NGO Grants in Aid Proposal and Tracking System (e-Anudaan)

The portal, developed by NIC in-house, facilitates online submission of NGOs proposals and automates the complete process for release of Grant-in-Aid. Various Back-office users have privileges for application processing as per the role defined at District, State Secretariat and at the Central Ministry. The process involves application verification, checklist filling, inspection report, scrutinizing, screening, recommendation, financial approval, and GIA sanction. It is integrated with NGO Darpan portal for Registration of VOs at e-Anudaan and DBT Bharat Portal for DBT data of the schemes.

**NATIONAL TRACKING SYSTEM
for
MISSING & VULNERABLE CHILDREN**

TrackCHILD 3.0

Let's reintegrate every "Missing Child" of the country with their families

There is no greater burden or torture in this life than for parents to live without their child.

In Emergency, dial
1098 for Childline
100 for Police

CITIZEN'S CORNER	USEFUL LINKS	LOGIN SECTION	TODAY'S STATISTICS
<ul style="list-style-type: none"> Inform About Missing/Found Children Search a Missing/Found Children  Khoya-Paya Citizens corner of Track Child	Photographs of Missing/Found Children Check The Status of Your Complaint of a Missing Child Quick Search Online Registration of Child Care Institutions	 POLICE LOGIN HERE  CCI/CWC/JJB	 VIEW DETAILS

2.4.10.4 Development Action Plan for Scheduled Castes (DAPSC)

Government allocates funds across Ministries/ Departments for different schemes where targeted financial and physical benefits can accrue to the Scheduled Castes. The allocation under the scheme of welfare of Scheduled Castes deals with this matter across Ministries through earmarking of a certain percentage of funds exclusively for welfare of Scheduled Castes. The portal facilitates online monitoring of physical and financial progress of aforesaid schemes.

2.4.10.5 National Helpdesk Against Atrocities

Ministry of Social Justice and Empowerment had initiated a project to provide a 24x7 helpline and web portal for members of SC/ST communities to registering any atrocities under PCR Act 1955 and POA Act 1998. Under this Act, there is provision of providing financial relief at 3 stages as on registration of FIR, On submission of Chargesheet and after final conviction.

A national toll free no 18002021989 and Short Code 14566 have been released and can be accessed from anywhere in India. There is a 24x7 multi-lingual and multi-

location call centre established. The centralized system can recognize the state of origination calls and forward to the operator who can speak in the local language of that state.

It also has a Web portal, where complaint can get information about the Acts/ Scheme, register complaints, and also track the status of their complaints.

DATA OF FINANCIAL YEAR 2022-2023		2022-2023	
▪ MINISTRIES/DEPARTMENTS & UTS: 39		▪ TOTAL SCHEMES: 274	
▪ BUDGET ESTIMATES (CR.) ₹ 142,342.36		▪ REVISED ESTIMATES (CR.) ₹ 0.00	
▪ EXPENDITURE (CR.) AS ON 28 SEP 2022 ₹ 59,341,9295		▪ EXPENDITURE W.R.T. BUDGET ESTIMATES AS ON 28 SEP 2022 41.69 %	
▪ EXPENDITURE W.R.T. REVISED ESTIMATES AS ON 28 SEP 2022 0 %		▪ EXPENDITURE W.R.T. REVISED ESTIMATES AS ON 28 SEP 2022 0 %	

2.4.10.6 Unique Disability ID (UDID)

UDID project : The UDID project initiated by Department of Empowerment of Persons with Disabilities aims at building a holistic end-to-end integrated system for Issuance of UD ID and Disability Certificates for Persons with Disabilities (PwDs) with their identification and disabilities details. It includes :

1. Online availability of data of Persons with Disabilities across country through a centralized web application.
2. Online filing and submission of registration application form for disability certificate/ UDID card.
3. Quick Assessment process for calculating the percentage of disability by the hospitals/Medical Board.
4. Online renewal and updating of information by PwDs.

MIS reporting framework

2.4.11 Labour and Employment & Skill Development

2.4.11.1 Jan Shikshan Sansthan MIS portal (JSS)

The JSS portal (<https://jss.gov.in>) has been developed by NIC for Ministry of Skill Development & Entrepreneurship (MSDE). Jan Shikshan Sansthan (JSS) scheme is implemented through NGOs with 100% grants from the Government of India. At present, 304 JSSs in 26 States and 7 Union Territories are functional. The annual coverage of the beneficiaries is around 4 lakhs, out of which 85% are women. It provides vocational skills in non-formal mode to non-literate, neo-literates, persons with rudimentary level of education up to 8th and school dropouts up to 12th standard in the age group of 15-45 years. The priority groups are women, SC, ST, minorities, and other backward sections of the society. JSSs are reaching to the unreached areas to cater the needs of the poorest of the poor with a minimum infrastructure and resources.

JSS portal covers the entire lifecycle of the trainee from admission to the certificate generation. The portal also has a facility to accept the applications to start new JSS and grade the existing JSS.

2.4.11.2 SANKALP (Skill Acquisition and Knowledge Awareness for Livelihood Promotion)

The web portal of SANKALP (<https://sankalp.msde.gov.in>) under Ministry of skill Development & Entrepreneurship aims to improve short term skill training qualitatively and quantitatively through strengthening institutions, bring in

better market connectivity and inclusion of marginalized sections of the society.

Through the SANKALP, a stringent system of accreditation can be followed where (Vocational Training Partners) VTPs are given a final level of accreditation only if a certain number of courses have been successfully completed with students meeting reasonable attendance targets both at the individual and aggregate levels. The portal provides the facility to allow state and district to prepare and upload their annual work plans which are monitored and tracked by the SANKALP team.

2.4.11.3 National Database of Unorganized Workers (eShram Portal)

NIC has developed an e-Shram portal for creating Aadhaar authenticated comprehensive National Database of Unorganized Workers (NDUW). The portal has details of the Unorganized workers such as Name, Mobile Number, Occupation, Address, Aadhaar seeded Bank name, Educational Qualification, Skill types etc. It is the first-ever national database of Unorganized workers. Hon'ble Minister of Labour & Employment launched the portal on 26 August 2021 across India. It is estimated that more than 40 Crore Unorganized workers will get registered. More than 28 crore workers have already been registered since launch of the portal. Each registrant is allocated Universal Account Number (UAN) and can download UAN card instantly. Integration of eShram Portal with National Career Service (NCS) has been completed and integration with Skill India Portal and Pradhan Mantri Shram Yogi Maandhan Yojana (PMSYSM) is in progress. eShram registration is available on UMANG.

2.4.11.4 Unified Shram Suvidha Platform (USSP)

USSP portal facilitates the Ministry of Labour & Employment and its Labour Law Enforcement Agencies to monitor the implementation of Labor laws in various establishments in central sphere. It facilitates the employer/establishment to common registration, filing annual returns under 8 Labour Laws along with online common Return under Mines Act. Unique Labour Identification Number (LIN) is allotted to each establishment registered under any Labour law after

de-duplication of data coming from various enforcement agencies. Nine State Governments are also on-boarded with Shram Suvidha Portal. LIN Only Regime is being established within various agencies in Labour sector. The USSP Platform provided transparent Labour Inspection Scheme through computerized system on Risk based criteria and uploading the inspection reports within 48 hours by the Labour inspectors. USSP made easy Sharing of Inspection Reports, Annual Returns among various Labour enforcement agencies. Integration with National Single Window System (NSWS) of Department for Promotion of Industry and Internal Trade (DPIIT) is also being enabled. The facility for Registration under five acts and Licence issuing under two acts is made operational.

Shram Suvidha portal further enhanced to cater amendment and renewal of registration and licence under CLC Acts. Digitally signed show cause cum inspection report is send through mail to employer and they subsequently upload compliance report against irregularities on portal.

2.4.11.5 Platform for Effective Enforcement for No Child Labour (PENCiL)

PENCiL portal connects the Ministry of Labour & Employment with 21 States, 280 Districts Project Societies with 3,400 (approx.) Special Training Centers (STCs) for effective enforcement for “No Child Labour”. It sets baselines based on key performance indicators at the levels to monitor physical and financial progress report. The platform captures children identified and rehabilitated through STCs and skill development depending on age group and nature of industry from where the children have been rescued. The portal facilitates reporting of child labour incidents through Complaint Corner. At present, more than 2834 complaints are closed out of 3926 (approx) registered complaints. District Nodal Officers take action through First Action Report (FAR) within 48 hours and subsequently Second Action Report (SAR) with 21 days, if required. Afterwards, Legal Action Report (LAR) is recorded. The portal has been enhanced to capture daily attendance along with group photograph of children attending the school. The portal is also integrated with PFMS for DBT of stipend.

2.4.11.6 SAMADHAN Portal

Software Application for Monitoring and Disposal, Handling of Apprehended/Existing Industrial Dispute (SAMADHAN) portal facilitates workman, trade union or management to raise an industrial dispute before Conciliation Officer (CO) of the area CO for the purpose of bringing about a settlement of dispute, without delay, investigate the dispute and all matter and tries to settle the dispute amicably, without delay, through counselling with the concerned parties. The settlement or FOC (Failure of Conciliation) report is sent to appropriate Government to take necessary action. The portal facilitates the appropriate Government to refer the industrial disputes to Central Government Industrial Tribunal-cum-Labour Courts (CGIT-cum-LCs). The portal is operational on PAN-India basis.

This Samadhan Portal has further updated with new features such as lodging claim under five Acts (The payment of gratuity act, 1972. The minimum wages act, 1948. The maternity benefit act, 1961. The equal remuneration act, 1976. The payment of wages act, 1936) and general complaint. Samadhan portal is also integrated with Sandes App. Ministry of Labour and Employment has also made available the Samadhan portal on all 4 lakh (approx) CSCs across the country. This portal is also likely to be available on UMANG platform shortly and work is in progress.

2.4.11.7 National Career Service Centre for SC/STs Portal

The National Career Service Centres (NCSCs) for Scheduled Castes and Scheduled Tribes (erstwhile NCSC) comes under Directorate General of Employment (DGE) operate three courses, namely Special Coaching Scheme, Computer O Level Training, Computer Hardware Maintenance Training. The scheme aims at providing Occupational Information, Individual Guidance and organizing Confidence Building Programs for the benefit of the job seekers belonging to Scheduled Castes and Scheduled Tribes. The website developed for this scheme contains the process flow from filling up the application form by beneficiaries till the monthly stipend being disbursed from the PFMS based on eligibility criteria. The portal has been integrated with PFMS for seamless payment to beneficiaries using Direct Benefit Transfer

where the payment is made through bank account seeded with Aadhaar Number. This led to integration with NIC Aadhaar Vault where the Aadhaar Numbers of the beneficiaries have been encrypted and stored securely as per guidelines.

2.4.12 Power and Energy

2.4.12.1 National Power Portal (NPP)

National Power Portal (NPP), an integrated suite of various energy applications for Indian Power Sector facilitates online data capture at various frequencies (daily, monthly, annually). The data is provided by generation, transmission, and distribution utilities in the country through various automated subsystems which validate and process the collected data and disseminates the same through various analyzed reports, graphs, statistics at all India, region, state level for central, state, and private sector. NPP monitors around 50,455 urban distribution feeders, their power supply position, and AT&C losses and 1,27,226 rural feeders, their power supply position. The All India Installed Capacity and Generation data is captured from around 419 stations and 1615 units.

2.4.12.2 National Portal for Rooftop Solar (NAPS)

National Portal for Rooftop Solar (NAPS) has been developed to simplify the procedure for Rooftop Solar Programme Phase -II. The main objective of the portal is to install residential grid connected rooftop solar plants with an aim to achieve cumulative capacity of 40,000 MW by 2022. The main stakeholders are MNRE Solar Division, DISCOMs, SNAs, SECI, PSUs, Government Agencies, Vendor, and Beneficiary. Hon'ble Prime Minister, Shri Narendra Modi launched NAPS on 30th July 2022 during closing event of Bijli Mahotsav. Portal facilitates beneficiaries for registration followed by submitting application for installation. Subsidy disbursement through PFMS is also integrated with NAPS. DISCOMs in turn initiates the process of installation through their registered vendors and take necessary actions accordingly. The portal has also been integrated with all DISCOMs, PFMS, DBT, SANDES, PRAYAS, NGO DARPAR. Till date, 66435 beneficiaries have registered themselves on portal and 25264 applications have been received through the portal.

2.4.12.3 Biogas & BioUrja Portals

Ministry of New & Renewable Energy (MNRE) introduced BioUrja and Biogas schemes under the Umbrella scheme of National Bioenergy Programme for duration of FY 2021-22 to 2025-26. NIC designed, developed, and implemented BioUrja and Biogas portals for the Ministry. Biogas Portal (<https://biogas.mnre.gov.in>) is a central platform for beneficiaries for applying to set up small and medium biogas plants ranging from 1 cubic meter to 2500 cubic meter. BioUrja Portal (<https://biourja.mnre.gov.in>) is an online platform developed for assisting project developers to submit their proposals/applications and MNRE to track the real-time status of plant installation and commissioning. In addition, portal will facilitate Central Finance Assistance (CFA) to project developers in respect of setting up Waste to Energy plants for generation of Biogas, Bio-CNG/enriched, Biogas/Compressed Biogas, Power/generation of producer or syngas from urban, industrial, and agricultural wastes/residues and Briquette/Pellet manufacturing plants and Biomass (Non- Bagasse) cogeneration projects.

2.4.13 Good Governance & Enforcement

2.4.13.1 eOffice

eOffice aims to contribute significantly to transforming the core of the Government working which eventually would bring desirable values of transparency, efficiency, accountability, and faster decision making. It promotes less paper office with greater collaboration and knowledge sharing. As of this writing, eOffice has been implemented in 786 organizations, which include 347 Central Government institutions and 439 at various State Government Institutions. As on December 2022, eOffice has been used by 9.7 Lakh users generating 3.67 Crores eFiles and 15.50 Crore eReceipts.

2.4.13.2 IVFRT: Immigration, Visa, and Foreigners Registration & Tracking

IVFRT: Immigration, Visa, and Foreigners Registration & Tracking Immigration, Visa, and Foreigners Registration & Tracking (IVFRT) are one of the Mission Mode Projects (MMP) undertaken by the Ministry of Home with the core objective to develop and implement a secure and integrated service delivery framework that facilitates legitimate travellers while strengthening security. The

project has been implemented in 184 Indian Missions out of 195 Indian Missions abroad, 700 + Districts and 110 ICPs across the country. e-Visa service has been extended to 156 Countries at 28 Indian airports and 5 Sea Ports. Since the launch of the scheme (November 2014) more than 1.05 Crore-Visas have been issued.

2.4.13.3 e-Visa

e-Visa scheme facilitates international travelers in seeking Indian Visa on short notice for business visits, medical patients, and tourists. It is a Faceless, Cashless and Paperless service for foreigners which has reduced Visa application processing time wherein Electronic Travel Authorization is conveyed to applicants via e-mail within 72 hours of online application. Presently, the e-Visa service has been extended to 156 Countries at 28 Indian airports and 5 Sea Ports. Further, Visa-on-Arrival service has also been extended to the nationals of Japan, South Korea, and UAE.

2.4.13.4 PARIVESH (Pro Active and Responsive facilitation by Interactive and Virtuous Environmental Singlewindow Hub)

PARIVESH, launched by Hon'ble PM Narendra Modi in August 2018, 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 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.

2.4.13.5 Indian Virtual Herbarium (IVH) of Botanical Survey of India (BSI)

The Indian Virtual Herbarium is the biggest virtual database of flora in the country. Each record in the digital herbarium includes an image of the preserved plant specimen, scientific name, collection locality, and collection date, collector name, and barcode number. The digital herbarium includes features to extract the data state-wise, and users can search plants of their own states, which will help them identify regional plants and in building regional checklists. The digital herbarium has some of the oldest botanical specimens dating as early as 1696 and also deeply linked with the botanical history of the country. The portal provides most valuable historical collections of botanists like William Rosburgh, Nathaniel Wallich and Joseph Dalton Hooker, considered the founding fathers of botany in India.

2.4.13.6 NEVA (National e-Vidhan)

National e-Vidhan Application (NeVA), one of the 44 Mission Mode Projects (MMPs), aims to bring all the legislatures of the country together, in one platform thereby creating a massive data repository without having the complexity of multiple applications. The NeVA website can be accessed at the URL <https://www.neva.gov.in>.

Historical Achievement of conduction of Uttar Pradesh Assembly Budget Session 2022-2023 through National eVidhan Application Platform.							
MOU Signed	DRM Submitted Date	Demand as per state	Sanctioned amount by MPA Empowered committee	Sanctioned Date by MPA Empowered committee	1 st instalment & Date	2 nd instalment & Date	3 rd instalment & Date
08-04-2021	15-11-2021	28,17,34,115	17,81,31,300	14.03.2022	2,13,75,756 (24-03-2022)	4,27,51,512 (31-03-2022)	2,13,75,756 (17-10-2022)

2.4.13.7 Service Plus

The Service Plus is a Low Code-No Code Service Delivery Framework that facilitate the departments/

organizations in offering their services and benefits of schemes to citizens and other stakeholders in online mode. It also facilitates doorstep delivery of services through common service delivery outlets and DBT of schemes. Around 3000 live services are made online by various participating States/UTs and Central Ministries through the ServicePlus framework.

2.4.13.8 NGDRS (National Generic Document Registration System)

NGDRS is a key eGovernance initiative by the Department of Land Resources, Ministry of Rural Development, Government of India under the aegis of DILRMP. The application is specifically designed for the use of sub registrars, citizens and apex users from registration departments. With the visionary mandate & Policy of Government of India, “One Nation One software”, the launch of NGDRS in twelve states of the country has started a new era in the process of registration of documents. The details can be seen at <https://ngdrs.gov.in>

2.4.13.9 Unique Land Parcel Identifier Number (ULPIN)

The Unique Land Parcel Identification Number (ULPIN) objective is to identify departments dealing with land & rendering multi-dimensional land related services to the citizens such as Revenue department, panchayat, forest, registration, survey & to provide comprehensive information on land & properties & maintain consistency of core data across all departments & agencies of the government nationwide. Unique ID of each Land Parcel of States has been helping Unified system to track the Land, its reconciliation etc. and has been providing higher values to all stakeholders. As on date it has been rolled out in 22 States/UTs & pilot testing done in 8 States/UTs.

2.4.13.10 Aadhaar Enabled Biometric Attendance System (AEBAS)

AEBAS Project was established and rolled out during September' 2014. The Government employees are facilitated to mark attendance conveniently from anywhere across India. Any Government Employee who has an Aadhaar number can successfully register

himself/herself on the portal and become a part of the system. The system has ensured role-based access to the users/stakeholder. The authorized user will be able to visualize dashboard and generate predefine online attendance reports for a particular organization/ department/ employee of their domain.

2.4.13.11 E-Sign Gateway

NIC E-Sign Gateway has been designed, developed and deployed for facilitating the use of Aadhaar authenticated E-Sign services of CDAC, and is the interface between C-DAC and e-gov applications for consuming the E-Sign services. The gateway is maintained and upgraded on regular basis for providing better security, new features and in compliance with respective guidelines as issued by C-DAC, CCA, UIDAI or any concerned agency.

The gateway has facilitated over 75 lakh signatures till date with over 300 applications.

2.4.13.12 Jeevan Pramaan

Jeevan Pramaan is a biometric enabled digital service for pensioners to generate and send the life certificate to the concerned pension-disbursing agency. The Pensioners of the Central Government, the State Governments or any other Government organization can avail the benefit of this facility. Jeevan Pramaan has provided relief to old, aged persons by eliminating the need of physical visit to Pension Disbursing Agencies. Cloud and Mobile enablement have enhanced the scalability & accessibility, and digitization has cut down unnecessary logistic hurdles. The details can be seen at <https://jeevanpramaan.gov.in/>

Period	Year wise DLC's Generated (Lakhs)	Cumulative DLC's Generated (Lakhs)
2014-2015	6.01	6.01
2015-2016	11.21	17.22
2016-2017	76.26	93.48
2017-2018	80.3	173.78
2018-2019	88.76	262.54
2019-2020	96.64	359.18
2020-2021	104.15	463.33
2021-2022	126.21	589.54

2.4.13.13 Single Window Clearance System Portal

Single Window Clearance System is the innovative endeavor of the Ministry of Coal conceptualized and launched on 11.01.2021 that facilitates to obtain clearances and approvals required for smooth operationalisation of coal mines in India as well as augmentation of coal production in the country through a single gateway. Various statutory provisions viz approval of Mining Plan and Mine Closure Plan, Grant of Mining Lease, Environment and Forest Clearances, Consent to Establish, Consent to Operate, Wildlife Clearance Permission for Explosive and Safety organization (PESO) for storage of Explosive, Land Acquisition Module, Safety Management Plan (with DGMS), Central Ground Water clearance etc. are pre-requisite for starting of a coal mine.

2.4.13.14 Regulatory Compliance Portal

Regulatory Compliance Portal (RCP) for DPIIT has resulted in minimizing Regulatory Compliance Burden for Businesses and Citizens and to decriminalize laws, and repeal redundant Acts. The Portal provides functionalities like Interface for Industry Associations such as CII, FICCI and ASSOCHAM to submit burdensome compliance and recommendations, Interface for Nodal and Sub Nodal officers of Central Ministries and State Governments to review and take actions on burdensome compliance and recommendations submitted by Industry Associations, submit burdensome citizen related services and actions thereon, Interface for Chief Secretaries, Secretaries and Cabinet Secretary to monitor the progress and recommendations within their states, Ministries / Departments and Pan-India level respectively.

2.4.13.15 CPGRAMS (Centralized Public Grievance Redress And Monitoring System)

Centralized Public Grievance Redress and Monitoring System (CPGRAMS), is a web-enabled system that aims at providing the citizens with a platform that primarily aims to enable submission of grievances by the aggrieved citizens from anywhere and anytime (24x7) basis to the concerned Ministries/Departments/Organizations/State Governments and facilitates Grievance Redress Officers (GROs) to scrutinize and take action for speedy and appropriate redress of these grievances within stipulated timelines.

There are 5 Nodal/Apex Grievance portals available for citizen to lodge grievances with the Central Government/ State Government departments /agencies:

<https://pgportal.gov.in>

<https://dpg.gov.in>

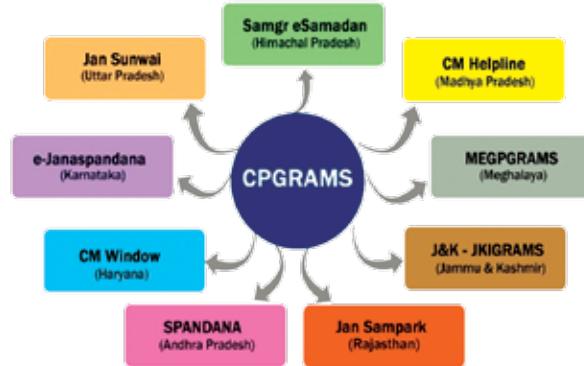
<https://www.pmindia.gov.in>

<https://helpline.rb.nic.in>

<https://pgportal.gov.in/pension>

CPGRAMS is receiving more than 18 Lakhs grievances per year and having disposal percentage of more than 90%. The CPGRAMS interlinks 89 Central Ministries/ Departments and 36 States /UTs. There are more than 80,000 GRO onboard which also includes officers from subordinate and field offices of GoI and State Governments.

2-way Integration with other PG Portals



2.4.13.16 Bhavishya

BHAVISHYA is an online Pension Sanction and Payment tracking system. It is a Web Responsive application which provides “End-to-End Solution” to the Pension Processing. It begins with online filling of pension forms by retiring employee till the issue of “Electronic Pension Payment Order” (ePPO) and “Electronic Special Seal Authority” (eSSA), payment of retirement benefits and credit of first pension in the bank account. Bhavishya has been seamlessly integrated with following applications: Employee Information System (EIS), Public Financial Management System (PFMS), eSampada, Pension Authorization Retrieval and Accounting System (PARAS) and DigiLocker. Bhavishya has integrated with banks to fulfill the post retirement requirements like pension slip, form-16, Life certificate status etc.

SEMICONDUCTOR

MOBILE
MANUFACTURING

MAKE IN INDIA

Electronic
Systems



Electronics Manufacturing

Electronics industry is the world's largest and fastest growing industry and is increasingly finding applications in all sectors of the economy. The Government attaches high priority to electronics hardware manufacturing, and it is one of the important pillars of both "Make in India" and "Digital India" programmes of Government of India. The intent of the Government is to provide a level playing field for the domestic manufacturers enabling them to compete with imports in the sector by rationalizing tariff structure, simplifying procedures, providing incentives, and upgrading infrastructure.

3.1 National Policy on Electronics 2019

The National Policy on Electronics 2019 (NPE 2019) was notified on 25.02.2019 with a vision to position 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 implementation of the schemes and initiatives under the aegis of NPE 2019, is expected to generate employment for about 10 million (1 crore) persons (Direct and Indirect) at various levels.

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 aim of NPE 2019 is as follows:

- To promote an ecosystem of manufacturing (group of industries) which form supply chain of a product as against the emphasis of existing policy on promoting individual industries.
- To increase domestic value addition and combining potential of both domestic demand and export with the aim to make India a global hub of electronics manufacturing.
- To promote generation of intellectual property in India and deepening of the domestic research, development and designing capabilities.

- To envisage intervention in emerging sectors of electronics like IoT, 5G equipment, Sensors, drones, additive manufacturing (3D printers), robotics etc. and promote their R&D and manufacturing among the sectors viz. Medical Electronics, Strategic Electronics, Auto & Power electronics etc

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 the supportive environment, NPE-2019 envisages extending the Phased Manufacturing Programme (PMP) to products other than mobile phones, maintain a progressive duty regime and incentivize 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. NPE-2019 has ushered in a slew of new incentive schemes. Prominent among these are Production Linked Incentive (PLI) Scheme for Large Scale Electronics Manufacturing, Scheme for Promotion of manufacturing of Electronic Components, Semiconductors (SPECS) and Electronics Manufacturing Clusters (EMC 2.0) Scheme.

In furtherance of the vision of Aatmanirbhar Bharat and positioning India as the global hub for ESDM, a comprehensive program for the development of semiconductors and display manufacturing ecosystem in

India has been approved by Government of India with an outlay of ₹ 76,000 crore (>10 billion USD). The program will usher in a new era in electronics manufacturing by providing a globally competitive incentive package to companies in semiconductors and display manufacturing as well as design. This shall pave the way for India's technological leadership in these areas of strategic importance and economic self-reliance

3.2 Growth of Electronics Sector

Indian electronic manufacturing industry has undergone major transformation in the last couple of years with the host of initiatives and reforms. Government has taken several initiatives to promote electronics manufacturing and as a result, the electronic manufacturing is on high growth trajectory (domestic production of electronic items has increased from ₹ 3,17,331 crore (USD 49 billion) in 2016-17 to ₹ 6,40,810 crore (USD 87.1 billion) in 2021-22, growing at a Compound Annual Growth Rate (CAGR) of 15%).

The key drivers of growth are large domestic market, and availability of skilled talent and low-cost labour.

The Government's "Make in India" programme, launched in 2014, was designed to make India as the Global design and manufacturing hub by 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", also targets a substantial boost in the domestic manufacturing of electronics and aims at reducing India's dependence on imports in this important sector.

Production, Imports and Exports

The production, imports, and exports of electronic goods for previous 6 years are presented below:

CAGR for production from FY16-17 to FY21-22: 15%

CAGR for Imports from FY16-17 to FY21-22: 12%

CAGR for Exports from FY16-17 to FY21-22: 22.3%

Electronics manufacturing sector has several verticals in terms of its constituents. The production profile of the electronics sector for 2020-21, based on the information provided by Industry Associations is as follows:

Product Segment	FY20-21 (USD Bn)	FY20-21 (INR Crore)	FY21-22 (USD Bn)	FY21-22 (INR Crore)
Mobile Phones	30	2,22,675	38	2,75,000
IT Hardware (Laptops, Tablets)	3	22,268	4	29,801
Consumer Electronics (TV, Audio, Accessories)	9.5	70,514	10	74,503
Strategic Electronics	4	29,690	4.25	31,664
Industrial Electronics	10.5	77,936	11	81,953
Wearables & Hearables	0	0	0.25	1,863
PCBA	0.5	3,711	0.6	4,470
Auto Electronics	6	44,535	7	52,152
LED Lighting	2.2	16,330	2.5	18,626
Electronic Components	9	66,803	9.5	70,778
Electronics Manufacturing	74.7	5,54,461	87.1	6,40,810

Source: Industry Associations

Note: 1. Telecom Equipment, Medical Equipment and other Equipment having electronic content have not been taken into consideration.

2. Exchange rate as published by RBI is used (1 USD = ₹ 74.225, Financial Year (2020-21) – Annual Average)

(Values in ₹ crore)

	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Production*	3,17,331	3,88,306	4,58,006	5,33,550	5,54,461	6,40,810
Imports**	2,87,559	3,40,901	4,01,450	3,85,081	3,99,374	5,09,679
Exports**	39,980	41,220	61,908	82,929	81,822	109,797

* Source: Figures are shared by industry associations.

** Source: Directorate General of Commercial Intelligence and Statistics (DGCI&S)

As per DGCI&S data, import of electronic goods has increased from ₹ 3,99,374 crore (USD 54 billion) in 2020-21 to ₹ 5,09,679 crore (USD 67.9 billion) in 2021-22, exhibiting a Y-O-Y increase of 27% over last year. It is also seen that growth rate of imports of finished goods has declined and that of electronic components has grown up indicating setting up of manufacturing units of electronic products in the country.

As per the data provided by DGCI&S, the export of electronic goods has increased from ₹ 81,822 crore (USD 11 billion) in year 2020-21 to ₹ 109,797 crore (USD 14.6 billion) in year 2021-22, exhibiting a Y-O-Y growth of 34% over last year. Government has taken several measures for the growth of the exports of electronics hardware sector. Special Economic Zones (SEZs) are set up to enable hassle-free manufacturing and trading for export purposes and EHTP units are the major contributors to exports.

a) Mobile Phones

India has become the second largest mobile handset manufacturing nation globally and India has also become the second largest smart phone market in the world thus making India as the fastest growing smart phone market in the world. Production of mobile phones has gone up from 6 crore units in 2014-15 to 29 crore units in 2020-21 thus making the domestic manufacturing of cellular mobile handsets and its sub-assemblies/ parts and components as one of the flagship sectors under the “Make in India” initiative of the Government. Over 200 manufacturing units for cellular mobile handsets and their sub-assemblies/ parts/ components have been set up in the country during the last couple of years, resulting in estimated employment for about 7 lakh persons (Direct and Indirect). Most of the major brands (both foreign and Indian) have set up the manufacturing plants or have sub-contracted their mobile handset manufacturing to Electronic Manufacturing Services (EMS) companies.

MeitY had introduced the Phased Manufacturing Programme (PMP) for cellular mobile handsets and related sub-assemblies/ parts manufacturing with the objective of progressively increasing the

domestic value addition for establishment of a robust cellular mobile handsets manufacturing ecosystem. As a result of implementation of the PMP and other Schemes/ Programmes of Government of India, now almost entire demand of cellular mobile handsets is being met by domestic manufacturing. The aforesaid Schemes/ Programmes and the recently Notified Schemes viz. PLI, SPECS and EMC 2.0 are expected to significantly boost the production and export of cellular mobile handsets and identified sub-assemblies/ parts/ sub-parts thereof.

b) Information & Communication Technology (ICT) Hardware

The first application of electronics was in the domain of communication and computing. With the emergence of integrated circuit, the world saw the advent of the digital computer era, and with the advent of microprocessor in the 1970's, the world saw an exponential growth of the Information and Communication Technology (ICT) industry. Such is its strategic importance that countries across the world have declared it as an essential commodity. With its pool of technical manpower, its proven capability as a design center for most of the global hardware companies, the country is all ready to emerge as an end-to-end player and global leader in the ICT hardware design and manufacturing space.

India has a huge opportunity arising from both import substitution and export led manufacturing in the space of ICT hardware. In addition, ICT hardware holds the promise of high value addition in India, with the manufacturing of the Components (i.e., Sub-Assemblies of ICT Products), Product design and Semiconductor Design being done in the country.

Emerging domains of AI, ML, IOT are becoming the new driving forces behind the growth of ICT hardware segment. These domains require the design of specialized Semiconductors, Sensors and Servers for which India has the capability. Another emerging domain in ICT hardware is the Large-Scale Data Centres. India with its technical prowess, cheap labour, large pool of manpower,

English as the working language, has the opportunity to lead the world in all these domains. Year 2020 has seen a rise in demand for ICT hardware arising out of work from home and the need to be connected remotely due to the COVID-19 pandemic. Individual consumers have bought computers and tablets, enterprises have invested in their data centre infrastructure (to service the work from home, online B2B dealings) and the Telecom Service providers have been upgrading their infrastructure to cater to the increased broadband demand.

The newly released National Education Policy 2020 will promote the use of ICT in education towards building India's next generation of skilled manpower and narrow the digital divide in the nation.

c) Electronic Components

According to Global Industry Analyst Inc., the global market for electronic components is expected to reach USD 191.8 billion by 2022, of which the Asia Pacific region is going to capture a dominant share. Following this global trend, the Indian electronic components market is also poised to grow significantly. Mobile Phones, Consumer Electronics and Industrial Electronics account for the major demand (82%) for electronic components in India. This is followed by the demand of electronic components in computer hardware, strategic electronics and lighting industry sector. Industries like Mobile Phones, Industrial Electronics (due to the advent of EVs) and Strategic Electronics are expected to witness substantial growth in the near future.

GoI launched the Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS) (notified vide Gazette Notification No. CG-DL-E-01042020-218992 dated April 01, 2020). This scheme provides financial incentive of 25% on capital expenditure for the identified list of electronic goods that comprise downstream value chain of electronic products, i.e., electronic components, ATMP units, specialized sub-assemblies and capital goods for manufacture

of aforesaid goods. Apart from SPECS, the other policies of Government that boost the production of electronic components include rationalization of tariff structure, Phased Manufacturing Programme (PMP), and notification of electronics products under the Public Procurement (Preference to Make in India), Order 2017. Under the umbrella of "Make in India" program, BCD has been imposed and increased on Printed Circuit Board (PCB) Assembly of Mobile handsets with the intention to strengthen the domestic EMS and components segment in India. Production Linked Incentive Scheme (PLI) for Large Scale Electronics Manufacturing is also supporting manufacturing of specified electronic components.

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. A strong component manufacturing base is essential for a sustainable Electronics System Design and Manufacturing (ESDM) ecosystem in India. 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.

d) Consumer Electronics

Consumer electronics refers to any device containing an electronic circuit board that is intended for everyday use by individuals for the purpose of entertainment, recreation or communication. This encompasses a massive category of electronic products which includes televisions, cameras, digital cameras, PDAs, calculators, VCRs, DVDs, clocks, audio devices, headphones, and many other home product. Key drivers for this market's growth are growing awareness, easier access, changing lifestyle, higher disposable income and reduction in the per unit prices.

Television is an important device in the home consumer electronics and has been identified as one product for which India can become the global hub for manufacturing. As per FICCI, India's TV production stood at USD 4.24 billion in 2020-21

and is expected to reach USD 10.22 billion by 2025-26 with a CAGR of 20%. Type of televisions available today in the market cover a wide range that starts from Plasma to LED and LCD TVs which offer sharper, higher resolution pictures. With the decreasing trend in the prices of LCD/LED televisions, the penetration of these TVs is increasing significantly.

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 have been 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, a local partner is both legally and practically required.

e) Light Emitting Diodes (LEDs) Products

The lighting infrastructure in India is evolving rapidly through the replacement of conventional products and LED lighting is extensively used now, in a wide variety of domestic and industrial products ranging from screens and walls to ceilings and wearables. LED lighting offers multiple benefits over the other types of lighting systems including energy efficiency, cost-saving, longer life, lower heat emission, etc. Demand for the LED lighting market in India has been majorly driven by Government initiatives such as Unnat Jyoti by Affordable LEDs for All (UJALA) and Street Lighting National Programme (SLNP), Smart City project, housing for all etc. Under the SLNP, Government aims to replace over 1.34 crore conventional street lights in India. Further with the decline in Average Selling Price of chips and components, the manufacturing cost of LEDs has declined significantly and has resulted in the growth of the LED market. Opportunities for LEDs have emerged in sectors

like automotive, communications, signaling, and entertainment. Global LED lighting market was approx. USD 50.91 billion in 2020 and is expected to grow to approx. USD 135.58 billion by 2028 at CAGR of 12.5%. (Source- Report by Grand View Research, Inc).

Indian LED lighting industry is assembling LED lighting products in India and is dependent on imports of chips and electronic components which are not manufactured in India.

f)

Industrial Electronics

Industrial electronics can be classified on the basis of segments viz Power Electronics, DC/AC converters, Material handling and Industrial Robots. 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 would play an important role in the modern industry. 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.

Increasing focus on the use of renewable power sources across the globe, growing adoption of power electronics in the manufacturing of electric vehicles, and increasing use of power electronics in consumer electronics are the major factors driving the growth of the power electronics market. Power electronics space in India 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.

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. In future, M2M (machine-to-machine and machine-to-man) communication modules driven by Industry 4.0 activities will drive the growth of the Industrial electronic segment.

g) Automotive Electronics

Automotive electronics are the electrically operated systems integrated and mounted in several vehicle applications such as body electronics, safety systems, and infotainment. The automotive market demand is experiencing trends related to advanced mobility solutions, powertrain & vehicle system electrification, and advanced safety systems. Due to the increased implementation of these systems in vehicles, the penetration of automotive electronics has also increased, further creating the demand for automotive electronics products across the globe. The digitization of automotive systems by including connected technologies, in-vehicle communication, and ADAS & automated systems have created several opportunities for market growth. The growing integration & adoption of automotive electronics in modern vehicles to deliver enhanced safety & comfort to consumers is one of the major factors driving the automotive electronics industry growth. Several features offered by OEMs including Automated Emergency Braking (AEB) system, airbag system, and lane departure warning, etc. have significantly decreased road accidents worldwide. Automotive electronics along with the presence of broad computing technologies and connected features are enhancing automobile capabilities. Alcohol ignition interlock, accident data recorder system, and emergency call system are some of the features gaining attraction, which will further propel the growth. According to Allied Market Research, the global Auto electronics market is estimated to reach USD 382.16 billion by

2026, growing at a CAGR of 7.3 percent from 2019 to 2026.

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.

The introduction of autonomous or driverless cars that offer a self-driven experience to the user along with the launch of cost-efficient electric vehicles with enhanced features is driving the growth of the market. Furthermore, a shift toward hybrid and luxury vehicles equipped with in-vehicle entertainment devices offering a more sophisticated and interactive user experience is further augmenting the demand for automotive electronics.

h) Strategic Electronics

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.

India has the second largest armed force in the world, and is considered the seventh largest aerospace and defence (A&D) market globally with a sizeable budget to cover the needs of the country's Army, Navy and Air Force. The large-scale modernization of the defence forces and the drive to manufacture local have become focus areas of the government. Emerging technologies are going to reshape modern day warfare, and will harness the power of electronics to do so. This will make the Indian strategic electronics (SE) sector, mainly

comprising aerospace and defence, a vibrant industry over the next decade. The defence sector in the country has been growing at a modest pace for the past few years. However, it is the strategic partnership (SP) model in defence production that will boost the Make in India programme to a great extent. The concept of import substitution is being gradually accepted by stakeholders.

The next decade is likely to see exponential growth in combat systems as well as non-platform-based programmes, facilitating smart battalions. Therefore, there are opportunities for electronics manufacturing in India in both standalone systems (as part of platforms) as well as at a sub-system level. Key factors that will influence growth are:

- The modernization of weapon platforms
- The induction of state-of-art weapons by the armed forces
- The impact of indigenization and the Make in India programme

i) **Medical Electronics**

Designing, implementation and use of electronic components, devices and equipment for medical or healthcare purposes, comes under the field of medical electronics. Some of the important applications of medical electronics are research, examination, diagnosis, treatment, assistance and care to name a few.

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 Government has taken various regulatory steps to promote this sector and has created excellent opportunities for the domestic manufacturers, thereby reducing the dependence on imports. Medical devices industry in the country is dominated by multinationals that controls about 75-80 per cent of the Indian market. Further, more than 80 percent of domestic manufacturers are in the small-scale sector and have a turnover of less than ₹ 10 crore. Also, more than 6,000 types of medical devices are in use worldwide, but India manufacturers are just one-sixth of these medical devices.

3.3 Modified Special Incentive Package Scheme (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. The Scheme has been amended twice – in August, 2015 and in January, 2017. The Scheme has been closed on 31st December, 2018 to receive new applications. The salient features of the Scheme are:

- Provides Capital Subsidy - 20% for investments in Special Economic Zones (SEZs) and 25% in non-SEZs.
- Provides incentives for both new units and expansion units.
- Provides incentives for a period of 5 years from the date of approval of application.
- Provides incentives for 44 categories/verticals across the value chain (raw materials including assembly, testing, packaging and accessories, chips, components).
- Minimum investment threshold for each product category/vertical.
- Unit to be in Industrial Area notified by Central/ State Govt.

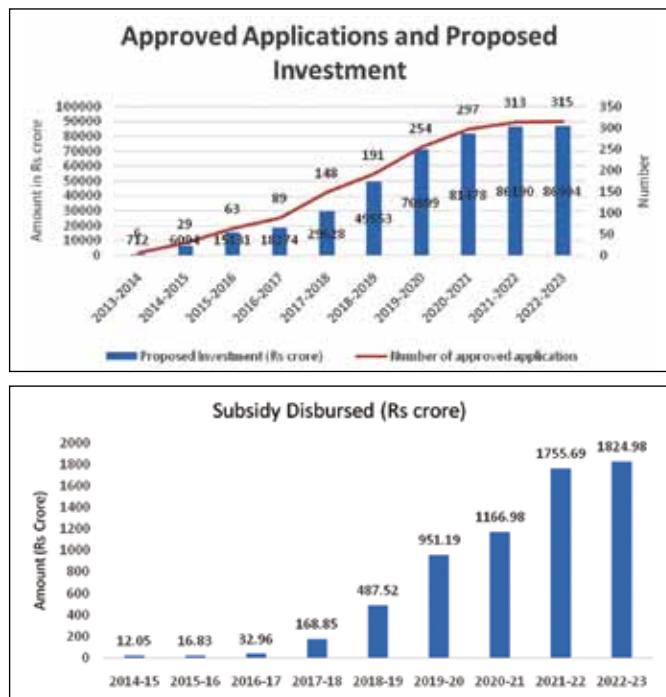
Status of M-SIPS applications as on 20 September, 2022 is as follows:

As on 30 September, 2022, 320 applications with proposed investment of Rs 89,194 crore are under consideration. Out of these 320 applications, 315 applications with proposed investment of approximately Rs. 86,904 crore have been approved, 3 applications with proposed investment of approximately Rs. 197 crore have been recommended by the Appraisal Committee for approval, 2 applications with proposed investment of Rs 2,093 crore are under appraisal.

The incentives to the tune of ₹ 1824.98 crore have been disbursed to the 117 applicants.

Out of 315 approved applicants, 271 applicants have started incurring investment on their projects and have made investment of ₹ 32,541 crore. 236 applicants have commenced commercial production with reported

turnover of ₹ 6,22,348 crore, which includes exports to the tune of ₹ 86,392 crore. These units have given employment opportunities (Direct & Indirect) to over 2,69,624 persons and given revenue of about ₹ 80,298 crore to the Government.



3.4 Electronic Cluster Manufacturing (EMC) Schemes

To create conducive and sustainable ecosystem for electronics manufacturing in the country, Government notified the Electronics Manufacturing Cluster (EMC) Scheme in October, 2012 for providing support to create world-class infrastructure along with common facilities and amenities for attracting investments in the ESDM sector. The scheme was open to receive 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. The salient features of the scheme are as follows:

- To create robust infrastructure base for electronics manufacturing in the country through development of Greenfield EMCs and Common Facility Centres (CFCs).

- Financial assistance upto 50% of the project cost subject to a ceiling of ₹ 50 crore for every 100 acres of land for Greenfield EMC and 75% of the cost of infrastructure, subject to a ceiling of ₹ 50 crore for Common Facility Centre.
- State Government incentives are over and above the Central financial assistance.
- Development of EMCs to provide ready infrastructure for industry engaged in electronics verticals and its entire value chain to set up their manufacturing facilities in EMC.

Status of EMC till September, 2022 is as follows :

Under the scheme, MeitY received 50 applications out of which 46 applications were for setting up of Greenfield EMCs and 4 applications for setting up of Common Facility Centers (CFC) in Brownfield Clusters from 19 states across the country. Of these, nineteen (19) Greenfield EMCs and Three (3) CFCs were accorded approval admeasuring an area of 3,464 acres with project cost of ₹ 3,639 crore including Grant-in-aid of ₹ 1,503 crore from Government of India. These EMCs are poised to attract an investment of ₹ 52,119 crore and are expected to generate 6.30 lakh employment opportunities once operational. The details are as follows :



RBF



Road Network and Landscaping

Site Pics: EMC Sri City (Andhra Pradesh)



Plug & Play Space



Warehouse

Site Pics: Adityapur EMC (Jharkhand)

List of 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
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	Salarpur Industrial Area, Khushkhera, Bhiwadi
14		Karoli Industrial Area, Bhiwadi, Alwar District
15	Telangana	E-city, Fab City, Hyderabad
16		Maheshwaram, Ranga Reddy District
17	Uttar Pradesh	Ecotech-VI Industrial Area, Greater Noida
18	West Bengal	Falta Industrial Centre, P.S. Ramnagar, South 24 Parganas District
19		Naihati town, North 24 Parganas District



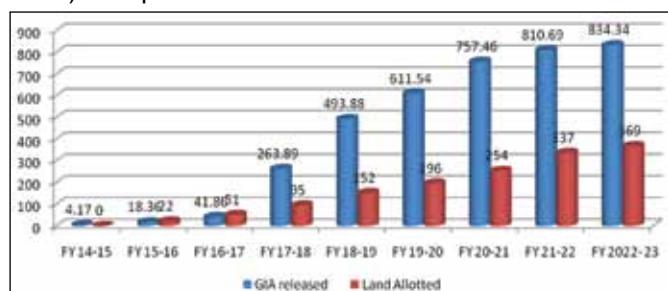
List of Approved Common Facility Centres (CFCs)

S.No.	State	Location/City
1	Karnataka	Hebbal Industrial Area, Mysore
2	Maharashtra	Shendra Five Star Industrial Area, Aurangabad District
3		Pimpri Industrial Area, Pune



The infrastructure development is under progress. As on September 2022, Grant-in-aid amounting to ₹ 834.34 crore has been released for implementation of these projects. These EMCs/CFCs are providing developed infrastructure with plug & play facility along with requisite testing/validation services to electronics industry to start their production activity in the country. Electronics industries are showing their interest to set up their manufacturing operations in these clusters. About 369 companies with projected investment of ₹ 54,276 crore have committed for setting up of their manufacturing facilities within these EMCs with estimated employment generation of more than 2.5 Lakh. Of these, 53 companies started their commercial production with an investment of ₹ 7,949 crore and provided employment opportunities to over 28,000 persons. Another 113 electronics manufacturing units are at various stages of construction and implementation.

Year wise progress of the EMC scheme (as on Sept. 2022) is depicted below:



3.5 Modified Electronics Manufacturing Clusters (EMC 2.0) Scheme

To provide avenues for expanding and strengthening of electronics manufacturing ecosystem in the country; Ministry of Electronics and IT notified the Modified Electronics Manufacturing Clusters (EMC 2.0) Scheme on April 01, 2020. By providing support for creation of world class infrastructure along with common facilities

and amenities for attracting major global electronics manufacturers along with their supply chains, the scheme aims to make India an Electronics Manufacturing Hub. The scheme also provides requisite financial assistance for creation of industry specific facilities like Common Facility Centers, Ready Built Factory Sheds / Plug and Play facilities etc. This will attract large scale electronics manufacturers to commence their production in the country and act as Anchor units to bring their suppliers in such clusters. It will also ensure greater integration with the global supply chains in the electronics manufacturing sector. The salient features of EMC 2.0 Scheme are as follows:

- Financial assistance upto 50% of the project cost subject to ceiling of ₹ 70 crore per 100 acres of land for setting up of Electronics Manufacturing Cluster projects and 75% of the project cost subject to a ceiling of ₹ 75 crore for Common Facility Centres (CFCs).
- Minimum land area requirement is 200 acres (100 acres in case of North-Eastern States, Hill States and UTs)
- Commitment from Anchor Units for having min. 20% of saleable/ leasable area with investment Commitment of ₹ 300 crore (10% and ₹ 150 crore in case of North-Eastern States, Hill States and UTs)
- Development of Ready Built Factory (RBF) Sheds and Plug & Play facilities in atleast 10% of the saleable / leasable land area.
- Open for new as well as expansion of existing EMCs/CFCs.
- Implementation and execution of scheme through Project Management Agency i.e., STPI.
- State Government/its agencies, Central PSUs/ State PSUs, Industrial Corridor Development Corporations (ICDCs) or joint venture of such agencies with Anchor units or industrial park developers (existing SPVs in case of expansion of projects) all eligible to apply
- Scheme open for receipt of application for a period of three (03) years i.e., upto March, 2023

and further five (05) years for release of financial assistance to approved projects.

Status of EMC 2.0 till September, 2022 is as follows:

Under the scheme 3 applications for setting up of EMC with a project cost of ₹ 1,903 crore including Central financial assistance of ₹ 889 crore have been approved. These EMCs are poised to attract an investment of ₹ 20,910 crore and have potential to generate over 51,000 employment opportunities after getting operational. The financial assistance of ₹ 205.24 crore has been released so far. An investment commitment of INR 7,965 crore has already been received from Anchor unit(s) with employment potential of 10,000 persons.

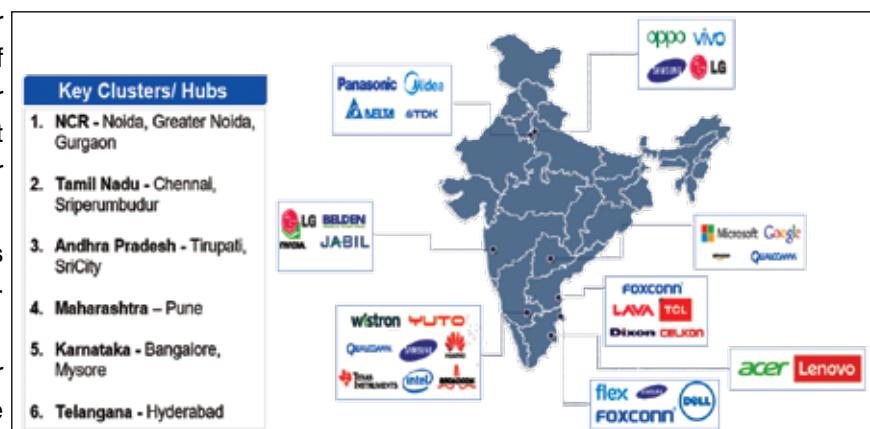


Figure: ESDM Landscape (Key Clusters/Hubs)

3.6 Electronics Development Fund (EDF)

Electronics Design & Manufacturing is a sector which 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. Setting up of EDF was one of the important strategies to enable creation of an electronics industry ecosystem in the country. Encouraging 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 provides risk capital to companies developing new technologies in the area of Electronics and Information Technology (IT). This

fund is expected to foster R&D and innovation in these technology sectors through creation of an ecosystem for providing risk capital to industry to undertake market driven R&D. It will, in the process, enrich the intellectual property in the country and encourage more entrepreneurs towards product and technology development.

Canbank Venture Capital Funds Ltd. (CVCFL), a 100% subsidiary of Canara Bank, is the Investment Manager and MeitY is the anchor investor of EDF. EDF has drawn ₹ 217.24 crore from its contributors, which includes ₹ 210.33 crore from MeitY. The total targeted corpus of these 8 Daughter Funds is ₹ 2,176 crore and the current commitment by EDF to these 8 Daughter Funds is ₹ 271.30 crore. As on 30.09.2022; EDF has invested ₹ 238.50 crore in eight Daughter Funds, which in turn have made total investments of ₹ 1227 crore in 128 Ventures/Startups. Total Funds raised by the supported startups of the Daughter Funds of EDF are approx. ₹16,000 crore. Total employment in supported Startups was more than 18,400. Number of IPs created/acquired by the supported start-ups is 372. The supported start-ups and companies are majorly working in IOT, Robotics, Drones, Autonomous Cars, Health-tech, Cyber security, Artificial Intelligence / Machine Learning etc.

S. No.	Daughter Fund Name	Amount Invested by EDF (₹ in crore)	Total Amount Invested by the Daughter Fund in Startup/ Companies (₹ in crore)	No. of Investee Startups/ Companies of the Daughter Fund
1	Endiya Seed Co-Creation Fund	29.51	137.03	12
2	KARSEMVEN Fund	24.00	83.43	17
3	YourNest India VC Fund II	43.15	162.60	19
4	PI Venture Fund-1	13.69	173.84	15
5	Unicorn India Ventures Fund – I	15.82	69.89	17
6	Aaruha Technol-ogy Fund - I	6.75	26.31	13
7	Ventureast Proactive Fund II	80.51	353.12	18
8	Exfinity Technology Fund Series-II	25.30	220.81	17
Total		238.50	1227.03	128

3.7 Production Linked Incentive Scheme (PLI) for Large Scale Electronics Manufacturing

Notified vide Gazette Notification No.CG-DL-E-01042020-218990 dated April 01, 2020, the Scheme provides financial incentive to boost domestic electronics manufacturing and attract large investments. The Scheme extends an incentive of 4% to 6% to eligible companies on incremental sales (over base year i.e., 2019-20) of manufactured goods including mobile phones and specified electronic components for a period of five years (FY 2020-21 to FY 2024-25) subsequent to the base year. The scheme will promote large scale electronics manufacturing particularly in the mobile phones segment and contribute significantly to achieving a USD 1 trillion digital economy and a USD 5 trillion GDP by 2025.

PLI Scheme has been a huge success in terms of the immense interest received from Global as well as Domestic Mobile Manufacturing companies. Over the next 5 years, the Scheme is expected to lead to total production of about ₹ 10.5 lakh crore. The scheme is also expected to boost exports significantly. Out of the total production, more than 60% is expected to be contributed by exports of the order of ₹ 6.5 lakh crore. The Scheme will bring additional investment in electronics manufacturing to the tune of ₹ 11,000 crore. PLI Scheme will also help in promotion of domestic champion companies by reviving Indian Brands and strengthening Indian EMS companies.

After the success of the First Round of Production Linked Incentive Scheme in attracting investments in mobile phone and electronic component manufacturing, Second Round of the PLI Scheme for Large Scale Electronics Manufacturing was launched on 11.03.2021 for incentivizing Electronic Components. Under the Second Round, incentives of 5% to 3% have been extended on incremental sales (over base year i.e., 2019-20) of goods manufactured in India and covered under the target segment, to eligible companies, for a period of four years (FY 2021-22 to FY 2024-25).

Over the next 4 years, the 16 approved electronic component manufacturers are expected to generate a total production of upto ₹ 12,432 crore. The Second Round of the Scheme will bring an additional investment in electronics manufacturing to the tune of ₹ 573 crore.

In accordance with the announcement made by Hon'ble Union Finance & Corporate Affairs Minister on 28.06.2021 to provide relief to companies approved under the PLI Scheme affected by the COVID-19 pandemic, the tenure of the PLI Scheme has been extended by one year i.e., from 2024-25 to 2025-26. The notification in this regard was issued on 23.09.2021.



3.8 Production Linked Incentive Scheme (PLI) for IT Hardware

With an objective to boost domestic manufacturing and attract large investments in the value chain, the Government of India (MeitY) came up with Production Linked Incentive Scheme (PLI) for IT Hardware which was notified on 03.03.2021. This scheme extends an incentive of 4% to 2% / 1% on net incremental sales (over base year of FY 2019-20) of goods under target segments - Laptops, Tablets, All-in-One Personal Computers (PCs) and Servers of goods for a period of four years (FY 2021-22 to FY 2024-25). Incentives are applicable under the scheme from 01.04.2021.

The scheme was open for filing applications till 30.04.2021. A total of 14 companies have been approved under the PLI Scheme. Over the next 4 years, the 14 approved companies under the Scheme are expected to lead to total production of about ₹ 1,60,000 crore. Out of the total production of ₹ 1,60,000 crore in the next 4 years, more than 37% is expected to be contributed by exports of the order of ₹ 60,000 crore. The scheme is expected to bring an additional investment in electronics manufacturing to the tune of ₹ 2,500 crore. Generation of 36,066 additional direct jobs and four times indirect employment is expected under the PLI Scheme for IT Hardware.



Figure: Inside view of a manufacturing plant of PLI Applicant

3.9 Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS)

Notified vide Gazette Notification No. CG-DL-E-01042020-218992 dated April 01, 2020, the Scheme provides financial incentive of 25% on capital expenditure for the identified list of electronic goods that comprise downstream value chain of electronic products, i.e., electronic components, semiconductor/display fabrication units, ATMP units, specialized sub-assemblies and capital goods for manufacture of aforesaid goods. The scheme promotes development of electronic components manufacturing ecosystem in the country and deepening of electronics value chain and is expected to bring new investments to the tune of ₹ 20,000 crore with total employment generation potential (Direct and Indirect) of 6,00,000. The scheme is open for applications for 3 years from the date of its notification i.e., till 31.03.2023.

Status of SPECS till August, 2022 is as follows:

Under the scheme twenty-nine (29) applications have been approved with total proposed investment of INR 11,044 crore. The total employment generation potential of the approved applications is 31,542.

3.10 Investment Promotion to Attract Investment in ESDM Sector

3.10.1 Promotion of PLI, SPECS, EMC 2.0 and Schemes for Development of Semiconductors and Display Manufacturing Ecosystem in India

After the successful launch of schemes (i.e., PLI Scheme for Large Scale Electronics Manufacturing, SPECS and

EMC2.0) and aggressive promotional activities for these schemes, MeitY, further came out with PLI Scheme for IT Hardware and Schemes for Development of Semiconductors and Display Manufacturing Ecosystem in India. Online meetings were organized with individual companies where presentations on the aforesaid schemes were made.

Individual meetings with companies at various levels including Secretary, Joint Secretary, Senior Director and other senior officials of MeitY were organised in this focused and strategic outreach initiative. As a result of this outreach exercise, the PLI schemes, SPECS and EMC 2.0 got a tremendous response from the industry.

3.10.2 Advocacy and Outreach Programmes

The new leadership in MeitY showed the way and renewed the focus of the Ministry in developing a strong ESDM ecosystem in India. The mandate was to invite global suppliers to the OEM / ODM / EMS companies to consider India as their manufacturing base and be a part of the trusted value chain of India.

3.10.3 Supply Chain Focused Meetings & Webinars

Mobile phone manufacturers were approached to invite their global vendors to these Supply chain Meets where they were informed of the various initiatives of the Government of India, State Governments and other Ease of Doing Business (EoDB) initiatives. It was assured that the companies would be handheld throughout the entire process of setting up their facility in India. Companies which express the interest in manufacturing in India are assisted with such information.

A supply chain webinar has been organized on 02.03.2022 with global vendors of Vivo, wherein, 18 suppliers of various verticals of mobile phone participated. 2 State Governments also participated and pitched for attracting investment in ESDM sector.

Organized 2nd Electronics Supply Chain Summit on 25.03.2022 at Noida in association with ELCINA. The event theme focused on “Electronics Manufacturing in Mission Mode - Creating a credible Electronic Component Eco-system in India by 2025”. The Summit witnessed strong participation by 125+ participating organisations

and 250+ Delegates. The Conference hosted eminent speakers from industry as well as 13 Buyers from Mobile, Consumer Electronics & Lighting segments and the Buyer Seller interactions.



3.10.4 National Level Events & Facilitations

Organized an event for release of Volume-II of the Vision Document entitled “\$300 bn Sustainable Electronics Manufacturing & Exports by 2026.” by Hon’ble Minister for Electronics and IT on 24.01.2022. Further, various sub groups on Trillion Dollar Digital Economy have been constituted, which inter-alia, comprises of an Advisory Group on “Digital India Electronics Mission \$ 300 Billion”. A meeting of the aforementioned advisory group has been organized on 8th June, 2022.



In line with MeitY's vision of achieving \$300 Bn electronics manufacturing by 2026, a roundtable meeting under chairmanship of Hon'ble MEIT was organized with members of MAIT on 30.05.2022 to discuss PLI IT Hardware, Ease of doing Business and Electronics Repair Services Outsourcing (ERSO).



A meeting with Resident Commissioners on Achieving \$300 Bn Sustainable Electronics Manufacturing and Exports by 2026 was organized under the chairmanship of Hon'ble Minister of State on 9th May, 2022.

A 3 Days inaugural 'Semicon India 2022' was organized in Bengaluru from April 29 to May 01, 2022. The theme of the Conference was "Design and Manufacture in India, for the World: Catalysing India's Semiconductor Ecosystem"

MeitY also participated in the Electronica India event organized at India Expo Mart, Greater Noida from September 21 – September 23, 2022. More than 600 exhibitors showcased innovative electronic products and solutions in the event which led to face-to-face interactions also by more than 200 participants. MeitY through its exclusive "Electronics India Pavilion" reached out to manufacturers and investors with the agenda of helping them understand Government of India's various schemes and policies to boost domestic manufacturing and attract large investments in the electronics and associated value chain. Special focus was given to explain various opportunities in Semiconductors and Display Manufacturing Ecosystem in India apart from larger ESDM (Electronics System Design & Manufacturing) ecosystem in India.



Organized an event for report launch on Globalise to Localise: Exporting at scale and deepening the ecosystem are vital to higher domestic value addition in electronics" by Hon'ble MoS on 29.08.2022 at National Media Centre, New Delhi.



Conducted various One to one meeting with ESDM companies to understand the issues being faced by them.

3.10.5 International Events & Facilitations

Outreach engagements held with Indian Consulates/ Embassies/ High Commissions in other countries for promoting the schemes launched by MeitY.

Facilitated visit of government cum business delegation led by Deputy Foreign Minister, Ministry of Foreign Affairs from Taiwan from 22nd -25th August 2022 to conduct an

on-site survey of the feasibility of the semiconductor industry development in India.

Under the framework of the Indo-German Digital Dialogue a Government delegation led by Secretary, MeitY, visited Germany during 21-24 June, 2022 for official meetings and industry appointments.

Facilitated B2B meeting on the Investment opportunity in Semiconductor, Electronics and Talent development in association with ITA and TECC on 22.08.2022 during the visit of Taiwanese delegation to India.

Facilitated visit of Government cum Business delegation from Taiwan to infrastructure facilities of Integrated Industrial Township, Greater Noida and organized meeting with big business houses and State Governments of Uttar Pradesh, Maharashtra

3.10.6 Social Media Participation

To reach out to all ESDM stakeholders, all the events, webinars were widely promoted on twitter through the official handle (@Electronics_GoI) of the IPHW Division of MeitY.

3.11 Modified Programme for Development of Semiconductors and Display Manufacturing Ecosystem in India

In furtherance of the vision of Aatmanirbhar Bharat and positioning India as the global hub for ESDM, a comprehensive program for the development of semiconductors and display manufacturing ecosystem in India was approved by Government of India with an outlay of ₹ 76,000 crore (>10 billion USD). The Programme contained various schemes to attract investments in the field of semiconductors and display manufacturing. The Union Cabinet in its meeting held on 21.09.2022 has accorded its approval for modification of this programme. Following modifications have been approved:

Fiscal support of 50% of Project Cost on pari-passu basis for all technology nodes under Scheme for Setting up of Semiconductor Fabs in India.

Fiscal support of 50% of Project Cost on pari-passu basis under Scheme for Setting up of Display Fabs.

Fiscal support of 50% of Capital Expenditure on pari-passu basis under Scheme for Setting up of Compound

Semiconductors / Silicon Photonics / Sensors Fab and Semiconductor ATMP /OSAT facilities in India. Additionally, target technologies under the Scheme will include Discrete Semiconductor Fabs.

Accordingly, the modified Programme for development of Semiconductors and Display manufacturing ecosystem in India offers following Schemes:

3.11.1 Modified Scheme for setting up Semiconductor Fabs in India

The scheme is aimed at attracting large investments for setting up semiconductor wafer fabrication facilities in the country to strengthen the electronics manufacturing ecosystem and help establish a trusted value chain.

The Scheme extends a fiscal support of 50% of the project cost across the technology nodes for setting up of Silicon based Semiconductor Fabs in India.

The fiscal support under the scheme shall be provided on pari-passu basis for a period of six years from the date of approval.

Apart from such fiscal support, Semiconductor Fabs set up in India will be supported through purchase preference in procurement of electronic products by the Government under the Public Procurement (Preference to Make in India) Order.

3.11.2 Modified Scheme for setting up of Display Fabs in India

The scheme is aimed at attracting large investments for manufacturing TFT LCD or AMOLED based display panels in the country to strengthen the electronics manufacturing ecosystem.

The Scheme extends fiscal support of up to 50% of Project Cost for setting up of Display Fabs in India.

The fiscal support under the scheme shall be provided on pari-passu basis for a period of six years from the date of approval.

Apart from such fiscal support, Display Fabs set up in India will be supported through purchase preference in procurement of electronic products by the Government under the Public Procurement (Preference to Make in India) Order.

3.11.3 Modified Scheme for setting up of Compound Semiconductors / Silicon Photonics / Sensors Fab/ Discrete Semiconductors Fab and Semiconductor Assembly, Testing, Marking and Packaging (ATMP) / OSAT facilities in India

The scheme extends a fiscal support of 50% of the Capital Expenditure for setting up of Compound Semiconductors / Silicon Photonics (SiPh) / Sensors (including MEMS) Fab/ Discrete Semiconductor Fab and Semiconductor ATMP / OSAT facilities in India.

Companies / Joint Ventures proposing to set up such facilities can apply for support under the scheme through an online portal. The scheme will be open for receiving applications till 31.12.2024. Fiscal support shall be available for a period of five years from the date of acknowledgement of the application.

3.11.4 Design Linked Incentive (DLI) Scheme

'Design Linked Incentive Scheme' has been notified on 21.12.2021. It shall offer financial incentives as well as design infrastructure support across various stages of development and deployment of semiconductor design for Integrated Circuits (ICs), Chipsets, System on Chips (SoCs), Systems & IP Cores and semiconductor linked design.

Under the "Product Design Linked Incentive" component of the scheme, reimbursement of up to 50% of the eligible expenditure subject to a ceiling of ₹ 15 crore per application will be provided as fiscal support to the approved applicants. This shall include expenditure relating to design, development, testing, fabrication, validation, prototype development, product development, filing of Intellectual Property Rights etc. It will also include manpower costs.

Under the "Deployment Linked Incentive" component of the scheme, incentive of 6% to 4% of net sales turnover over 5 years subject to a ceiling of ₹ 30 crore per application will be provided to the approved applicants whose semiconductor design for Integrated Circuits (ICs), Chipsets, System on Chips (SoCs), Systems & IP Cores and semiconductor linked design are deployed in electronic products.

C-DAC is the Nodal Agency to implement the scheme

and establish the semiconductor design infrastructure such as EDA Tool Grid, repository of IP Cores, hardware and software licenses, patents, and trademarks etc.

The duration of the scheme for receipt of applications is three years. Fiscal support shall be available for a period of five years from the date of application.

3.11.5 India Semiconductor Mission (ISM)

India Semiconductor Mission (ISM) has been established as an Independent Business Division under the Digital India Corporation on 22.12.2021. ISM will implement the schemes for Semiconductor and Display Fabs, Compound Semiconductor Fabs, Silicon Photonics Fabs, MEMS Sensors Fabs, Discrete Semiconductor Fabs and Semiconductor Packaging Units (ATMP / OSAT). It shall drive the long-term strategies for the development of semiconductor and display ecosystem in the country.

The India Semiconductor Mission will be led by global experts in semiconductor and display industry. It will act as the nodal agency for efficient and smooth implementation of the schemes for setting up of Semiconductor and Display Fabs.

3.11.6 Semi-conductor Laboratory (SCL)

Union Cabinet has also approved that Ministry of Electronics and Information Technology will take requisite steps for modernization and commercialization of Semi-conductor Laboratory (SCL), Mohali. Semiconductor Laboratory (SCL), Mohali has been brought under the administrative control of Ministry of Electronics and Information Technology from Department of Space.

SCL is an Integrated Device Manufacturer which undertakes activities pertaining to design, development, fabrication, assembly & packaging, testing and quality assurance of Silicon CMOS and MEMS Devices for various applications. Presently, SCL has two wafer fabrication lines, i.e., 200 mm wafer line operating in 180nm CMOS technology and 150 mm wafer line for MEMS technology. SCL predominantly caters to low volume requirements for various applications.

3.11.7 Progress so Far:

Under 'Program for development of Semiconductors and Display manufacturing ecosystem in India', 5 applications

for Semiconductor and Display Fabs with total investment to the tune of USD 20.5 Bn (INR 153,750 crore), Two (2) applications for Semiconductor Packaging Units and Sixteen (16) applications under Design Linked Incentive Scheme have been received.

3.12 Compulsory Safety Standards for Electronics

The “Electronics and Information Technology Goods (Requirements for Compulsory Registration) Order, 2012” was notified on 3rd October 2012 under the Compulsory Registration Scheme notified by Bureau of Indian Standards (BIS) under the ambit of the BIS Act, 1986, to ensure the safety of Indian consumers and curb the inflow of substandard electronic products. The Order has been migrated to BIS Act 2016 as “Electronics and Information Technology Goods (Requirement of Compulsory Registration) Order, 2021”. The Order necessitates creation of an institutional mechanism for developing and mandating standards and certification for electronic products to strengthen Conformity Assessment infrastructure nationwide. As per the provisions of the Order, before manufacturing, import, sale, stock etc of the products notified under the schedule of the Order, the products need to be registered with BIS based on testing of the notified product at BIS recognized laboratories as per the Indian Standards. The registration is granted to a manufacturer for manufacturing a product at a particular location. As per the provisions of the scheme, BIS grants registration to the manufacturers and to check compliance of the Order, random surveillance is carried out by MeitY. The order has come into effect for 63 notified product categories.

The Compulsory Registration Scheme has resulted in high compliance of notified electronic goods to Indian safety standards and more than 31,000 registrations have been granted by BIS to manufacturing units covering approximately 1,75,000 products models/series.

3.13 Public Procurement (Preference to Make in India) Order 2017

The Government has issued Public Procurement (Preference to Make in India) Order 2017 [PPP-MII Order 2017] vide the Department for Promotion of Industry and Internal Trade (DPIIT) Order No. P-45021/2/2017-B.E.-II dated 15.06.2017, as amended by Orders dated

28.05.2018, 29.05.2019, 04.06.2020, and 16.09.2020 to encourage ‘Make in India’ and 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 (MeitY) vide Notification No. W-43/4/2019-IPHW-MeitY dated 07.09.2020 has notified the mechanism for calculating local content for 13 electronic products viz., (i) Desktop PCs, (ii) Thin Clients, (iii) Computer Monitors, (iv) Laptop PCs, (v) Tablet PCs, (vi) Dot Matrix Printers, (vii) Contact and Contactless Smart Cards, (viii) LED Products, (ix) Biometric Access Control / Authentication Devices, (x) Biometric Finger Print Sensors, (xi) Biometric Iris Sensors, (xii) Servers, and (xiii) Cellular Mobile Phones.

MeitY has also notified Cellular Mobile Phones under clause 3(a) of the PPP-MII Order which mandates public procurement of Cellular Mobile Phones from local suppliers only.

3.14 Development and Implementation of Indian Conditional Access System (iCAS)

Conditional Access System (CAS) is a system used to limit the access of TV signals to only authorized viewers and forms an integral part of Set Top Boxes (STBs). A major impediment in design and development of domestic STBs was identified as the 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, had funded a unique project for the development and implementation of Indian Conditional Access System (iCAS) for Set Top Boxes (STBs). In November 2014, M/s. ByDesign India Pvt. Ltd., Bangalore, was selected and awarded the task for development and implementation of iCAS, in association with Centre for Development of Advanced Computing (C-DAC).

The iCAS was successfully developed in November, 2015, within the specified time limit. The development of iCAS has enabled India to enter a niche market hitherto dominated by few big global companies. The solution has been well received by Indian Operators at large. iCAS has been integrated with multiple leading chipsets for SD

/ HD / HEVC signals such as ALI-SD (M3281P), MSTAR HD (MSD5043), MSTARSD (5C35), STM Platform HD (STiH273), Broadcom 7581 and with different Head-ends such as Teleste, Ericsson, Thomson, Wellav, Dexin, Gospell, Arris, Winnersat, Harmonic, Envivio. iCAS has been localized in 22 Indian languages for Subscriber Management System (SMS). Electronic Program Guide (EPG) has also been developed in 22 Indian languages.

Over 22,00,000 STBs with iCAS have been deployed with more than 200 cable operators. Doordarshan has also adopted iCAS for its Free Dish DTH platform, thus giving thrust to 'Make-In-India' initiative.

3.15 Scheme for setting-up/up-gradation of Electronic Product 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 was to encourage setting up of 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 Scheme was valid up-to 25th August 2018. The Programme Review and Steering Group (PRSG) had approved 05 project proposals under the scheme for providing GIA of ₹ 1.5 crore (max). Following project proposals were 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.

3.16 Centre of Excellence in Electronics and ICT application

3.16.1 National Centre of Excellence for Large Area Flexible Electronics (NCFlexE)

The project for setting up of National Centre of Excellence for Large Area Flexible Electronics (NCFlexE) at IIT-

Kanpur was approved on 14th November 2014 with a project cost of ₹132.99 crore including Government Grant-in-aid (GIA) of ₹111.12 crore. The main objective of the NCFlexE centre is to establish a research programme to engage in leading edge research in large area of flexible electronics and building strategic academic collaborations to address requirements through joint technology developments and to realize homegrown technologies for manufacturing.

Overall objective of NCFlexE is to spur development of ecosystem for flexible electronics in the country. The Centre has been mandated to develop technology prototypes, in PPP mode through industry collaborations on areas such as Printable electronic tags, Anti-counterfeiting for medicine packages. Flexible solar module, OLED lighting, sensors, Conductive inks etc.

The centre is equipped with state-of-the-art laboratory facilities in the emerging flexible electronics area and has a portfolio of 63 filed patents. Five Technology/ Know-how have been transferred to industry including incubation & mentoring support to start-ups. A startup M/s Transpack Ltd. has been incubated in Anti-counterfeiting technology. The technology has been adopted by Exercise Department of Delhi Government. The other startup M/s Likhotronics Pvt. Ltd. has been incubated recently for the product Educational Kits using special inks. In addition, 3 technologies of the centre have been transferred to industries/start-ups for commercialization. Several companies have invested in the centre for R&D, product developments etc. The Centre is working closely with industries to meet their requirement in this thematic area and developed various prototypes like Gas Sensors for Milk Adulteration & Food Spoilage, Smart Label with tamper evident tracking, OLED Display, Handheld Infrared Thermometer, Screen-printed sensor for Bilirubin detection in Serum, Warm Hug/Heater Jacketsetc.



1. NCFlexE Building



2. State of the art roll to roll printing line



3. Printing infrastructures and some of the printed prototype models

3.16.2 National Centre of Excellence in Technology for Internal Security (NCETIS)

National Centre of Excellence in Technology for Internal Security (NCETIS) at IIT-Bombay has been approved on 28th May 2015 with a total outlay of ₹ 83.89 crore (MeitY contribution: ₹ 83.89 crore). The aim of the CoE is to address the challenges of homeland security and to develop state-of-the-art technologies which are vital for the national security agencies for providing rescue and relief operations with the indigenously developed technologies/ products. The project is envisaged to set up the required infrastructures and carrying out R&D activities for developing prototype model, commercialization, and technology transfer of multiple products. The project is expected to be completed in March 2023. Under the project, various technologies have been developed and three of them have commercialized. Explosive detector developed under the project has been registered and made available at GEM portal after the

successful certification and trials. Two Start-ups have been incubated under the CoE.

3.16.3 Next Generation AMOLED Displays, OLED Lighting and OPV Products

The project “Next Generation AMOLED Displays, OLED Lighting and OPV products: Development of disruptive Technologies to enable cost effective electronic component manufacturing in India”, was approved by Ministry of Electronics and Information Technology (MeitY) to be implemented by IIT Madras with total budget outlay of Rs. 35.63 Crore, including Grant-in-Aid amounting to Rs. 28.68 Crore.

The objective of the center is to demonstrate state-of-the-art AMOLED based displays developed by Fine Metal Mask (FMM) and Closed Space Sublimation (CSS) processes. OPV devices are also being developed for roll-to-roll manufacturing. A laboratory has been developed successfully for state-of-the-art research facility. A clean area has been set up of area around 3000 sq ft. There are two parts in the clean area. One is of class 100 and the rest of the area is of class 1000. The class 100 area is used for substrate cleaning, which is very crucial for the fabrication. Class 1000 area has all the deposition units and is utilized for AMOLED device fabrication.



1. AMOLED Dock system control



2 AMOLED clean room



3. AMOLED Dock system

3.16.4 Centre of Excellence in Medical Electronics and Bio-Physics

Centre of Excellence on Medical Electronics and Bio-Physics has been set up at the Andhra Pradesh MedTech Zone Limited (AMTZ), Visakhapatnam with a total outlay of ₹32.02 crore (MeitY contribution: ₹18.67 crore). The Center of Excellence in Medical Electronics and Bio-Physics has been approved in the month of April 2020. The Project is being implemented by the Kalam Institute of Health Technology (KIHT), AMTZ for a period of three years.

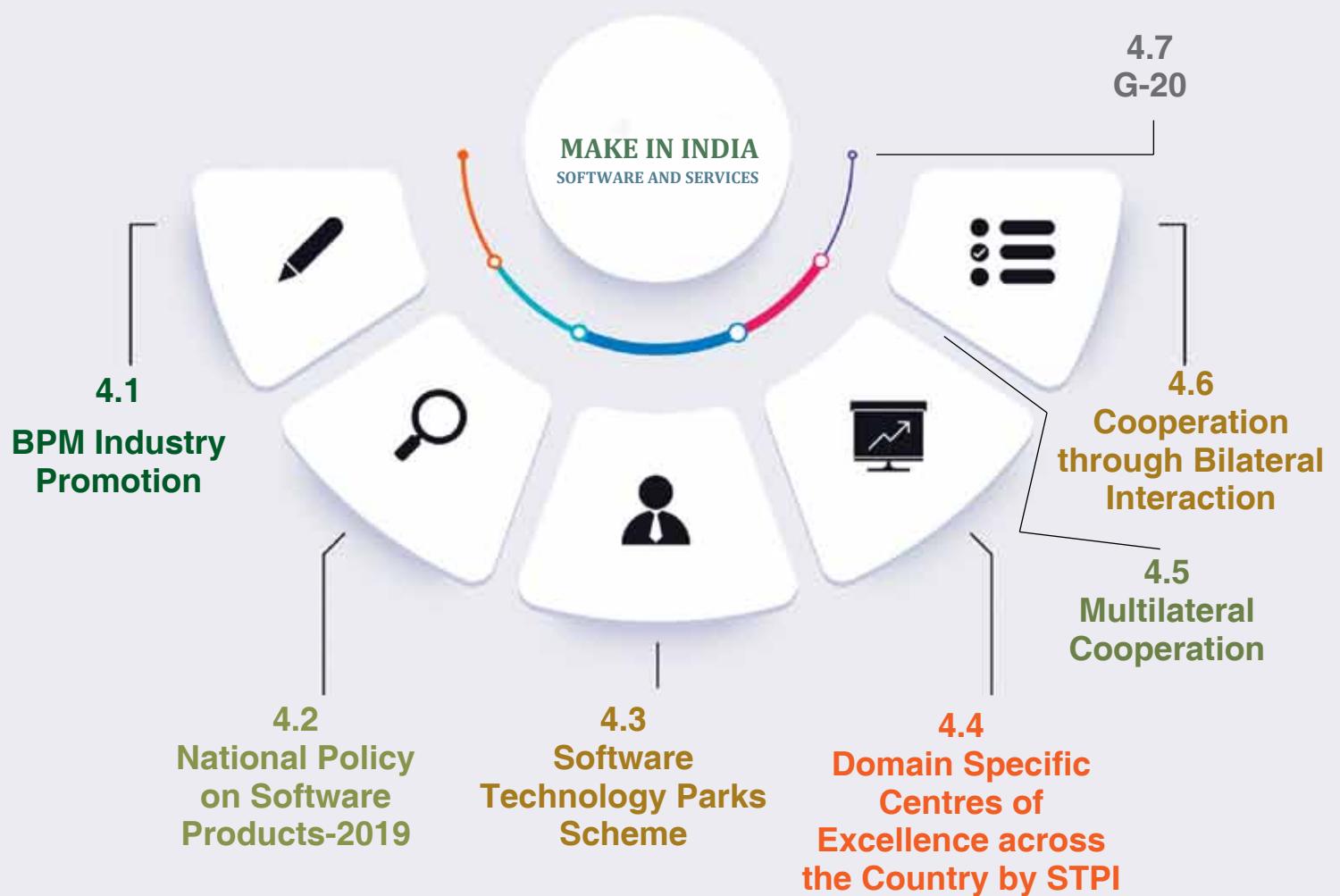
The aim of the project is to strengthen the medical electronics devices manufacturing ecosystem in the country with suitable innovations, import substitution and value addition, etc. The objectives of the CoE are to provide functional research support to design and prototyping for manufacturing in ESDM, conduct R&D for manufacturing of electronics and integration of components to make functional critical parts (PCB assembly/ sub-assembly) for medical devices, carrying out Bio-Physics research such as Bio-Organ/ Electro-organs, etc., and research and prototyping of key electro-potential based components, etc.

The Centre of Excellence at AMTZ has procured the necessary machinery supporting manufacturing of PCBA for Medical Electronics and Bio 3D Printing applications. AMTZ has a self-sustainable model, and it acts as one stop solution for all kinds of medical device manufactures and startups. The funds released by MeitY are being used for purchasing of capital

equipment only. The CoE, since its inception, has been providing functional research support for innovators, manufacturers, researchers on medical devices and has led to the following achievements:

- Skill building on ESDM has led to 82 trained professionals.
- Design, Prototype and Manufacturing for ESDM has enabled PCBA line installation which supports production of 10,000 units of ventilators, 5000 Oxygen Concentrators, 100 units of Defibrillator.
- Electro Bio Physics research has enabled development of prosthetic arms and prototyping of electro-bio organs.
- Ongoing research at Centre for Bio-physics include development of 3D bio printed synthetic ears.
- 10 startups have been supported so far.





Software and Services

With the Government's outlook on Digital Diplomacy, Digital Economy and launch of Digital India Programme, this Ministry has been synergized its efforts to expand IT/ITeS sector globally including diversification of geographies, domain expertise, High Skill Work Forces to enhance business opportunities. Efforts have also 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 industrial bodies for forging partnerships for mutual progress, 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 in India's 'Digital India Program' and 'Make in India' initiatives of the Government of India.
- Strengthen India's position on multilateral forums for the 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, UN & its associated organizations UNESCO, UNCTAD, UNDP, ECOSOC, ESCAP etc. ASEAN, SCO, BRICS, SAARC, WSIS, World Bank, WTO, ADB, World Economic Forum (WEF) etc. 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 of this Ministry has been pursuing the above objectives through Memorandum of Understandings (MoUs), Joint Working Groups (JWG) meetings, Multilateral deliberations/negotiations, Projects in other geographies/countries, participating in major International events to showcase India's strength and enhance business opportunity for Indian IT/ Software Industry. Also, issues faced w.r.t India's IT exports and mobility of Indian IT professionals have been handled at various bilateral and international forums from time to time.

4.1 BPM Industry Promotion

MeitY is working towards the vision of Digital Inclusion and to create new opportunities in the digital economy North-East BPO Promotion Scheme (NEBPS) and India BPO Promotion Scheme (IBPS) were initiated in 2015 and 2016 respectively 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 5,000 seats under NEBPS were planned. The duration of IBPS was up to 31.03.2019 while NEBPS was up to March 2020 to invite new bids, however

disbursement of financial support may continue beyond this period. Under IBPS, Seat distribution to States and UTs was based on population as per 2011 Census. The outlay of the Scheme is Rs.493 crore (IBPS) and Rs.50 crore (NEBPS).

Salient Features

- **Financial Support:** These schemes provide financial support up to Rs.1 lakh per seat in the form of Viability Gap Funding (VGF) towards Capital and Operational expenses for a period of 3 years.
- **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 were 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.

Location of BPO/ITES Units under IBPS and NEBPS

Location of some of the Operational/Tenure Completed Units setup under these schemes are as follows:

Patna, Muzaffarpur, Raipur, Shimla, Sagar, Bhubaneswar, Jaleshwar, Kottakkuppam, Jammu, Srinagar, Nashik, Bhiwandi, Sangli, Ranchi, Mohali, Kanpur, Varanasi, Guwahati, Kohima, Imphal, Madurai, Mayiladuthurai, Chengalpattu, Tiruchirappalli, Tiruppattur, Vellore, Karimnagar, Tirupati, Guntupalli etc.

Impact

Dispersal of Industry: Growth of IT/ITES sector in India has traditionally remained confined to a few select urban clusters. BPO Promotion Schemes have facilitated in expanding the base of IT/ITES industry and creation of employment opportunities beyond metros. Under IBPS and NEBPS, 246 units have set up at more than 100 locations distributed across 27 States/UTs providing direct employment to around 51,010 persons.

Journey towards Digital India through Bridging 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 especially 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 had also launched North-East BPO Promotion Scheme (NEBPS), under Digital India Programme, to incentivize setting-up of 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 Rs. 50 crore. Under NEBPS, 19 BPO/ITES units have set up across 6 States of NER, namely, Assam, Nagaland, Meghalaya, Manipur, Arunachal Pradesh and Tripura providing initial employment to about 824 persons. Further details of the scheme are available at <https://nebps.stpi.in>.

4.2 National Policy on Software Products-2019

The National Policy on Software Products 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 a robust Indian Software products ecosystem.

The Indian Software Product industry has made historic achievements in FY 2022, reaching \$13 Bn in total revenue. Undeniably 2021 was the year of tech start-ups and unicorns growth in India. Apart from the unicorn story, the software product segment witnessed rise in demand for collaborative applications, application platforms, security software, system and service management software, and content workflow and management applications.

The followings programmes are being implemented under the National Policy on Software Products-2019:

National Software Product Mission (NSPM)

The National Software Product Mission (NSPM) has been constituted to evolve and monitor schemes, programmes and strategy for the implementation of National Policy on Software Products (NPSP 2019).

Indian Software Product Registry (ISPR)

Indian Software Product Registry (ISPR) has been created to analyse numbers/ statistics/ database of Indian Software Product Companies (ISPC) and to bring all software products at one single platform. The key features of the ISPR are as below:

- The Indian Software product registry acts as a common pool of Indian Software Products thereby providing a trusted trade environment.

- Serving as a gateway to the Indian Software Product Company (ISPC) with exposures to millions of global players.
- Core Identity base for ISPC's to be a part of Government e-Marketplace (GeM)
- Facilitation of Indian Software Product Industry for providing fiscal incentives, if any, at a later stage.
- Database for the Indian Software Product Companies, products developed in India with any analytics around what kind of domains, sectors, geo-regions are currently serves.
- List Products Industry-wise, Technology-wise, intended audience (B2B, B2C, B2G), product stage etc.
- Updates on latest news/events

The ISPR (www.ispr.gov.in) has been launched on 21 October 2019. As of now, more than 1230 users, 300 software product companies and 378 software products have been successfully applied for registration on ISPR. Out of these, more than 239 Indian Software Product Companies having ownership over the software product (s) and more than 95 Indian Software Product have been displayed live on the portal after internal verification and declaration provided by the applicants. The ISPR is being implemented by iSPIRT.

Next Generation Incubation Scheme (NGIS)

Next Generation Incubation Scheme (NGIS) has been approved to support software product ecosystem and to address a significant portion of National Policy on Software Products (NPSP 2019). It is envisaged to create a vibrant software product ecosystem to complement the robust IT Industry for continued growth, new employment and enhance competitiveness.

Objectives of NGIS are as below:

- To identify start-ups working towards solutions/outstanding software products for futuristic problems/ emerging ICT technology/ societal problems
- To promote identified startups through technical & financial support and provide them training on business solutions/mentoring support/plug-n-play facility and preferably "Challenge/Internship Grant".

- To provide vibrant software product ecosystem to complete the robust IT industry for continued growth, new employment and to enhance competitiveness.

The scheme has a vision to drive the rise of India as a Software Product Nation so as to make India a global player in development, production and supply of Innovative, Efficient and Secure Software Products thus facilitating the growth across the entire spectrum of ICT sector.

The scheme focusing on 12 locations pan-India viz. Agartala, Bhilai, Bhopal, Bhubaneswar, Dehradun, Guwahati, Jaipur, Lucknow, Prayagraj, Mohali, Patna and Vijayawada. The scheme aims to support 300 tech Start-ups over a period of 3 years with the total budgetary outlay of Rs. 95.03 crore.

As on date, 14 challenge contests under the Next Generation Incubation Scheme (NGIS) have been launched through an online challenge program “CHUNAUTI” (Challenge Hunt Under NGIS for Advanced Uninhibited Technology Intervention). Total 261 startups have been selected through 3 challenge programs (CHUNAUTI - Challenge Hunt Under NGIS for Advanced Uninhibited Technology Intervention). 4th edition of CHUNAUTI has been launched with 11 contests by 11 STPI Directorates. Screening, Evaluation & Selection process for CHUNAUTI 4.0 is underway.

Innovation Challenge for Development of Indian Video Conferencing Solution (Software Product)

A programme of Innovation Challenge for development of Video Conferencing solution has been launched to develop innovative Video Conferencing solution. The end product will be an Indian Software Product at par with International video and audio quality, should work in low and high network scenarios. The initiative is an attempt to promote Indian Software products as envisaged under the National Policy on Software Products.

The winner of the challenge has been provided financial support of Rs 1 Crore (One Crore) with additional Rs.10 Lakhs towards O&M for next three years and is being adopted for Government use through a contract is:

Sr. No.	Name	City
1.	Techgentsia Software Technologies Private Limited (Product name: Vconsol)	Alappuzha

Installation of Vconsol on NIC Cloud has been completed with brand name BHARAT VC (<https://bharatvc.nic.in/>).

In addition, the Jury also selected the following three applicants as potential products and decided to sign a developmental contract and have been supported by Rs 25 Lakh each for further maturing their product.

Sr. No.	Name	City
1.	Instrive Softlabs Pvt Ltd (Product Name: HydraMeet)	Chennai
2.	People Link Unified Communications Pvt Ltd (Product name: Insta VC)	Hyderabad
3.	Sarv Webs Pvt. Ltd. (Product Name L: Sarv Wave)	Jaipur

ICT Grand Challenge (ICTGC) under National Policy on Software Products

National Policy on Software Products has a provision to conduct at least 20 Grand Challenge so as to develop a variety of software products addressing socio-economic challenges. ICT Grand Challenge (ICTGC) Scheme has been launched to develop innovative software product by conducting four challenges round in the specified area.

The Ministry of Electronics & Information Technology (MeitY) in partnership with National Jal Jeevan Mission (NJJM), Department of Drinking Water and Sanitation, Ministry of Jal Shakti has announced to develop a ‘Smart water supply measurement and monitoring system’ via an ICT Grand Challenge.

The aim of this ICT Grand Challenge is to develop innovative, modular, and cost-effective solution called “Smart water supply measurement and monitoring system” to be deployed at the village / semi-rural / semi-urban levels. The system would collect and facilitate centralised monitoring of data. A battery back-up for controller may support the system for downtime and it is expected that the design should support 48 hours back-up and the sensors should also be battery powered with more than 3 years of battery life.

Under this ICTGC, total 218 applications were received, from Indian Tech start-ups, Companies, Individuals, LLP etc. Subsequently, top 10 applicants have been selected for ideation to prototype stage. Subsequently, top four applicants from prototypes to product development have

been identified and their products have been deployed at 100 locations across the country.

After detailed deliberation, review and evaluation of product, the following winner and runner-ups after final stage of the challenge have been declared.

	Name of the company	Reward money
Winner	Rydot Infotech Private Limited	Rs 50 lakh
Runner-ups	Greenviroment Innovation & Marketing India Private Limited GLOBALm Pvt Ltd	Rs 20 lakh each
Second Runner-up	Consortium of Eyenetaqua Solutions Private Limited & Ilonnnati Innovations Private Limited	Rs 15 Lakh

Start-up Accelerator Programme of MeitY for Product Innovation, Development and Growth (SAMRIDH)

The SAMRIDH programme has been launched to support existing and upcoming Accelerators to select and accelerate potential product based start-ups to scale. The program focus on accelerating the start-ups by providing customer connect, investor connect, and international immersion.

Deliverables from Accelerators:

The start-ups selected by accelerator under the scheme are being provided with the following support from Accelerators:

- **Market Related Research and Market/Customer Access:** Expert diagnostics to understand user requirements, appropriate customer base and product scale to find the right product positioning.
- **Business Mentors:** Special sector specific experts to guide the entrepreneurs to recommend preferred business and revenue models for the product.
- **Partnerships and Collaborations:** National/International.
- **Legal Assistance:** IP, Incorporation, and other matters.
- Connected Learning and Networking through shared SAMRIDH/ MSH platform.
- **Investment from VCs and Angels:** Selected start-ups will get a chance to present their company before a panel of VCs and Angel Investors to receive funding.

Investment from Government (Up to Rs 40 Lakh per startups)

The programme is being implemented by MeitY Startup Hub (MSH). Under the scheme 22 Accelerators have been selected from the 1st Expression of Interest (EoI) called by MSH.

MeitY-NASSCOM Start-up Women Entrepreneur Award for Software Products

Government of India has been assigning increasing importance to the development of women entrepreneurs in the country in recent years. MeitY-NASSCOM Start-up Women Entrepreneur Award for Software products is a remarkable mission to recognize & cultivate the entrepreneurial spirit in women and encourage promising women tech Entrepreneurs who not only contribute to the nation economy but also the social community. The aim and objective of the proposed award are as below:

- To recognize and cultivate the entrepreneurial spirit in women and inspire the next generation of women to lead the Indian digital era so as to serve as guiding role models.
- To encourage promising Entrepreneurs who not only contribute to the nation's economy but also to the social community.
- These entrepreneurs will serve to provide leadership and also as guiding examples for emerging and young or future entrepreneurs.

For 2020-2021, MeitY-NASSCOM Start-up Women Entrepreneur Awards for Software Products was announced in partnership with UN Women. The awards were open for participation from tech start-up women entrepreneurs. An overwhelming response was received across the country and as a result total 159 applications were received.

In these awards twelve women entrepreneurs as winners, two women entrepreneur as Jury Choice Awardees and one women entrepreneur for a special mention was selected. Each winner and Jury Choice Awardee has been rewarded by Rs. 2 Lakh.

Further, the 33 women entrepreneurs have also been selected for MeitY-NASSCOM Tech. Women Entrepreneur Accelerator Program to give them access

to networks, connects, learning and resources that are needed to build scalable, profitable and global businesses.

iTamil Nadu Technology (iTNT) Hub in Chennai

In order to establish a Software products Cluster under NPSP, the 1st cluster titled iTamil Nadu Technology (iTNT) Hub in Chennai is being established. The primary objective of Tamil Nadu Technology Hub will be to nurture the deep tech innovation ecosystem in Tamil Nadu that can guide, develop, implement and support startups, especially in a scaling up phase in deep tech. iTNT Hub shall support 200 numbers of start-ups / accelerated in technology space preferably in deep tech/emerging tech over a period of five years. In addition to that 200 start-ups over a period of five years shall be supported in the hub and spoke model and provided acceleration and infrastructural service.

Centre of Excellence on Industry 4.0 at Rashtriya ISPAT Nigam Ltd. - Visakhapatnam Steel Plant (RINL-VSP)

The demand of Industry 4.0 products & solutions is going to rise exponentially in the backdrop of growing Industrial Automation. Strengthening domestic capabilities of Industry 4.0 products & solutions will take the domestic industry up the value-chain significantly by way of increase in products, patents & IPR. In order to boost start-ups in these fields, a Centre of Excellence in the field of Industry 4.0 (Artificial Intelligence, Machine Learning, Augmented Reality, Virtual Reality, Industrial Automation, Industrial Robotics, Industrial Drone, Industrial IoT, Industrial 3D Printing and other related technologies powered by AI) at RINL Visakhapatnam is being established.

4.3 Software Technology Parks Scheme

For the promotion of Software exports from the country, Software Technology Parks of India (STPI) was set up in 1991 as an Autonomous Society under the Ministry of Electronics and Information Technology. STPI acts as 'single-window' in providing services to the software exporters. STPI has set-up a total of 62 STPI operational centres/ Sub-centres across the country, out of which 54 centres are in Tier-II and Tier-III cities.

The STP Scheme allows software companies to set up operations in convenient and inexpensive locations and plan their investment and growth driven by business needs. There are many benefits under STP scheme like duty free import of capital goods which are also IGST exempted, capital goods purchased from DTA are entitled for refund of GST, 100% FDI is permitted, Sales in the DTA is permissible, 100% depreciation on capital goods over a period of 5 years etc.

4.4 Domain Specific Centres of Excellence across the Country by STPI

To ensure India builds leadership in the emerging sectors of IoT, Block Chain, FinTech, Artificial Intelligence, Augmented & Virtual Reality, Medical Electronics, Health Informatics, Gaming & Animation, Machine Learning, Data Science & Analytics, Cyber Security, Chip Designing, ESDM etc., and to build nextwave of budding entrepreneurs, Honourable Minister of Electronics & IT announced setting-up of domain centric "Centers of Excellence" (CoEs) by STPI in collaborative manner across India. The CoEs aim at providing comprehensive structural & fundamental support including lab & incubation, training, mentoring, hand-holding, funding etc., through a joint collaborative effort of Government of India, State Govt, Industry, Academia, Domain & Technology experts etc. Accordingly, STPI is currently setting-up around 18 domain specific CoEs in collaboration with suitable partners.

VR/AR CoE at Bhubaneswar, Fin Tech CoE ("FinBlue") at Chennai, IoT Open Lab CoE at Bengaluru, AI/Data Analytics/AVG/IoT CoE ("Neuron") at Mohali and ACES CoE ("Motion") at Pune have commenced activities and start-ups for incubation for these CoE's have been selected after a formal "Call for Application" process & Open Challenge Program. Gaming/VFX/CV/AI CoE at Hyderabad, Block Chain CoE (Apiary) at Gurugram, Medi-Tech CoE at Lucknow and 3 CoE-SIZ in three North-East regions has been also launched and are in process of selection of start-ups for incubation. ESDM Incubation CoE at Bhubaneswar ("Electropreneur Park") has been launched in December 2019. Smart AgriCoE at Patna-Motihari, CoE for IoT in Agriculture at Akola and 5 CoE-SIZs in each of the 8 North-Eastern capital cities are also approved by GoI.

4.5 Multilateral Cooperation

In order to protect India's interest and promote India's Digitalization story on global platforms, MeitY actively participated in various multilateral meetings including G20, BRICS, Shanghai Cooperation Organization (SCO).

Under the G20 Saudi Arabia Presidency, the ministry negotiated various ICT issues in G20 Digital Economy Task Force (DETF) meetings and presented India's position. Subsequently, a G20 Digital Ministers Meeting was convened on July 22, 2020 on virtual mode to discuss the fundamental importance of harnessing emerging technologies and data for the social inclusion while addressing the challenges of security, data privacy and protection. The Ministers agreed and adopted a Digital Economy Ministerial Declaration to work towards the enhanced cooperation in trustworthy Artificial Intelligence, Data Flows, Smart Cities and Mobility, Security and Measurement of Digital Economy among the G20 members. Hon'ble Minister, Electronics & Information Technology, Shri Ravi Shankar Prasad led the Indian delegation and share India's success story of Digitalization through Digital India to bridge the digital divide and bring digital inclusion. Shri Prasad also highlighted that India has set up a new benchmark in pursuit of empowerment and inclusion of every citizen of India with the adoption of smart applications of its digital ecosystem. India also highlighted the critical role of data for the development and advocated for the sovereignty of personal data of the Indian citizens. He further emphasized that G20 nations should seriously ponder and reflect upon the emerging contours of data use and its impact on digital economy.

India joined the Global Partnership on Artificial Intelligence (GPAI or Gee-Pay) as a founding member on June 15, 2020 to support the responsible and human-centric development and use of AI. With this, India joined the league of leading economies including USA, UK, EU, Australia, Canada, France, Germany, Italy, Japan, Mexico, New Zealand, Republic of Korea and Singapore to launch the GPAI. By joining GPAI as a founding member, India will actively participate in the global development of Artificial Intelligence, leveraging upon its experience around use of digital technologies for inclusive growth.

The Ministry also attended the GPAI Council Meeting during the GPAI Montreal Summit 2020 (Virtual) in December, 2020 and Shri Ajay Prakash Sawhney, Secretary, MeitY represented the country to share India's experiences and future plans towards the development of Artificial Intelligence across various sector of economy.

4.6 Cooperation through Bilateral Interaction

During the year 2021 bilateral cooperation activities with other countries in the field of Electronics & IT have been taken up in line with Nation bilateral engagements:

The 13th meeting of the India-EU Joint ICT Working Group took place on 19 April 2021 in virtual format. As agreed by the leaders at the EU-India Summit held in July 2020, the 13th India-EU Joint ICT Working Group was opened by Ajay Sawhney, Secretary, Ministry of Electronics and Information Technology (MeitY), Government of India and Roberto Viola, Director General, DG CONNECT (European Commission). The detailed discussions were held to enhance collaboration and to come with an outcome based cooperation. Both side discussed the progress made on India-EU Digital Investment Forum (DIF), Issues related to the ICT&E Industry, National Digital Platforms, Data protection and Data flows, discussion of emerging technologies like ethical Artificial Intelligence, High Performance Computing (HPC); 5G standards and deployment, network security, Global Initiative on Data Security, reforms of Internet Governance Architecture and International topics.

India and UK enjoy a Strategic Partnership. On 4th May 2021, Prime Minister India had a Virtual Summit with the Prime Minister of the United Kingdom. During the summit, they inter-alia welcomed the signing of the new India-UK Joint Declaration of Intent on Digital and Technology. The objective of this JDI is to facilitate and encourage cooperation between the countries' industries in the ICT sector.

During the India-EU Summit held in July 2020, it was decided by both leaders to create Business Community investment in the area of Digital connectivity –“Digital Investment Forum” (DIF). The EU-India digital investment forum is aimed to provide a platform to business leaders from both sides to discuss concrete opportunities for digital cooperation and issues of concern and foster

innovation/start-up cooperation. Under the DIF, 1st EU-India Digital Business and Investment Roundtable held on 23 July 2021.

The 3rd India Vietnam Joint Working Group on Information Technology was held on 27 July 2021 on virtual mode. Indian side shared the various achievement and best practices undertaken to implement various projects under Digital India Programme, Digital literacy, IT Industry, innovation and start-up development. Vietnam side shared the best practices of Viet Nam National Digital Transformation Programmes and development of Vietnam Digital Industry. The brainstorming session was held on Cyber-security concerns & Cert-In collaborations.

On the request from the French Ambassador, Hon'ble MoS, Shri Rajeev Chandrasekhar kindly agreed to meet H.E. Emmanuel Lenain, Ambassador of France to India on 30th July 2021 in MeitY. Both sides reviewed the range of our bilateral ties in these areas and discussed future prospects on expanding the technology partnership of the two countries. During the meeting Ambassador also proposed for a Joint Working Group between two countries counterpart. Hon'ble MOS has also invited more French Electronic companies to set up manufacturing in India.

Secretary, MeitY participated and interacted with top Industry leaders of the USA from Microsoft, Dell, Apple, Google, Cisco, etc. under the US India Strategic Partnership Forum (USISPF) held on 19th August 2021. The interaction was mainly focused on Production Linked Incentive (PLI) Schemes, Public Procurement (Preference to Make in India) Order, 2017, Governance of Non-Personal Data in India / Update on Personal Data Protection Bill, Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021, Amendment of Information Technology Act, 2000, Update on launch of Semi-Conductor Taskforce and Engagement on AI Ecosystem for India.

Additional Secretary, MeitY participated in India Digital Infrastructure Virtual Reverse Trade Mission (RTM) organized by U.S. Trade and Development Agency (USTDA) held on 26th August 2021. The session focused on "Digital India" projects and their achievements and the opportunities available to U.S. companies. Along with members of US companies and industries, members

from Data Security Council of India; ITE & C Telangana, Department of Electronics, Information Technology and Biotechnology, Science and Technology, Karnataka and other state governments participated in the event.

Secretary, MeitY delivered a keynote speech in the inaugural session of the 1st virtual Indo-Dutch mission on Digital Key Enabling Technologies held on 13th September 2021 from 14.15 – 15.15 hrs and spoke on the "Indian perspective and approach to digital key enabling technologies" and event was attended by a large gathering from India and Dutch ICT business community. During the session, Secretary, MeitY talked about Digital India programme, Digital Platforms, trusted-supply chains, Indian IT-ITeS perspective during Covid-19, Indian Tech-start-up Ecosystem

A Courtesy call on Hon'ble MEIT by Dr. Thani Ahmed Al Zeyoudi, UAE Minister of State for Foreign Trade and Dr. Ahmed Albanna, UAE Ambassador to India with other delegation held at 12-12.30 pm on 23 September 2021 in Rail Bhawan. Both sides discussed promoting and solidifying the UAE-India partnership in Information Technology, Artificial Intelligence, FINTECH and Electronics sector, etc.

2nd Chile-India virtual meeting on collaboration in Information and communications technology was held on 13 October 2021 between representatives of Ministry of Electronics and Information Technology (MeitY), Chilean Economic Development Agency (Corfo) and Energy, Science and Technology Division, Ministry of Foreign Affairs of Chile (DECYTI). Both sides briefed about the various initiatives undertaken and the collaboration opportunities in the field of digital literacy and tech skills, Fintech Sector, collaboration between the start-ups, Electro-mobility and Digital Preservation.

An introductory meeting was held on 20th October 2021 between Joint Secretary Shri Bhuvnesh Kumar, MeitY and Investment and Digital Trade Branch at the Australian Department of Foreign Affairs and Trade on digital trade Chapter under Australia-India Comprehensive Economic Cooperation Agreement (CECA). Both sides briefed about the various issues and their regulatory framework on the Digital trade technology.

Hon'ble MEIT virtually attended International Conference on Artificial Intelligence and Data Analysis – AI Journey

2021 on November 12, 2021 organized by the Russian bank, Sberbank. During the Conference, Hon'ble MEIT informed about India's AI journey and various initiatives taken through Digital India Programme.

Mr. Bhuvnesh Kumar, Joint Secretary, MeitY along with the Ministers of Foreign Affairs of various countries including USA, Japan, UK etc. virtually attended the country review's session through a pre-recorded remarks in International Conference on Digital Diplomacy (ICDD) held on 16 November 2021. The event was organized by Indonesia. During the ICDD, he briefed about the Digital Diplomacy and a New Era of opportunities.

India-France Innovation in Information Technology (InFinity) an India-France Digital summit was organized by Embassy of India in Paris through a virtual platform on 24-25th November 2021 with an aim to connect the French and Indian ecosystems to promote cooperation and highlight cross-border opportunities between the two countries. The event along with start-up Exhibition was inaugurated by Hon'ble MEIT and H.E. Mr. Cedric O, Minister for Digital Affairs with a keynote address. The start-up Exhibition was held virtually from 24th to 30th November 2021. More than 250 Indian start-ups participated in the start-up Exhibition.

A meeting between Secretary, MeitY and Deputy United States Trade Representative Sarah Bianchi was held on 23rd November 2021 in MeitY along with the representatives from USTR and MeitY. During the meeting, discussions and deliberations were held between both sides on the policy regulations, issues and various areas of collaboration in the Digital regime. Secretary, MeitY also briefed about the various initiatives under the Digital India Programme including Digital Platforms.

A meet and greet video call held on 2nd Dec 2021 between the Co-chairs of the JWG Mr. Mr. Philippe SCHIL, Special Secretary & Chairman of Technology and Society group of the High Council for Economy and Shri Bhuvnesh Kumar Joint Secretary, MeitY. During the meeting a general update on the status of the Indo French Roadmap on Cyber security and Digital Technology discussed, also agenda for the meeting was the salient features of the draft Indo-French MoU and timeline for signing the MoU and organizing the first Joint Working

Group session.

A meeting between the Ambassador to EU delegation in India and Secretary, MeitY held on 7th December 2021 in MeitY. During the meeting both sides review the ongoing ICT cooperation activities between EU and India and future scope work together to implement the India-EU Summit commitments and Road map.

On an invitation from CGI Dubai to Hon'ble MOS (E&IT) to attend the India Global Forum in Dubai with key stakeholders including Ministerial dignitaries from India, UAE, UK and Africa during 13-14 December 2021. Hon'ble MOS kindly attended the event and deliver keynote speech on 14th December 2021.

A meeting between H.E. Nguyen Manh Hung, Minister for Information and Communications, Vietnam and Hon'ble Minister of State for Electronics and Information Technology & Skill Development and Entrepreneurship, Shri Rajeev Chandrasekhar held on 16 December 2021 in person in MeitY. They exchanged views on various initiatives being taken by the two countries to boost digital economy and agreed to further enhance ICT Trade & cooperation between the two sides. An agreement to extend India - Vietnam MoU on cooperation in the field of Information Technology was also signed by the two Ministers during the visit.

4.7 G-20

In order to protect India's interest and promote India's Digitalization story on global platforms, MeitY being the nodal ministry for the G20 Digital Economy Task Force (DETF) meetings, now Digital Economy Working Group (DEWG) has participated in various DETF/DEWG and ministerial meetings and workshops during the previous Presidencies since 2016 under China, Germany (2017), Argentina (2018), Japan (2019), Saudi Arabia (2020), Italy (2021) and Indonesia (2022) and presented India's stance in various working group and ministerial meetings and negotiated various issues of Digital Economy and showcased India's strength in the field of ICT.

Further, India assumed the Presidency of G20 for the period of One Year from 1st December, 2022 to 30th November, 2023 and MeitY being the nodal ministry for DEWG will host DEWG and Digital Economy Ministers' Meeting (DEMM) during India's Presidency.



Innovate and Design in India

5.1 Creation of Research Ecosystem

5.1.1 National Supercomputing Mission (NSM) & High-Performance Computing (HPC)

Under National Supercomputing Mission (NSM) approved by Cabinet Committee on Economic Affairs (CCEA) in 2015, MeitY is engaged through CDAC in design & development of Indigenous Supercomputing ecosystem in phased manner: from “Assembly” to “Manufacturing” to “Design and Manufacturing” of HPC systems carrying out frontier research in design and development of HPC Components (HPC processor, Server node, Interconnect switch, Cluster, and Liquid cooling system), HPC System Software, HPC Applications and HPC Solutions and Services along with deployment of peta-scale computing infrastructure across the country. NSM aims for complete self-reliance in the field of HPC.

NSM is targeted at manufacturing and deployment of 24 supercomputing facilities with cumulative compute power of 64 Petaflops. Till March 2022, C-DAC deployed 11 systems at IISc, IITs, IISER, JNCASR, NABI and C-DAC under Phase-1 and Phase-2 with a cumulative compute power exceeding 20 Petaflops. Three systems comprised of PARAM Shivay at IIT BHU and PARAM Brahma at IISER Pune and PARAM Shakti at IIT Kharagpur under Phase-1, PARAM YUKTI at JNCASR Bangalore, PARAM Siddhi-AI at C-DAC Pune, PARAM Utkarsh at C-DAC Bangalore, PARAM SANGANAK at IIT Kanpur, PARAM Pravega at IISc Bangalore, PARAM Smriti at NAABI Mohali, PARAM Seva at IIT Hyderabad and PARAM Ganga at IIT Roorkee under Phase-2 were made operational during 2019 – 2022. C-DAC commissioned 4 systems under Phase-2 viz. PARAM Ananta at IIT Gandhinagar, PARAM Porul at NIT Trichy,

PARAM Himalaya at IIT Mandi and PARAM Kamrupa at IIT Guwahati during 2022 - 2023. These 15 systems with total compute power of 24 PF, cater to computational demands of academia, researchers, MSMEs, and startups in areas of national importance.



C-DAC installed PARAM Vidya at four High Performance Computing Nodal Center (HPC-NC) at IIT Goa, IIT Madras, IIT Palakkad and IIT Kharagpur under NSM. All the nodal centers partner among themselves to achieve shared goals in HPC education and research in India. These HPC-NC focus on manpower creation and up-skilling of students, faculty, scientists, researchers, scientific users in the areas of HPC and AI.

Significant number of components utilized in building Phase-2 systems are manufactured and assembled within India, which is a step in making India ‘Atmanirbhar’.

These systems use C-DAC's HPC Software Stack developed indigenously. A wide range of applications from scientific & engineering and data science domains are optimized for the underneath architecture on these systems. The facilities under Phase-1 and Phase-2 along with systems under Phase-3 will be accessed by user communities on Nation Knowledge Network (NKN).

	Performance Monitoring	HPEC	IMPROVISE	IDR	HPCD	C-DAC Tools
HPC Programming Tools	Vizualization Tools	Fenix	GrADS	ParaView	Vista / VHD	ParADE CAPE
	Application Libraries	NetCDF/HDF	Math Libraries	Python Libraries	GML Scientific Library	MLLIB Framework
	Development Tools	Intel Cluster Studio	GML	CLUSA Toolkit/ OpenCL	Container Technology	DRIVE
	Communication Libraries	Intel MPI	MPICH2	Open MPI	PGAS	
Middleware Applications and Management	Cluster Monitoring/ Meta Deck	Ganglia	C-DAC Tools	Napios	XDMoD	eChakshu
	Resource Management/ Scheduling/ Accounting	SLURM		SLURM Accounting		
	Prolifiuring		OpenHPC (wCAT)			HPC Tasks Automation Scripts
File System	HFS	Local FS (DFS)	Lustre	GPFS		Cluster Checker Scripts
Operating Systems	Drivers	OSFS	CDSW	Network & Storage Drivers		
	Operating System		Linux (Ubuntu 22.04)			C-DAC Components

Rudra-I server

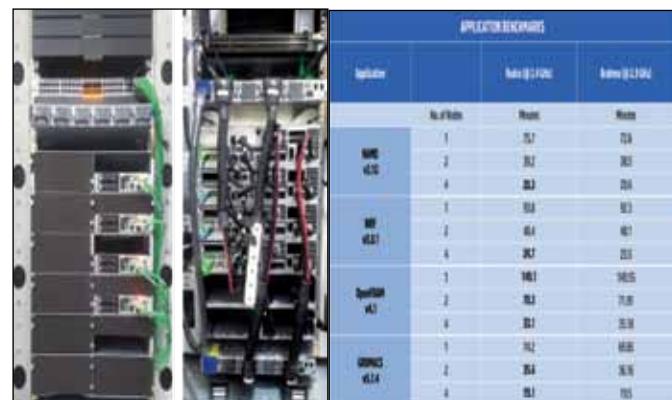
Indigenously designed Rudra-I server is based on Intel's Xeon 2nd Generation scalable Cascade Lake dual socket Processors supporting DDR4 Memory up to 1.28 TB. It is designed with interfaces for HPC system with an objective to attain self-reliance in supercomputing. Phase-3 systems under build approach of NSM are being built using Rudra-I server.

Rudra-I supports dual socket and is built for ½ width 1U and ½ width 2U Open19 form factor. It provides two riser slots in which two GPU can be installed. Rudra assembly is designed with efficient utilization of space with effective thermal design. It is targeted for Hyperscale Data Centers in addition to HPC. In July 2022, C-DAC signed contract with VVDN for production of 6000 Rudra-I servers.

Rudra-I server has a peak performance of 3.68TF to 34 TF based on configuration. A 4-node cluster with peak performance of 127 TF was setup. HPC applications were benchmarked. Performance was found to be at par with clusters with commercial servers elsewhere.

Government of India has decided to offer to the industry and the world the technology of Rudra-I server. It is aimed at achieving its "true market potential". Rudra-I is designed, developed and manufactured with security trustworthiness. It has an exceptionally greater

acceptance and has an edge in security conscious environments and businesses. C-DAC has also promised a robust business continuity plan for Rudra series servers. C-DAC is continuing working on Rudra-II server and HDR switch and HDR NIC in collaboration with Nvidia.



Trinatra Interconnect

Trinatra interconnect development encompasses complex chip design (Network Controller chip), Platform design (PCB development), and Lightweight Protocol networking software design. Development effort is split in multiple phases, with an aim of technology mastering, creating real world products, and leveraging on know-how, to plan for future Indigenous Exascale network design.



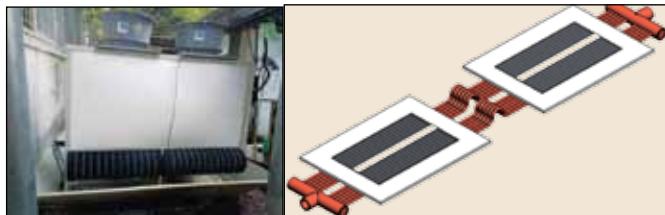
C-DAC launched Trinatra-A, a fourth-generation network. It is an interconnect of 600 Gbps (100Gbps*6) throughput for supercomputers. Multiple hardware and software components realize high bandwidth, low latency, scalable network fabric supporting industry-standard programming interfaces. IP was released after finalizing software packet size and mechanism of posting. C-DAC assembled 12-node Trinatra test cluster and 3D-Torus based Trinatra-A interconnect. It was benchmarked for HPL and a range of scientific applications including OpenFOAM, NAMD etc. HPL benchmark ran with 73% efficiency and results were submitted to topsc.in.

Trinetra-B platform was validated for (a) data transmission over 10 concurrent channels of 200Gbps each, i.e., net aggregate fabric data rate of 2 terabits/sec, full duplex, and (b) PCI-e Gen3, 16x interface using bidirectional DMA, with approximately 80% of peak throughput achieved. DMA transfers of data from host-to-device and device-to-host over queues was tested. Average bandwidth of 1.43 GB/sec was observed for a single transfer of 4MB size. Up to 2k pairs of queues can be added for data transfers.

Along with Rudra-I server, Trinetra-A was featured at Digital India Week (DIW2022) held during July 4-8, 2022 at Gandhinagar, Gujarat.

Direct Contact Liquid Cooled (DCLC) System

A 30 kW Panel Water Cooler was designed and fabricated at Heat Pump Laboratory of IIT Bombay. It was installed and tested at IISER Pune.



To cool a server, a Coil-on-Chip Liquid cooling system was designed, and fabricated to extract heat load up to 360 W from a 50 mm × 50 mm base. Subsequently, a chip cooler was designed and fabricated to extract 330 W (165 W from each processor) to cool Rudra server board. It was experimentally tested and its thermal performance is satisfactory. Now it is being packaged for its integration with actual Rudra server.

Human Resources

PG diploma in HPC System Administration is being conducted under NSM during March 2022 – August 2022 and September 2022 – February 2023. It trained the next generation of HPC aware manpower comprising students, researchers, and faculties through organization of Faculty Development Programs, Workshops, Bootcamp, and Hackathon. C-DAC installed a PARAM Vidya each to impart training in HPC at respective NSM Nodal Centers.

Following activities were carried out during 2022-23

in association with NSM Nodal Centers located at IIT Kharagpur, IIT Madras, IIT Goa and IIT Palakkad:

- NSM CFD workshop in hybrid mode at IIT Mumbai during May 2022
- HPC Domain Specific Workshop during 9th June, 2022 - 15th July, 2022
- Online Open ACC domain specific Bootcamps in area of Astrophysics, Molecular Dynamics & Quantum Chemistry and Climate & Weather modelling
- Two-day workshop at Manipur University during July 2022
- Faculty Development Workshop at IIT Goa in HPC for the faculties from colleges in Goa
- Intel One API Awareness Workshop during 14th July, 2022 - 28th July, 2022
- 5-day HPC workshop at NIT Mizoram during July 2022
- Summer internships with stipends to students
- Course on Accelerated Applied Artificial Intelligence for 3 months on NPTEL platforms
- Open ACC Hackathon during September 2022
- Workshop on HPC and its Multidisciplinary Applications at NIT Meghalaya
- HPC Workshop at GUJCOST during September 2022
- One-day workshop at NIT, Surat on 20th September 2022
- PG Diploma course in HPC System Administration and HPC Application programming for SC/ST candidates during October 2022 – March 2023

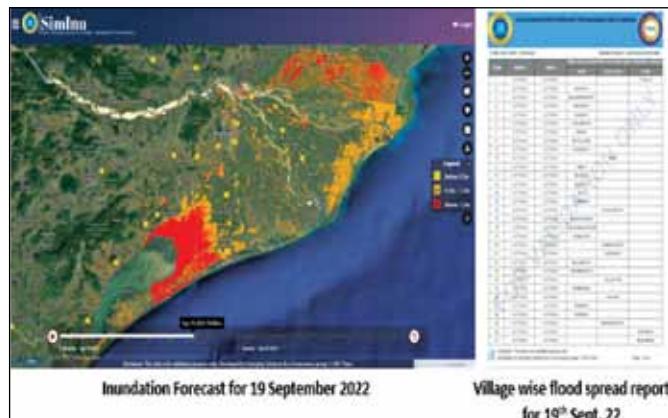
Application Porting, Optimization and Scaling services

Following porting ANUGA (a flood simulation code from disaster management) from Python2 to Python3 and fine-tuning cores/node and algorithmic parameters including Minimum Allowed Height, Maximum Allowed Speed, CFL condition etc., the performance was improved by 5.3 times. Following profiling of the code, it was demonstrated that the code scales up linearly from 32-96 nodes during simulation for Mahanadi-Delta with mesh resolution of 300 square meters resolution dataset.

C-DAC provided User Support for PARAM Shivay, PARAM Shakti, PARAM Brahma, PARAM Yukti, PARAM Seva, PARAM Utkarsh, PARAM Pravega, PARAM Ananta, PARAM Porul, PARAM Himalaya, PARAM Kamrupa, PARAM Shrestha and PARAM Sangam via tickets.

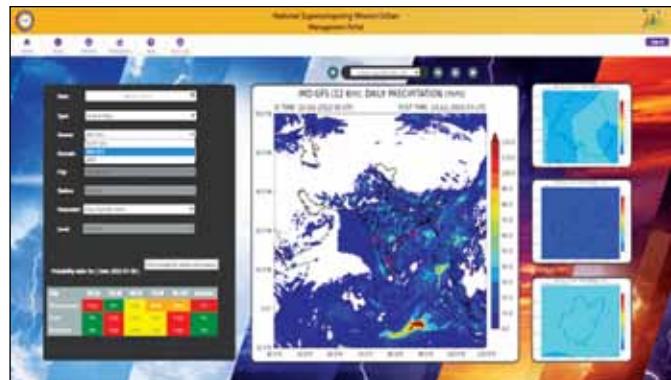
Early warning system for flood prediction in river basins of India

Since 2020, the simulation runs for predicting floods are being carried out by C-DAC. In the current year, daily flood prediction started from June 1st, 2022 for the Mahanadi River Basin and the 2-days flood forecasts and percentage village inundation information were shared with CWC Delhi and Odisha State Water Resources Department at Bhubaneswar.



Development of multi-sectorial simulation lab and science-based decision support framework to address urban environment issues

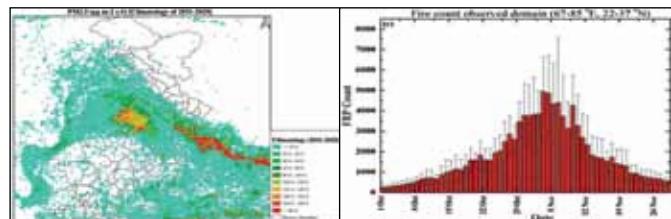
A 3-domain WRF model setup was designed where the outermost domain covers southeast Asia with a spatial resolution of 4.5 km. The innermost domain with 0.5 km resolution was created over the city of interest after performing domain sensitivity analysis. It was used for daily weather forecast and heavy rainfall prediction over Pune, Bengaluru, and Bhubaneswar. A portal was developed to visualize meteorological parameters such as temperature, pressure, humidity, winds, and rainfall from WRF model simulation output, global forecasted data, and various observational data. Entire process of downloading initial condition data from various sources, model pre-processing, simulation, post-processing, and visualization was automatized.



A detailed urban LULC map using the Local Climate Zone (LCZ) classification system from World Urban Database and Access Portal Tools (WUDAPT) was implemented in the WRF model to improve the accuracy of the forecasting system. A series of performed experiments were performed using WUDAPT LCZ information and different urban canopy models available in WRF for heavy rainfall event simulation over Pune city.

A forecasting system was set-up for Pune with 2x2 km resolution. It was fine-tuned with the ingestion of local emission inventory and data assimilation from various sources. Particulate matter (PM2.5) sampling to study chemical speciation was completed at Bangalore city for winter season and for summer season. A WRF-Chem output-based decision support system for Delhi has been developed at IITM, Pune and being used by concerned authorities for policy making decisions.

The impact of fire emissions from North-West region of India over Delhi-NCR was quantified. The extent of these fire emitted pollutants contributed to the already severe pollution in Delhi and the heavily populated regions located downwind of the fires. An accurate temporal and spatial estimate of biomass burning emissions was developed to effectively implement the control measures toward the reduction of biomass burning emissions.



An analysis of Uttarakhand fire event (occurred in April 2016) showed that the high values of aerosol optical

depths (AODs) during fire events simulated by WRF-Chem compared very well with MODIS AODs. It was estimated that the fire has caused an increase in Fire induced change in the near-surface air temperatures in the range of 1-3 °C; while relative humidity decreased by ~10% over the affected areas. The net atmospheric heating rates due to fire were found to vary between 0.4 to 1 K/day over India.

A HPC Software Suite for Seismic Imaging to aid Oil & Gas Exploration

A Reverse Time Migration (RTM) software for seismic imaging of complex structure is being developed using NSM Infrastructure which will help in saving processing cost. The developed software will be beneficial for Indian Oil companies for regular production usage. SeisRTM package comprising of 2D and 3D Isotropic Modeler and RTM, 2D Anisotropic Vertical Transverse Isotropy (VTI) Modeler and RTM with 8th order, and 2D Anisotropic Tilted Transverse Isotropy (TTI) Modeler and RTM with 4th order was deployed at GEOPIC-ONGC, Dehradun and IIT Roorkee.



5.1.2 R&D and IP development

5.1.2.1 Design and Development of a Unified Blockchain Framework for offering National Blockchain Service and creation of a Blockchain Ecosystem

Blockchain, a distributed ledger technology, enables a layer of trust and eliminates the need for a third party to validate the transactions. Considering the requirement for shared Blockchain infrastructure, Ministry of Electronics and Information technology has initiated an R&D project titled “Design and Development of a Unified Blockchain Framework for offering National Blockchain Service and creation of Blockchain Ecosystem”. It is a consortium project with C-DAC centres (Hyderabad, Pune and Mumbai), NIC, SETS Chennai, IIT Hyderabad,

IIT Hyderabad and IDRBT Hyderabad as implementing agencies. The project aims at development of unified Blockchain framework which enables a technology stack that would aid in rapid development of Blockchain applications, deployment of developed applications, emerge as a shared infrastructure and also enable cross domain application development. A basic version of Unified Blockchain Framework (UBF) has been developed. The National Blockchain Framework (NBF) Portal is being also developed to manage the contents related to the Blockchain initiative. It contains information related to the current Blockchain News, latest Articles, Events, Conferences, Education & Training, Success Stories thereby providing the viewers with the latest updates of Blockchain trend.

5.1.2.2 Blockchain and Machine Learning Powered Unified Video Know Your Customer (KYC) Framework

Know Your Customer (KYC) is a mandatory requirement for the financial institutions to establish identity, suitability and risks involved in carrying out business with the customer. Video KYC is the process of establishing KYC over a video interaction session with the customer. All financial regulators have permitted Video KYC for their respective regulated entities (REs). At present, the video KYC is carried out separately by individual REs for their customers. The repetition of video KYC for a single customer across several REs is a drawback in the ecosystem in terms of (a) customer dissatisfaction for going through the same process repetitively, and (b) wastage of resources for repeating the same task by different REs. Moreover, REs are using third-party cloud-based infrastructure for carrying out video KYC, which is a security concern for the ecosystem. This project aims to develop a video KYC framework using Blockchain and machine learning driven algorithms for various tasks. This framework is envisaged as multiple regulated entities (REs) in the financial sector will collaborate to carry out video KYC of their customers and to share KYC data among themselves on a need-to-know basis. It is being implemented at IDRBT, Hyderabad, IIT Hyderabad and IIT Bhilai as implementing agencies.

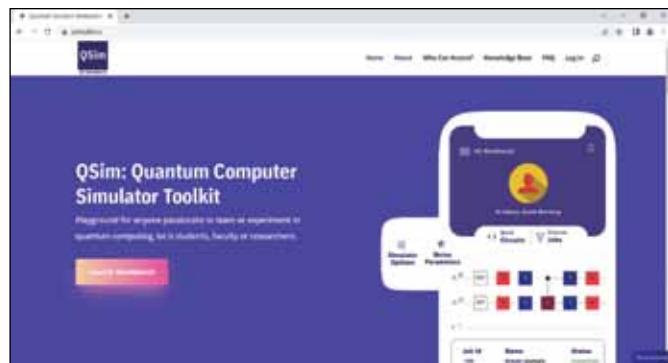
Centre for Excellence in Quantum Technology: MeitY has also initiated a project “Centre of Excellence in Quantum Technologies” to promote research

activities, build state-of-the-art infrastructure and train human resources in this niche area of technology. The centre is set up at IISc-Bangalore and RRI- Bangalore. The Centre brings the multi-disciplinary expertise of prestigious institutions such as IISc-Bangalore, RRI- Bangalore and CDAC-Bangalore on a single platform to develop different aspects of quantum technology in the realms of secure quantum communications including Quantum Key Distribution, quantum random number generation and quantum sensing and as well as quantum computing-related developments. The centre aims to deliver quantum-enhanced technologies. Its experimental program will focus on superconducting qubit devices, single photon sources and detectors for quantum communications, integrated photonic quantum networks, and quantum sensors.



Facilities created at IISc-Bangalore

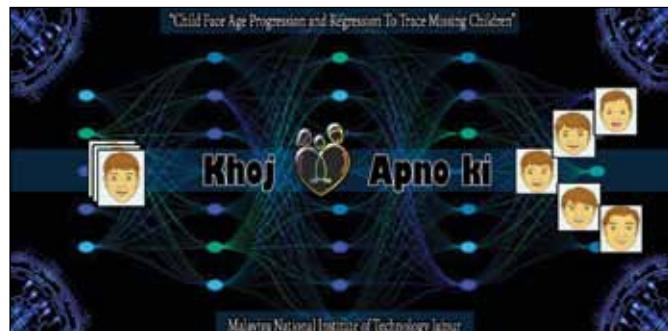
Quantum Computer Simulator & Toolkit and Capacity Building initiative: Under the project, India's first indigenous Quantum Computer Simulator (QSim) Toolkit has been developed and launched by Hon'ble Minister of State, Ministry of Electronics and Information Technology. The QSim offers a robust QC Simulator integrated with a GUI based workbench to create quantum circuits and quantum programs, view the outputs, online help, solved examples and related literature / material. Short-term courses on Quantum Technology with the objective of generating skilled manpower in this emerging technology area. The developed simulator is available at qctoolkit.in.



Web portal of QSim

Development of Quantum optical sensor: Identification of ultra fine trace elements in water, packaged food etc. is much needed requirement of the society. Existing measurement technique has the limitation to identify them with limited resolution. A project has been for the development of a quantum optical sensor based array device towards the quality grading of useable water for several purposes.

Child Face Age Progression and Regression to Trace Missing Children: Finding the long time missing children is a great problem world over. A project is being implemented at MNIT Jaipur to develop a system for tracing the missing children and teenagers by using more precise and objective age progression techniques for the prediction of their current appearance. This would help in finding missing children who went missing at a young age. The first version of model for the task of generating age progressed and rejuvenated facial images of children has been developed. A pilot web portal khojapnoki.mnit.ac.in ("KHOJ अपनो की") has been developed and hosted at MNIT Jaipur. Its customization is being done in such a way that it could be used by end-users in more general way and work on identifying and matching missing children.



Identifying Anomalous Dealers in GST using Big Data Analytics:

The project initiated at IIT Hyderabad aims at development software product for GST tax evasion detection using deep learning techniques. This would help in identifying fake invoice traders in GST, identifying malicious dealers and potential return defaulters.

Indigenous Intelligent and Scalable Neuromorphic Multichip for AI Training and Inference Solutions:

Research project initiated recently aims to design and develop an indigenous neuro-morphic architecture for AI training and inferencing. Firstly FPGA prototyping, system on Chip (SOC), ChipSet fabrication and design. Then fabrication of one MCM (Multi-Chip Module) module which comprises of several such SOCs. Further, It will be demonstrated using real-life applications including assistive technology as an illustration.

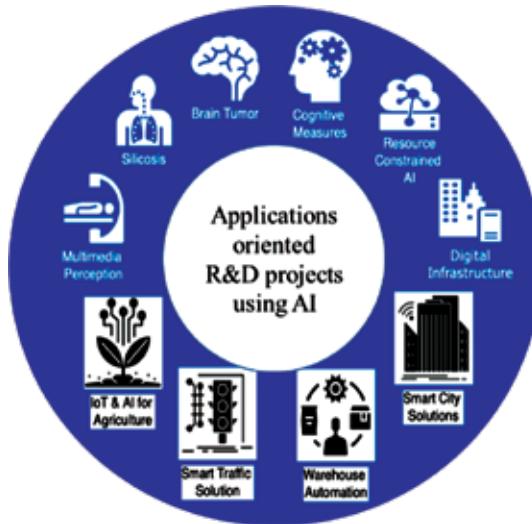
Affordable Deep Learning Based Point of care Cardiac Monitoring for heart attack survivors:

A project is being implemented in collaboration with IIT Hyderabad and ESIC hospital Hyderabad to develop a low cost, multi analyte sensors platform (biochip) for Acute Myocardial Infarction (AMI) biomarkers monitoring for Cardiac Infraction Survivor. Biomarkers alongside vital signals in decision making which could be reviewed by human experts. The system will generate clinical alerts to patient to get a medical attention. Two biomarkers namely Troponin I & T and HfaBP useful for diagnosing AMI have been identified. Machine learning algorithms to fuse information from ECG, PPG have been developed and are being tested.

Multi-modal analytics framework for machine-assisted diagnosis of pediatric pneumonia: Paediatric pneumonia is very common problem in our country. C-DAC Mohali is developing a system for machine assisted diagnosis of paediatric pneumonia. The auscultation data is being collected from the patients and artificial intelligence software models are being developed / tested for identifying the typical markers of adventitious sounds in auscultation data. The project is being implemented under the guidance of PGIMER, specialist and with the active support of medical specialists from govt. medical college and hospital Chandigarh. A web app being developed for testing and delivery of services.

"Development of Application oriented AI System":

A research project in Consortium mode is being implemented to develop innovative solutions using artificial intelligence technologies in different sectors such as education, agriculture robotics, human health, human living, process automation, cognitive system & cognitive intelligence, transportation, multimedia perception etc. The project is being implemented by a consortium of 20 institutions (IITs, IISc, IIIT, NITs, etc) with IIT Jodhpur as Consortium Leader. The major areas covered under the project include Development of an AI platform for Human Health, Neurocomputing and Cognitive Intelligence, AI for Agriculture & Food Sustainability, Robotics and Automation in Agriculture, AI in Education: Children with Learning Disability, IoT and AI enabled Traffic Sensing and Modeling, Resource Constrained AI, Intelligent Multimedia Systems with Applications.



Design and Development of software system for detecting and flagging Deepfake Videos and Images:

Deepfakes are getting used to spread misinformation in the form of: Fake Speech and Fake Videos etc. There is high need to develop AI technology to counter Deepfakes. This will also enable development of newer software tools for validating the controversial images/ videos content as Fake or Authentic. MeitY has initiated a project "Design and Development of software system for detecting and flagging Deepfake Videos and Images" at C-DAC Hyderabad and C-DAC Kolkata. The project aims to develop AI based system to detect and flag questionable person videos as fake or authentic.

Improving effectiveness of Gems and Jewelry industry using machine learning and data mining: A project has been initiated at IIT-Bombay to develop and build a data platform, collect data, and design machine learning algorithms to aid Gems and Jewelry industry to improve the effectiveness by improving Hit ratio & minimization casting defects of Gems and Jewelry industry.

Anaemia Detection Kit: A large population of India is badly affected by Anaemia which is a serious public health problem as Anaemia affects physical and mental development of an individual. A software application for Smartphone has been developed which facilitates the recording of video of palm/nail, uploading of the video, processing of the video, prediction of haemoglobin level of an individual and accordingly classifies patients based on gradation of anaemia.



ADKit Nail Device



ADKit Palm Device

Development of an Integrated Solution for Automatic Assessment of Autism: Autism is a lifelong developmental disability that affects how people perceive the world and interact with others. The project

“DISAAA: Development of an Integrated Solution for Automatic Assessment of Autism using Visual Attention, Facial Expression and Vocal emotion cues” is being implemented by CDAC-Kolkata and NIPID-Kolkata. The system would help and guide affected persons to learn through stimuli generated based on different emotional situations. The responses captured by the app would assist psychologists in understanding the mental condition of the affected person.

Detection of Chronic Illness from Retinal Images: The project aims to develop an Artificial Intelligence empowered Disease Diagnostic system for the detection of Chronic illnesses from retinal fundus images. The architecture is designed for the CNN based model for the detection of diabetic retinopathy. Approximately 12,000 images have been annotated by experts. The developed system is deployed at Government Medical College and Hospital, Chandigarh.

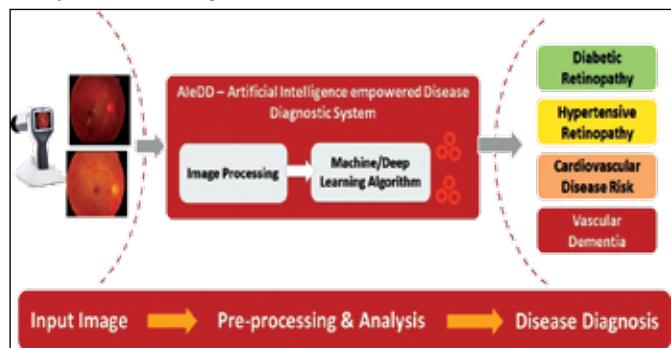


Figure: Disease Diagnostic Ecosystem

Development of computational protocols for designing inhibitors using PARP-1: Breast cancer is most common type of cancer among Indian population. Lack of awareness and high cost of treatment leads to lower reporting of illnesses. Poly Adenosine Diphosphate Ribose polymerase (PARP-1) inhibitors are among few handful of target which play an efficient role in treating breast cancer. A project has been initiated at NIPER, Guwahati for the development of computational protocols for designing inhibitors using PARP-1 as a model and synthesis & biological evaluation of designed inhibitors.

Development of Brain Machine Interface enabled Assistive System for children with special needs: The need for novel assistive technology and techniques for neurorehabilitation effective for children is high. One

of the most advanced technical solutions is the brain-computer interface (BCI). Using non-invasive EEG sensors, children could communicate through the brain while controlling display of computer. A project has been initiated at CDAC, Delhi for the development of AI based software solutions for BCI enabling computers to make commands as per the user's intention. The solution is useful for the children having difficulty in communication such as ASD, ADHD, GDD/ID, SLD, CP.

Development of Multi-Model Neuro-Physiological Framework for Cognitive Behavioral Analysis: The need to develop indigenous customized software solution for detecting lie/malicious intent is high in Safety critical industrial infrastructures (SCIs), police station, criminal proceeding, and forensic lab. The solution will be built based on different biological and neurological sensors which are non-invasive. A project has been initiated at CDAC, Delhi will create a lab set-up environment for the behavior analysis of the person. In addition, we are going to develop AI-based algorithm to detect behavior with higher sensitivity and specificity.

Visvesvaraya PhD Scheme for Electronics & IT

MeitY has launched "Visvesvaraya PhD Scheme for Electronics and IT" with an objective to enhance the number of PhDs in Electronics System Design and Manufacturing (ESDM) and IT/IT Enabled Services (IT/ITES) sectors in the country. Cabinet Committee on Economic Affairs (CCEA) has approved the scheme in 2014 for a period of nine years. The total estimated cost of the Scheme is Rs. 466 Crores (Rupees Four Hundred Sixty-Six Crores only)

Salient features of the PhD Scheme: Phase-I

- Give thrust to R&D, create an innovative ecosystem and enhance India's competitiveness in these knowledge intensive sectors.
- To fulfil the commitments made in NPE 2012 and NPIT 2012.
- Support to 1500 PhD Candidates including both Full-Time (500) and Part-Time (1000) in each of ESDM and IT/ITES sectors (Total: 3000 PhDs).
- Support 200 Young Faculty Research Fellowships in the areas of ESDM and IT/ITES with the objective

to retain and attract bright young faculty members in these sectors.

- The scheme is also expected to encourage working professionals and non-PhD faculty members to pursue PhD.

Fellowships/Assistance:

a) Full Time PhD Candidates:

- Fellowship: ₹ 38,750/- per month (I & II yr); ₹ 43,750/- per month (III to V yr)
- Annual Contingency Grant support ₹ 30,000/- per year for consumables etc.
- Reimbursement of Rent for those PhD candidates who are not provided accommodation or choose not to avail the accommodation provided by the institution.
- Support for attending international conferences (1000 supports @ up to ₹ 50,000 per conference)

b) Part Time PhD Candidates:

- Part-time PhD Candidate: One time incentive of ₹ 2,50,000 on completion of the PhD.

c) Young Faculty Research Fellowship

- Fellowship @ ₹ 20,000 per month in addition to the regular income
- Annual grant of ₹ 5,00,000 for research expenses and presenting research work, to be granted for a period of up to 5 years.

d) Support to the Institution:

- Infrastructural grant to Academic Institutions for creation/upgrade of laboratories. 50% of the expenditure by the Institutions (upto 5.00 lakh per candidate) for lab equipment.
- Institutional Overheads: ₹ 25000/- per annum / full time candidate

Duration

The duration of scheme was five years for the purpose of selecting candidates for support under the scheme. However, the funding is to be continued till 9th year for the commitments already made during the scheme period.

Visvesvaraya PhD Scheme for Electronics & IT: Phase-II

Phase-II of Visvesvaraya PhD Scheme for 9 years has been launched to support 1000 full-time PhD Candidates, 150 part-time PhD Candidates, 50 Young Faculty Research Fellowships and 225 Post-Doctoral Fellowships with an outlay of Rs. 481.93 Cr. for 9 years w.e.f. Academic Year 2022-23.

5.1.2.3 Convergence, Communications & Broadband Technologies, and Strategic Electronics

Convergence, Communications & Broadband technologies (CC&BT) have been recognized as the key enabling technologies for economic growth and development. R&D in the next generation/cutting edge Communication and broadband technologies is being promoted to ensure that citizens can take full advantage of increasingly pervasive digital services across the plethora of existing and emerging use cases and verticals.

In order to support the digital ecosystem, R&D initiatives in Convergence, Communications, Broadband Technologies and Strategic Electronics is aimed at developing indigenous capability in the thrust areas like Next Generation Networks (NGN) and Communication technologies, 5G and beyond, next generation mobile technologies, Broadband Wireless Technologies, Green Communications, Quantum Communication, Vehicular Communication, Cyber Physical System, Artificial Intelligence enabled Communication, Big Data Analytics and Internet of Things for societal applications & disaster management, Machine-to-Machine Communication and Strategic Electronics with applications in both Civil and defence domains and innovative backhaul Communication Technologies.

Activities in the R&D project are focused towards creating IPs which leads to patents, designing innovative algorithms that will make up the product design and also in developing prototypes that can give a head start in developing Technological solutions/prototypes. The activities and outputs from these projects will contribute immensely to achieve the goals set for 'Make in India' and 'Digital India' initiatives of the Government of India.

R&D initiatives in Convergence, Communications, Broadband Technologies and Strategic Electronics has been taken for developing indigenous capability in Next Generation Communications & Convergence technolo-

gies Massive MIMO, Software Defined Radio (SDR), Software Defined Networks (SDN), Network Function Virtualization (NFV), Cognitive Radio, Heterogeneous Wireless Networks, Green Communication; Cyber Physical Systems, Internet of Things (IOT) & Machine to Machine (M2M) Communications, Wireless Sensor Networks; Convergence of wired/wireless networks and fixed mobile convergence; ICT applications in strategic sector; Broadband Wireless Access Technologies; Visible Light Communication (VLC), Vehicular ad-hoc Networks (VANET); IP based products/services; Electromagnetic wave applications; High power RF/microwave tubes; Terahertz (THz) wireless systems; Radar Systems, etc.

Development of Unified IP Based Communication Platform for Voice, Video, Data and Chat Services

Primary aim of the project was to develop and enhance features and capabilities of unified communication system to support voice over IP and messaging services that will empower and support manufacturing telecom platform within India. It focuses on the domain of IP communication covering IP call routing, support for IPv6, telephony applications development and adding features to system for improving scalability and interoperability. Major achievements are:

- **'Nah-Sanchar'** supports multiple communication services such as voice, video, data, messaging and chat. Product focuses on enhanced features and capabilities of unified communication system to support voice over IP and messaging services that will empower and support manufacturing telecom platform within India. It is truly IP at core with "N+1" private cloud architecture covers IP call routing, telephony applications development, and adding customized features to system for improving scalability, inter-operability, etc. It also has Active-Active load sharing architecture, redundancy over various levels with Fiber or Copper or Wireless media and IP & E1/ PRI seamless path replacement. Fully featured App based softphone client has also been designed to manage communication efficiently from handheld mobile phone that allows user to make Voice and Video calls over IP, Instant Messaging and seamless connectivity over landline, 2W/PRI, etc. This product is developed using open-source tools.

It is unique and first of its kind initiative coming out of the Indian university system to fulfil the dream of 'Make in India'.

- Product is in compliance with Generic Requirement (GR) document (No. TEC/GR/SW/PBX-005/01/SEP-16) titled 'IP PBAX with MEDIA GATEWAY' and TSTP document (No. TEC/TG/SW/PBX-305/01/JAN-17) published by Telecommunication Engineering Centre (TEC). Technology Approval Certificate is issued by TEC, Department of Telecommunications, GoI after rigorous testing for all the Type-I, Type-II and Type-III interfaces. In addition to the GR document, Product is also certified for IPv6.
- Patent Published (patent number 201911048091 dated 25-11-2019) on "A System for Detection and Mitigation of Security Attacks in High Availability Sip-Based Communication".
- Trademark Nah-Sanchar has been registered.

Multi-Option Proximity Sensors (MOPS)

SAMEER has developed the multi-option 'fuzes' for warhead detonation application in artillery, mortar and rocket stores. The legacy fuzes presently in use are either 'impact' based or 'time' based, both of which have the limitation of not optimising the strike power of the warhead by accurately determining the height (altitude) over ground at a pre-determined set height of inflicting maximum detonation energy over the intended area of strike. Traditional fuzes lack this capability and are also affected by wind conditions, weather and angle errors during launch, etc. The RF based sensor circumvents these problems as it measures the height over ground in real-time during the flight. Thus, the RF based sensor lends an all-weather capability to the artillery/rocket store. The RF sensor developed by SAMEER has advanced processing functions with good measurement accuracy. The 'timer' and 'safe' mode has been built onto the same hardware and it also provides an override for the 'impact'



नह-संचार
(Nah-Sanchar)

IP - PABX Solutions
Technology Approved
by
TEC, Department of Telecommunication, Govt. of India



TELELABS
PANJAB UNIVERSITY
Connecting Lives



MAKE IN INDIA

SECURITY

NETWORK MANAGEMENT

- Mac. Port & IP binding at device level.
- MDS encrypted (Hash code) and passwords.
- Radius/LDAP authentication.
- SRTP voice/TLS for signaling.
- Intrusion tracking.

CONFERENCE

- Inventory management.
- Real time health monitoring.
- Alarm and triggers on SMS, e-mail and pops.
- Resource utilization reports.
- WOS management and report.

OTHER FEATURES

- Multi Party audio conference with or without password.
- Facility of invite participation.
- Operator assisted conference with beep.
- Portal based conference room facility with username password sent on emails. Announcement of names, auto disconnect when time expires.

HD Voice, caller ID, call transfer and call hold.

- Multiparty conference, follow me feature.
- Call recording on demand. Barge in (eavesdropping).
- Call Logging.
- Secure signaling and security.

CORE FEATURES

- RFC Compliant system.
- IPv6 conformance/Dual Stack.
- Truly IP at core with 'N+1' private cloud architecture.
- Availability of entire source code to inspect any possible intrusion.
- Highly scalable already tested from computer on a chip to server capability systems.
- UC Client with video conference video phones integrate with RTSP.
- Feature activation/Call history/click to call/ local directory/ dial from email or outlook.
- Desktop and white board sharing.

GET IN TOUCH

harishk@pu.ac.in | salshi@pu.ac.in

Telelabs, UIET, Block-1, First Floor
Panjab University, Sector-25, Chandigarh, India
<http://uiet.puchd.ac.in/telelabs/>

mode making it a very potent (multi-option) MOPS fuze. In-situ programmability of flight parameters just before the launch vide the Snap-off umbilical connector are huge advantages adding several degrees of performance. The MOPS design has been achieved for the very small customised form factor of Ø25-35 mm × 25-30 mm ht. The developed MOPS sensor is a fully indigenous design and can find ready application in PINAKA rockets, Artillery Guns, Air dropped stores, Naval Proximity sensors, etc.

Establishment of MIL STD EMC Test Laboratory

SAMEER-CEM, Chennai is establishing world class MIL Standard EMI/EMC test facilities to support all electronics manufacturing companies in the country. SAMEER setup one 3 meter Shielded Anechoic Chamber (SAC) and 5 meter Shielded Anechoic Chamber along with MIL STD testing system. These chambers and associated test systems are capable of providing MIL Standard, EMI/EMC testing services to all electronics manufacturing companies in India.

The proposed facility will engage in basic R&D in EMI/EMC measurements that will enhance the confidence/repeatability of EMI/EMC measurements with reduced uncertainties in the country.

Many private industries in addition to Government labs will be involved in development and production of electrical and electronic products/equipments for defence. Consequently, the requirement of MIL Standard qualification of such equipments will be mandatory before induction into the armed forces. This provides an opportunity for MIL Standard EMC laboratory to play major role in 'Atmanirbhar Bharat' and 'Make in India' initiatives by offering its design, test, measurement and consultancy services. The establishment of MIL chambers will address and benefit the manufacturing/developing industries, driven by 'Atmanirbhar Bharat' and 'Make in India' initiatives, especially in defence sector. Thus the need for MIL Standard chambers becomes all the more important where private and public sector industries can have all their EMC compliance requirements at one place, namely SAMEER-CEM, which will be a nodal agency.

The MIL standard EMC test facility will be a value addition

to SAMEER-CEM in terms of enhancement of customer base and revenue potential. SAMEER-CEM will provide all civilian and MIL EMC facilities at one place for the customers. In addition, it will be the National facility for Quality research in the field of EMI/EMC.

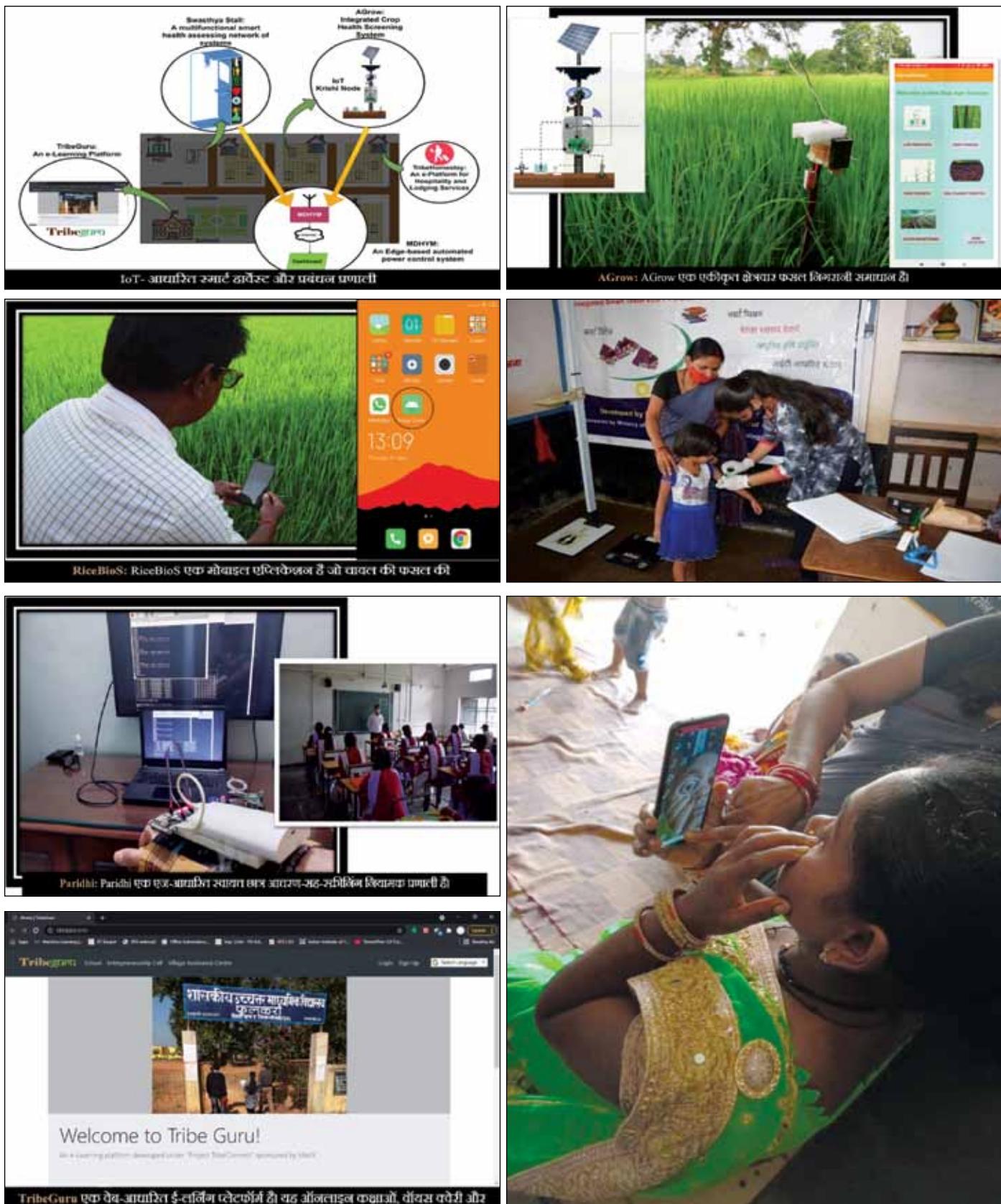
TribeConnect: Integrated Smart Tribal Eco-Platform

The project aims to decrease the woes of people residing in remote villages which is otherwise affected due to the unavailability of better services. It is proposed to implement a unified platform which will be connected to advanced models in several areas for monitoring and sensing, data gathering, inferring and decision-making for various application domains, enabling the implementation of a smart village.

With this motivation it is proposed to design, develop and prototype an integrated smart tribal eco-platform (Tribe Connect) to transform current state of a village to a smart full-grown village. In this regard, a tribal village Fulkara in Chhattisgarh has been identified, for the field visit and implementation. The project has the following objectives:

- a. **To develop ICT based Rural Health & Social Care**
 - Smart Anganwadi Kendras for malnutrition care.
 - Smartphone based Blood Anemia care for pregnant mothers.
- b. **To develop an IoT based Smart Harvest & Management System**
 - Smart Farming-Disease prevention, irrigation, and timely information
 - Smart Well for water quality monitoring
- c. **To develop a software and hardware prototype to enhance Empowerment & Services**
 - ICT based network to promote education
 - e-Mandi platform for marketing the tribal products

Under Agriculture section, implementing agency has developed an IoT Krishi-Node and Network prototype

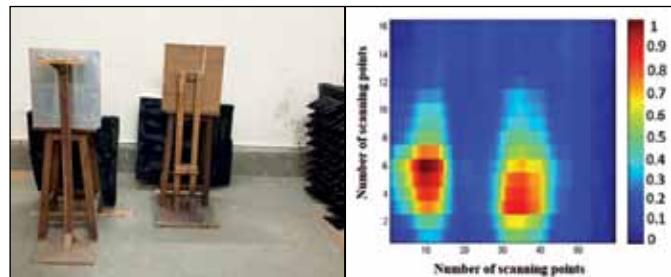


using soil moisture, temperature and humidity sensors, for which an Indian Patent has been filed. Subsequently, a conceptualized framework for establishing the communication between IoT Krishi Nodes in the farm has also been developed and initial testing has been done in the field. Implementing agency also developed a “**HamarKisan**” Mobile application prototype with its features such as live farm monitoring, crop disease prediction and growth monitoring. The implementing agency highlighted the usefulness of this application to the farmers in the Fulkara village. Additionally, a web user interface for nitrogen detection of crops from the leaf image has also been demonstrated.

Under Healthcare area, implementing agency identified the major diseases in central India, specifically in Chhattisgarh. From the available Govt. data it has found that anemia and malnutrition are some of major threats among rural population. With this motivation, implementing agency has developed an non-invasive blood hemoglobin measurement and anemia detection technique. In this regard, “iFlick” – a mobile application prototype for measuring the blood hemoglobin in non-invasive way has been developed. Further, the implementing agency has developed a federated system of Swasthya stalls which serve the purpose of an upgraded, smart and accessible primary health care center for which an Indian Patent has been filed. Additionally, Tribe Aid, a one-stop umbrella solution for the villagers, doctors and health workers has been designed specifically to cater to the needs of rural people concerned with the healthcare vertical of the project Tribe Connect.

MIMO based Microwave Imaging system for target detection and identification behind the wall

Through wall Imaging (TWI) is one of the most rapidly emerging technologies where the aim is to ‘see’ through visually opaque obstacles like different types of walls for detection as well as imaging various targets present behind the wall. This project aims is to develop a compact handheld Stepped Frequency Continuous Wave (SFCW) based TWI system with MIMO technique for target detection and identification in UWB frequency range, based on flexible, controlled measurement equipment.



Stream Data Analytics Framework for Precision Farming using Unmanned Aerial Vehicle (UAV)

The project aims to develop sensors, for collection of aerial data of the fruit crop field and to capture soil and other environment parameters for irrigation management and soil nutrient analysis, and development of the Artificial Intelligence based framework for yield estimation and early detection of crop diseases with the centralized interface for information sharing and dissemination. The project involves monitoring many acres of farms and orchards through unmanned aerial vehicles (UAVs) which are light-weight drones mounted with multiple sensing devices to capture data for the monitoring of the crops. Monitoring orchard or farms requires data at a centimetre precision scale which is necessary to observe stems, leaves and growth of fruits very closely for timely monitoring to minimize loss, early detection of crop diseases and production estimate of large farm area. The captured data is collected centrally in the form of video stream data with other environmental parameters. It is further processed using knowledge mining and executed with Artificial Intelligence system to extract meaningful information from the data collected. The multi-sensor based vision system will be developed and mounted upon the UAV for monitoring of fruit crop for yield estimation and disease detection. The knowledge discovered using this framework will be available to the farmers, students, researchers and academicians in standard structured formats, which will be easy to understand and correlate.

The project also includes the development of plant growth model based water management system. It comprises various soil monitoring sensors, which help to monitor crop states at multiple stages. It involves the acquisition and processing of large amount of data related to crop health and water content. The wireless sensor network of monitoring sensors are established in the pilot farm to monitor and analyse the infield parameters. The idea of development of automated system using Artificial Intelligence based technology to empower agriculture sector is being implemented by CDAC and tie-up has been established with ICAR-Indian Council of Agricultural Research, Himachal Pradesh Horticulture Development Society, Shimla and Directorate of Horticulture, Himachal Pradesh.



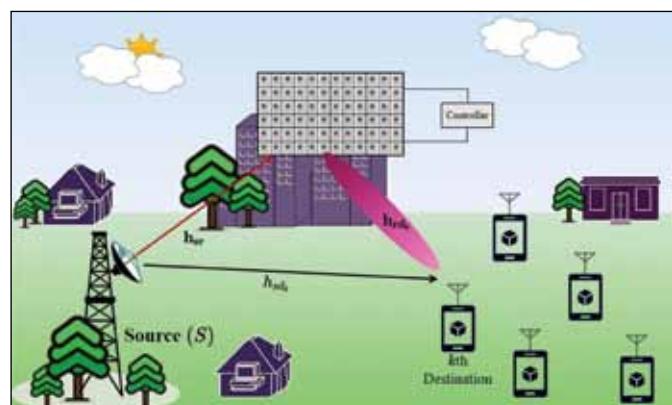
The field coverage planning for yield estimation is performed with different statistical features and automated machine learning model is trained for detection, classification and yield estimation of fruit crop. The tree canopies are analysed for possible disease detection with geo-location.



Automatic irrigation detection system

Intelligent Reflecting Surface Assisted Wireless Communication Systems

Intelligent Reflecting Surface (IRS) is an emerging area of research in the wireless communications field, and it is considered as technology with potential to uplift the performance of the wireless communication systems. An IRS is a surface of large number of sub-wavelength sized elements made of meta-materials and the properties of these meta-atoms can be engineered to improve the strength of received signal at a desired user. The overall beam forming of the signal towards the intended user is achieved by effectively controlling the phase shift of each element of IRS. IRS can outperform the currently existing technologies by reducing the signal leakage outside the intended user coverage area and avoiding large blockages in-between through smart reflections. The IRS is being talked about as the potential technology for the Sixth Generation (6G) of wireless communication systems. This project is focused on the analysis of IRS assisted wireless communication systems and design and fabrication of IRS meta-atoms.



Acoustic Gunshot Detection System for Strategic Applications (AGDS)

The Acoustic Gunshot Detection System detects and conveys the location of gunfire using an array of acoustic sensors. Design, development and integration testing of Vehicle mount configuration of AGDS has been completed.

Technical achievements

Hardware/Mechanical modules:

- Sensor array which listens to acoustic events
- Analog and Digital Processing modules

- Navigation Module
- Remotely operated Unmanned Ground Vehicle

Software modules:

- Algorithms for
 - Identification of Shock Wave and Muzzle Blast signals in a gunshot
 - Multipath rejection algorithm to reject the acoustic reflections from field
 - Computation of localization parameters
 - Tracking of Vehicle motion compensation parameters
- Communication, Control and Display software for (i) Receiving localization data and Display of the results in geographic map (Satellite map) (ii) Integration with Electro-Optic (EO) system to control and display the images/videos from the system, for a visual display of detected gunshot location, with human identification.
- The integration of the Vehicle mount Configuration of AGDS consisting of Sensor arrays, Processing Units, Navigation Module, Gunshot Display Unit and EO system Display Unit has been performed successfully.
- A product video of Static Configuration of AGDS has been realized by a professional digital content creator.
- Demo trial (Static system) to potential ToT partners, at Central Training College, CRPF - Coimbatore firing range has been conducted successfully.



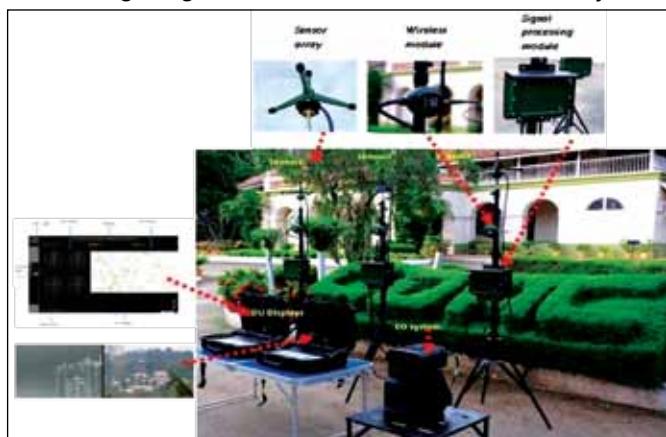
ADGS in field

Cognitive Radio (CR) for Strategic Applications - Development of a prototype wideband RF front end & Waveform for Spectrum Sensing based Interference Mitigation

The project aimed to pioneer R&D initiative in the niche area of CR for strategic applications with core technology development in both platform and waveform. The objective of the project are: Development of a performance tunable wideband RF front end with power saving features; integration of proposed RF front-end with C-DAC's in-house developed data conversion and baseband modules to form a CR platform; development of a data communication waveform with CR features (spectrum sensing, spectrum mobility and link adaptation) capable of operating in the presence of interference/jamming; porting of the CR waveform on to the in-house developed CR platform; design and setting up of Cognitive Radio test bed consisting of two CR nodes, to demonstrate CR features to potential customers and industry and study of potential technology solutions to address military communication requirements.

Conformal Jamming Systems for Radio Controlled Improvised Explosive Devices (RCIED)

The conformal jamming system is for VVIP convoy protection from threats from remotely operated devices. The system uses multiple distributed antennas conformal to the vehicle body and invisible from outside. Hence, the jamming vehicle is not distinguishable from the rest of the convoy. A distributed approach is proposed where multiple jamming hardware units with shared aperture antennas are employed. As a proof of concept, only low



Integrated system—AGDS, with processing cards mounted internally

power jamming will be carried out towards distributed approach where multiple jamming hardware units with share aperture antennas are employed.

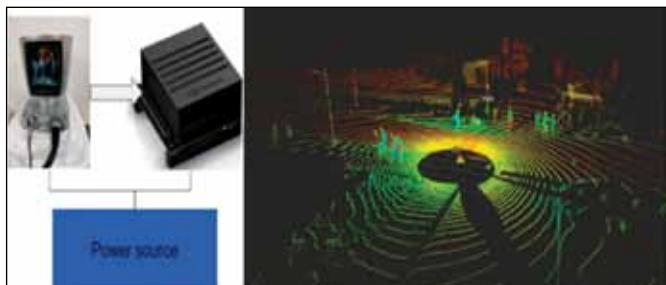
Prototype antenna and RF hardware testing have been completed to verify the jamming function on different cellular bands. Final integration on vehicle body and an outdoor measurement set-up has been completed progress.



Jamming system demonstration

Real-Time Edge Computing Architectures for LiDAR based Intelligent Transportation Systems

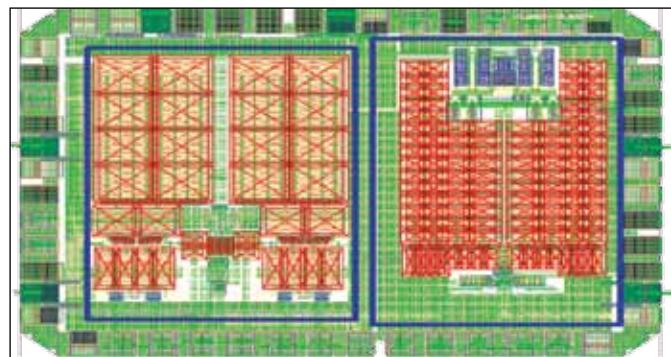
The Project “Real-Time Edge Computing Architectures for LiDAR based Intelligent Transportation Systems” aims at developing low latency edge computing enabled architectures for LiDAR point cloud processing for application in Intelligent transportation. The data acquiring setup has been prepared. Efforts are being made to integrate the LiDAR on a test vehicle to acquire Indian traffic specific data. As a part of outcome, a novel grid-based algorithm was developed which is used to remove unwanted ground points present in a LiDAR point cloud.



The set up for LiDAR data acquisition (left), sample of data acquired at IIT Hyderabad campus (right)

Design of dynamic MAC and PHY SoC for low power long-range networks

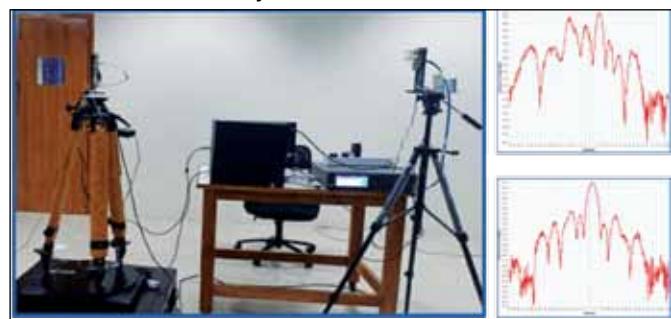
Using 1.2 V, 65 nm TSMC technology, two digitally intensive low power architectures for the standard IEEE-802.15.4e short-range-industrial communication and chip design have been developed. An out of Tree module in GNU Radio has been implemented in line with the 802.15.4e TSCH. Multi rate multi modulation digital baseband have been implemented on FPGA based SoC that supports SUN-OQPSK at 31.5, 125, 250, 500 kbps, SUN-FSK at 200 kbps.



Chip tape out

Multi Gigabit (MGBiT) wireless system at 60GHz for 5G and Beyond

The objective of the project is the design and development of a 60 GHz beamforming system with integrated RF circuits. The multigigabit design enables the development of new technology in antenna systems, high-frequency RF circuits, and mixed-signal layouts operating at the V-band spectrum. This system will provide backhaul support for 5G and point-to-point communication and is an alternate solution to high-cost copper and fibre networks with high speed and increased throughput. An antenna calibration system is shown below.



Antenna array calibration setup

Metro Area Quantum Access Network (MAQAN)

The project titled “Metro Area Quantum Access Network (MAQAN)” project has been initiated with focus on development of system components and establishment of a secured Quantum Key Distribution (QKD) access network connecting multiple nodes located at different places in a city. The main objective of the project is to demonstrate secure key generation, key management, and secure communication over India’s first quantum access network. A lab prototype of a simple QKD between two nodes has been implemented using commercially available off the shelf devices/elements. A fully integrated FPGA card will be developed at a later phase of the project. An on-field deployment of a MAQAN will be established between IIT-Madras, SETS and NIC in Chennai using dark fibres connecting those places.

Visible Light Communication based LED Lighting Solution

Visible Light Communication (VLC) based Indoor Positioning System:

This system consists of VLC transmitter that is programmed to transmit a unique ID. LED down light transmits the unique ID which is not visible to human eye. Transmitted unique ID will be received as black and white stripes via image sensor in smart phone through a mobile App. Decoding logic running in the mobile app will process the captured image and provides the unique ID. Upon the detection of ID mobile app will communicate with server via GSM/ Wi-Fi to get the user location. Mapping algorithm in server provides the exact location of user based on received unique ID.

Visible Light Communication (VLC) enabled Luminaire to Luminaire Communication:



Simplex visible light communication between transmitter and receiver

This system depends upon detection of occupancy state under any luminaire in a zone. Control command to turn ON all the luminaires under the zone will be sent via the visible light. Upon detection of non-occupancy state, a luminaire will be turned OFF only when all other luminaires in a zone are non-occupied.

High Performance Programmable Simulation Framework for Quantum Network / Internet Communication

The project aims to design and develop a Quantum Network Simulator that can efficiently simulate the communication of quantum information over quantum networks. The proposed simulator framework aims to address the challenges in development of quantum network technologies, by providing a simulation framework that can be used for modelling quantum networks and study the performance of different quantum network protocols, topologies, and configurations.

Development of SDN and NFV based Network Service Delivery Platform for Enterprise and Service Providers

Software Defined Networking (SDN) based Network Function Virtualization (NFV) platform is being developed by CDAC Thiruvananthapuram. The project aims to develop an indigenous agile network service delivery platform with smart network edge boxes and service orchestration software. The smart network edge box which is based on generic purpose hardware is capable of running multiple Virtual Network Functions (VNFs) for Routing, Switching, Fire walling, etc.

Indo-Dutch Collaboration

Under first phase of Indo-Dutch collaboration for collaborative research in Pervasive Communications and Computing, four projects have been completed successfully and the following project has been completed during 2022-23:

Big imaging data approach for oncology (BIONIC)

Big Imaging in Oncology the Netherlands India Collaboration (BIONIC) is a Indo-Dutch collaboration project funded by MeitY.

The objective of this project is to develop Big Data technology that opens up petabytes of Medical imaging

data stored in hospitals worldwide and to use for Decision Support Systems for cancer treatments.

Achievements:

Medical image archives in hospitals are increasing every year and oncology relies heavily on imaging for detection, diagnosis, treatment and follow-up of cancer patients. Radiation oncologists spend considerable amount of time to reduce the imaging to information such as stage of the disease, maximal uptake of a marker, one-dimensional measurement of size and contouring region of interest. BIONIC project aims to leverage and combine high-throughput automated image analysis using big imaging pipeline based on Radiomics image information extraction methods and a distributed framework to flexibly integrate the information with Semantic Web.

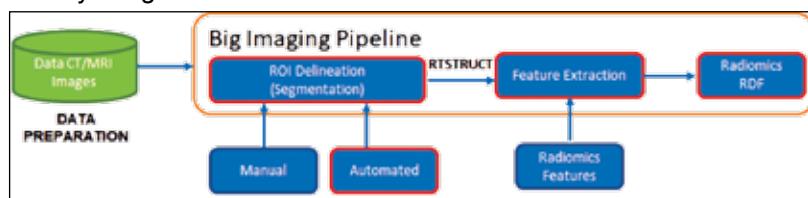


Figure: Big Imaging Pipeline

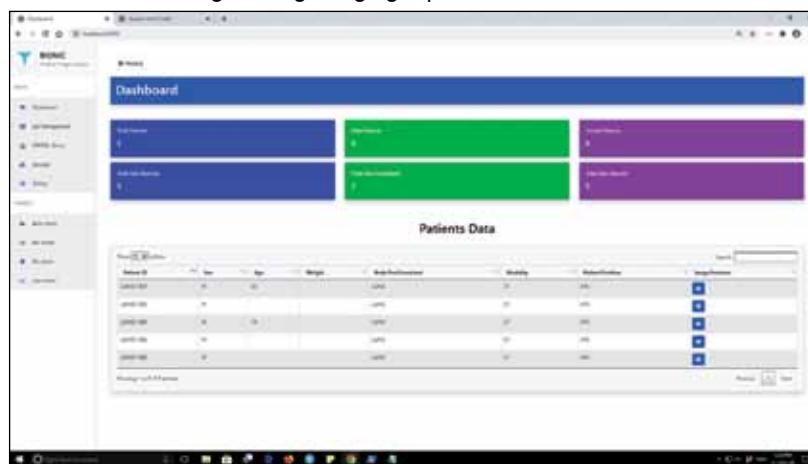


Figure: BIONIC Dashboard

A big imaging pipeline has been developed that automates the extraction of the image derived features from medical images. The semantic web-based Dashboard provides a web-based interface to view the image derived features, clinical features, and use SPARQL based end-point to query and perform data analysis combining clinical and image based features in one-go. The prediction models developed as part of project is validated and useful in lung, head, neck and rectal cancers and survival prediction

for the line of treatment and stage/phase of cancer. The model can selectively work for EGFR positive and negative for lung cancer diagnosis, SPN and Non-SPN cancers. NLP based models work on associated nuclear medicine and radiology report for better predictability.

Under second phase of Indo-Dutch collaboration, following three projects in the area of Big data and IoT are in progress:

- Data-Driven E-Commerce order Fulfilment, (DAREFUL)
- Personal health Train for Radiation oncology in India and the Netherlands (TRAIN) and
- Digital twin for Pipeline Transport Network (DP-Trans)

Next Generation Wireless Research and Standardization on 5G and Beyond

The fifth generation (5G) technology is identified to have the potential to make a major societal transformation in India by enabling massive digital products.

A new project titled “Next Generation Wireless Research and Standardization on 5G and Beyond” project has been initiated in July 2021 at premier institution (CEWiT, IITs, IISc). The broad objective of this project is to conduct collaborative research in the broadband wireless communication areas leading to standardization of 5G and beyond technologies by utilizing the expertise available in the country. Further, the research outcomes are taken to various standard bodies like 3GPP, ITU, TSDSI, IEEE, etc. to contribute to evolving the technologies for 5G and beyond.

Other new R&D initiatives are: On-chip Control of Polarization and Delay in Arrayed Waveguide Grating; Design and Development of a milli-meter wave based Road Condition Detection Radar for Automotive Applications.

Other R&D initiatives are: A Low-Power 8-16Gb/s/pin Full-Duplex Wireline Transceiver, Efficient multi-carrier wave-form design for next generation non-orthogonal multiple access for wireless mobile communication,

Design and Implementation of Intelligent Receiver over randomized Environment by Statistical and Machine Learning Approach, Design Studies of High Power RF Amplifiers and Development of Antennae for mm-wave backhaul/fronthaul Connectivity for 5G, Development of Secured and Reliable Spectrum Allocation Schemes for Next-generation Elastic Optical Networks, Analysis of Deep Learning Techniques for Electronic warfare 5G applications, A Machine Learning Framework for Deploying Mobile Edge Clouds for Real-Time Analytics on IoT Data over 5G, Efficient conformal antenna and array, Designing Reliable and Low-latency Networks for Tactile Cyber-Physical Systems, A Data-Centric Approach to Study Fundamental Limits of Communication in Adversarial Wireless Networks, Computation of a Localization Method to Compensate for Malicious Anchor Node behavior in UWSN, AI based 6G Network Slicing for multi-UAV prototype, Design and Implementation of Non-Orthogonal Multiple Access Techniques for Future Wireless Systems, Intelligent Joint Radar-Communication Transceiver Design and Prototype for Beyond 5G*, Development of MMW Radiometer for NE Region of India for Climate Modelling Studies for Weather Changes, Ensuring QoS In Internet of Medical Things (IoMT) using Software-Defined Networking (SDN)

Artificial Intelligence & Emerging Technology :

Promoting the Adoption of Cutting-edge Technologies to Create Significant Economic and Societal Impact

India is now prepping for cutting-edge technologies including 5G, AI, blockchain, augmented reality & virtual reality, machine learning & deep learning, robots, natural language processing, etc. These will be critical in the government and industry, for planning or decision-making, expediting development or analysing deployment, issue solving or product creation, detecting new trends or drawing out linkages and associations.

The Emerging Technologies Division of MeitY is responsible for fostering and promoting the utilization of cutting-edge technologies in the country. The Emerging Technologies Division is supporting work for policy / strategy papers in the emerging areas like AI, AR/VR, IOT, blockchain, robotics, computer vision, drones, etc. Initiatives by MeitY in Emerging Technologies

Artificial Intelligence Committees Reports

Artificial Intelligence (AI) is expected to change the way we work and live. In view of its positive impact on the economy, the technology is being embraced by the countries across the world. Its proliferation is being regarded as part of the fourth industrial revolution. The Government of India has also envisioned to support research and development and adoption of such technologies. In view of the possible impact of AI on the economy and society and to come out with a policy framework on AI, MeitY constituted four committees on AI. Reports given by them are available on the MeitY website (<https://meity.gov.in/artificial-intelligence-committees-reports>).

Centres of Excellence for Internet of Things (Gandhinagar, Bengaluru, Gurugram & Vizag)

Under the Digital India initiatives, MeitY along with NASSCOM and state governments has set up Centres of Excellence on Internet of Things at Bengaluru, Gurugram, Gandhi Nagar and Visakhapatnam. First Centre on IOT was established in Bengaluru in 2016 along with the Government of Karnataka and NASSCOM. One of the objectives of these centres is to enable India emerge as a innovation hub in IoT through democratization of innovation and realization of prototypes. The CoE, supported by Government and industry is a nationwide platform for innovation sandbox to enable technology adoption and innovation, and to develop a culture of cocreation in Industry 4.0, manufacturing, automotive and transportation, lifesciences and healthcare, agri and other industry verticals and horizontals. More than 320 startups have been enrolled, 63 societal projects have been undertaken, and 73 IPs filed.

Centre of Excellence on Virtual & Augmented Reality (VARCoE) at IIT Bhubaneswar

Virtual Reality and Augmented Reality (VR and AR) have massive innovation potential across a wide range of industries and research fields. With an objective to explore the opportunities in this niche area, Software Technology Parks of India in partnership with MeitY, Government of Odisha, IIT Bhubaneshwar and a philanthropist has established Centre of Entrepreneurship for Virtual and Augmented Reality (VARCoE) at IIT Bhubaneswar.

VARCoE undertakes world-class research, develop state-of-the-art testing facility/laboratories for advanced algorithms, applications and methods in aid of AR & VR for immersive visualization in areas including skill development, product design, healthcare, art & architecture, transport, construction, tourism, entertainment, education & productivity software. Presently nine major projects on AR&VR applications in various domains involving 12-15 highly qualified faculty and researchers of IIT Bhubaneshwar are in progress.

Centre of Excellence on Gaming, VFX, Computer Vision & AI at Hyderabad

This CoE has been set up in collaboration with MeitY, STPI, the gaming industry and the Govt of Telangana in Jan 2020 to provide resources such as mentoring, technology support and funding for gaming, animation, VFX, computer vision and AI start-ups. It offers integrated programs, CVLAB and Game Lab for start-ups to scale up through its incubation facility. The centre has been branded as IMAGE. The IMAGE accelerator program includes premium plug and play co-working space for start-ups and offers access to the ecosystem which comprises IP owners, mentors, seed funding, investors and a platform to support Go-To-Market strategy. At present 20 start-ups have been on-boarded and so far, 48 products & 31 prototypes have been created.

Centre of Excellence on Blockchain Technology at Gurugram

The STPI APIARY, a Centre of Entrepreneurship in Block chain Technology has been setup in collaboration with MeitY, STPI, Govt. of Haryana, Padup Venture Private Limited, IBM, Intel, GBA and FITT in March 2020. This is an initiative to identify and evaluate promising start-ups in the field of Blockchain technology that will be hosted in the STPI Gurugram incubation facility. The CoE is created to be an Incubation-cum-Accelerator Programme through which acute challenges faced by start-ups from validation of idea to initial investment will be addressed. Total 26 start-ups have been onboarded and so far, 12 products & 37 prototypes have been created.

Design, Development, and Deployment of National AI Portal (INDIAai)

The National AI Portal of India (INDIAai) is a joint

venture by MeitY, NeGD and NASSCOM that has been set up to prepare the nation for an AI future. This has been implemented as a one stop online portal for AI related developments in India, sharing of resources, details of start-ups, investment funds in AI, companies and educational institutions related to AI in India, etc. The portal currently has the following major sections – news, articles, case studies, research reports, listing of startups, listing of investment funds, colleges, companies, countries, people, videos, datasets, courses, and initiatives of states and central ministries. As on date, there are 1,393 national and international articles, 771 news, 256 videos, 111 research reports, 282 startups, 96 case studies, and 120 government initiatives listed on the National AI Portal.

POC for AI Research Analytics and Knowledge Dissemination Platform (AIRAWAT)

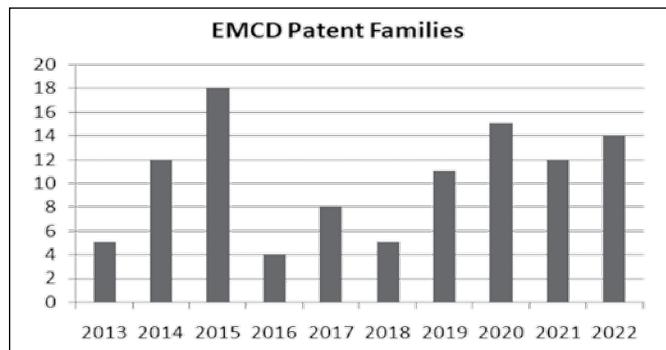
The Govt. has initiated a project AIRAWAT (AI Research, Analytics and Knowledge Dissemination Platform) for providing a common compute platform for AI research and knowledge assimilation. This AI computing infrastructure will be used by all Technology Innovation Hubs, research labs, scientific community, industry, start-ups and institutions under the National Knowledge Network. The PoC for AIRAWAT will be developed with 200 petaflops mixed precision AI machine which will be scalable to a peak compute of 790 AI petaflops.

5.2 Translation R&D

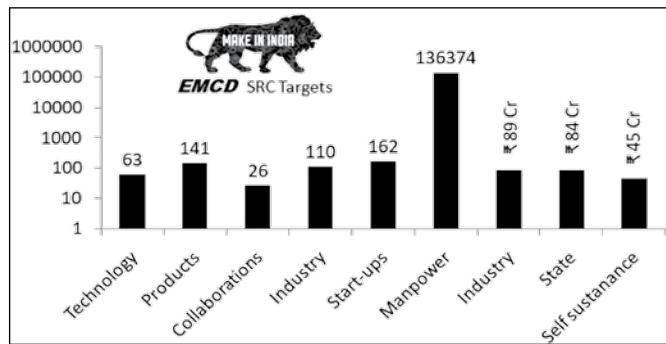
5.2.1 Initiatives under Electronics Components and Material Development

Electronics Components & Material Development Programme (EMDP) has been promoting research and development (R&D) activity since 1986 to nurture electronics development in the country for boosting local manufacturing. EMDP's core areas of research are electronics materials, components and process technology, photonics, electronics waste recycling (e-waste) and additive manufacturing. EMDP supported National MISSION under National Policy 2012 on Electronics: "Promotion of a vibrant and sustainable ecosystem of R&D design, engineering and innovation in electronics" during 2012 to 2018. During the period of 2012-2020 EMCD division has worked on 82 technology

development projects which has lead to 864 published papers, 68 filed patents (figure below) and 16 transfer of technologies.



EMDP is currently supporting National Policy on Electronics 2019 (NPE 2019): "Encourage industry-led R&D and innovation in all sub-sectors of electronics". The strategy under this objective is to adopt top-down approach or market pull R&D to cater for local manufacturing needs in the electronics sector. Under this objective EMDP's core areas of research are Electronics Materials & Components, Photonics, Circular Economy & E-waste, IoT Sensors and Additive Manufacturing & 3D Printing. To cater to the objective, EMCD has focused on establishment of self-sustaining R&D centres or SRCs with industrial partnership where industry is playing key roles in technology road-mapping, administration, funding and self-sustenance of the R&D platform. Govt. is extending funding, knowhow, scientific manpower, laboratory access, and IPR (existing) for development of industry demanded product prototype, indigenous technology solutions and IPR generation with specific target plans for commercialization through ToT to industry & start-ups and create atmosphere for absorption of the technologies in Indian market. In this direction, EMCD has initiated 12 centres with planned targets provided below:



Other ongoing technology developments under EMDP are provided below:

Supercapacitor-based power modules (SCPM) for applications in VVPAT of EVM: During the election process, Voter Verifiable Paper Audit Trail (VVPAT) which is a part of Electronic Voting Machine (EVM) is used nationwide. Currently power requirement of VVPAT is met from high power battery module comprising of 30 imported alkaline cells. CMET Developed Carbon Aerogel Supercapacitors has been utilized as power source for VVPAT along with batteries to reduce consumption of alkaline batteries leading to a cost reduction along with the enhancement of life of power module. M/s ECIL has now developed a prototype power module using CMET developed Carbon Aerogel Supercapacitors which is able to achieve a consistent printing capacity of 2250 numbers. EMI-EFC test of Supercapacitor power module was conducted and aerogel supercapacitor based power module passed the criteria A as per standards. The field trials of the developed power module in laboratory also completed



CW/Modulated Thulium Fiber Laser (TFL) System for Soft Tissue Vaporization/Ablation: Vaporization is a promising technique for faster treatments of benign prostate hyperplasia (BPH), eliminating the use of additional step for morcellation phase. Pulsed Holmium: Yttrium-aluminum-garnet (Ho:YAG; $\lambda=2.12 \mu\text{m}$) laser is a 'gold standard' clinical tool in urology. However, the limited pulsed operation of Ho:YAG laser is not very much applicable for the process of cutting or coagulation. In this respect, continuous wave (CW) operation of

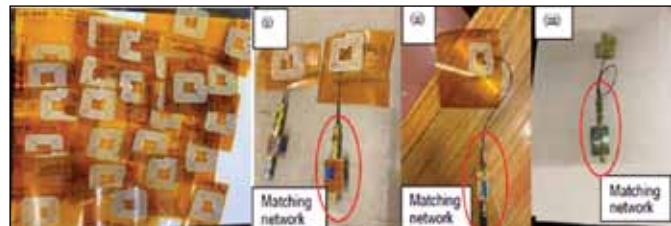
Thulium:Yttrium-aluminum-garnet (Tm: YAG; $\lambda=2.013 \mu\text{m}$) laser is an promising alternative laser for the surgical management of BPH. Over the bulk YAG based lasers, the recent technological advancement in fiber laser provides extremely high beam quality, high wall plug efficiency, and maintenance-free operation to integrate with a compact system for surgical applications. TFLs at $1.94 \mu\text{m}$ are becoming a promising energy source for high end surgery as the operating wavelength is more closely matching the water absorption peak, resulting in a lower ablation threshold and higher ablation rate over the Ho:YAG or Tm:YAG laser. A single mode beam of TFL allows a high-power delivery through a small-core fiber. Additionally, TFL can operate for a wide range of pulse properties and CW power levels, allowing use of a single system in different mode of treatment. MeitY through CGCRI in collaboration with M/s BioradMedisys Pvt. Ltd, Pune has now been able to design and develop 150 W CW/Modulated Thulium fiber laser (TFL) for pre-clinical validation in soft issue Vaporization/Ablation.

	MeitY developed Thulium Fiber Laser	Ho:YAG	Tm:YAG
Operating wavelength (nm)	1.94	2.12	2.013
Mode of operation	CW Pulsed	Long Pulsed	CW
Frequency (Hz)	10.1000	5.80	—
Average output power (W)	70	120	200
Beam quality'	Single mode	Multi-mode	Multi-mode
Laser delivery fiber core diameter (um) Min	150	200	200

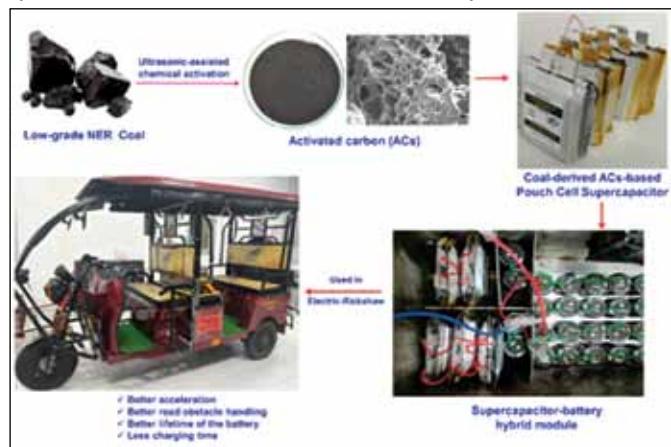


Printable Silver thick film ink for RFID Tags: RFID Tags are used in a variety of applications such as access management, tracking of goods, tracking of persons and animals, toll collection and contactless payment, machine readable travel documents, Telecom, Banking, Retail and IT Industries for contactless payments, Airport baggage tracking logistics and identification of LPG cylinders during bottling, distribution and supply chain management. Technology development for indigenous

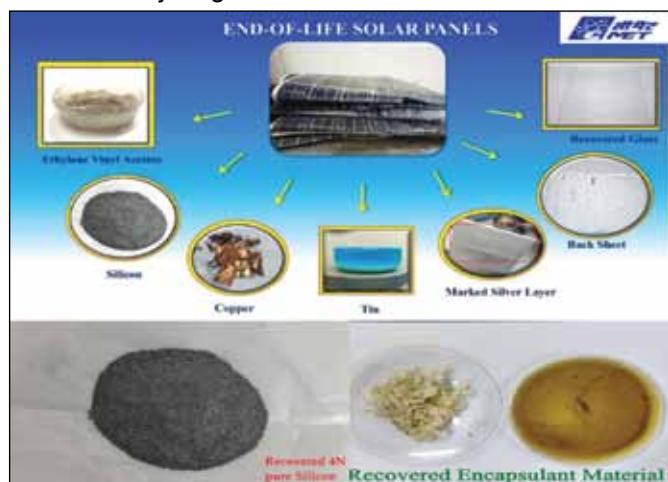
printable silver ink compatible to flexible substrate has been undertaken by MeitY through CMET. Lab-scale silver flakes, silver pastes and antenna tag for 13.56 MHz frequency has been now been developed. Prototype Antenna printed with in-house developed conductive paste shows expected results as per requirement.



Hybrid battery power module with indigenously developed super-capacitor and Li-ion cell: Carbon is the largest input raw material by weight for lithium ion cell and supercapacitors. A technology development for Li-ion battery and supercapacitor cell based on North-East coal as carbon has been initiated by MeitY through CSIR-NEIST, Jorhat. Hybrid power module using supercapacitor from NEIST, Li-ion battery from CMET and custom build BMS from industry is being developed to power e-rickshaw. The program has now successfully developed an indigenous technology of BMS for the hybrid power module and supercapacitor pouch with a capacitance of 100-200F. The electrochemical performance of coal-based prototype supercapacitors cells was evaluated as per standard IEC 62391-2 protocol. A hybrid prototype has been made from indigenous supercapacitor along with Li-ion battery. The hybrid battery with indigenous BMS was tested with a speed of 45 kmph in an e-rickshaw with comfortable quick acceleration at CSIR-NEIST campus..



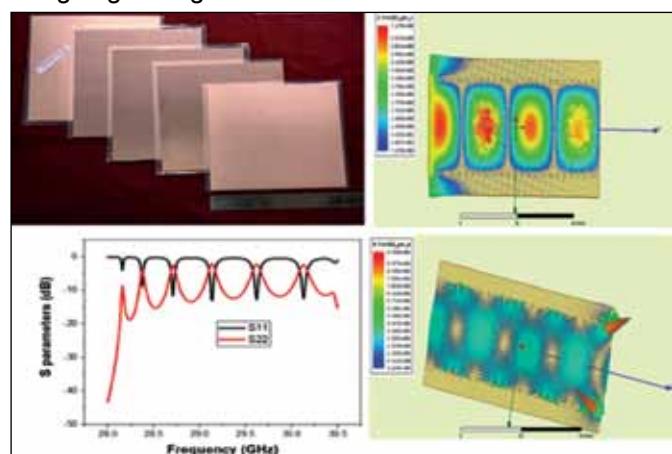
Feasibility study for development of process technology to recover valuable materials from end-of-life silicon solar modules: The goal of the R&D is to identify technically, environmentally and commercially sustainable recycling technology for end-of-life (EoL) silicon solar modules and recover various valuable as well as toxic metals, such as Si, Ag, Pb, Cu & Sn, for recycling and safe disposal of materials. Optimization10 Kg batch process for recovery of valuable materials from end-of life silicon solar modules has been achieved. The process has been established to recover 4N pure silicon at laboratory scale and optimization of the process at higher scale is in progress. The program has now signed MoU with M/s Greenko, Hyderabad for collaborative work for re-cycling of end – of life Si- solar modules.



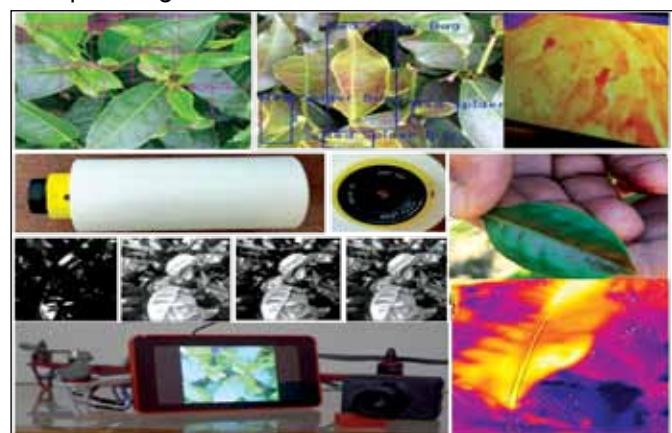
Polybutadiene/ ceramic composite laminates for Substrate Integrated Waveguides (SIW) applications:

Microwave substrates are extensively used for variety of high end microwave circuit applications such as high power solid state amplifiers, patch antennas, missile guidance, mobile base stations etc. Polybutadiene based composite laminates provides high dielectric and low loss microwave substrates. More than 70% of the cost of any microwave device accounts for the base microwave circuit board and requirements of high frequency circuit boards are fully met through imports. Availability of Polybutadiene based composite laminates for microwave and millimetre wave circuit applications is going to reduce import cost and boost Indian manufacturing. CMET with its industrial partner M/s Micropack Pvt Ltd, Bangalore has been able to develop 5 products till date of 8"X8" and 8"X6" with different dielectric constant (DK from 6

to 14.38 and loss from 0.0028 to 0.0045). Standard third party testing has revealed the as developed products to be comparable to commercially available similar imported microwave substrates. Application designs have been completed based on substrate integrated waveguide using the products developed which are currently which are going through fabrication.



Early detection of pest on Tea plantation through Multispectral imaging from Unmanned Aerial Vehicle: MeitY through Tezpur University, Assam is developing low-cost, rapid and early detection system based on arrays of multispectral and thermal imaging sensors on (unmanned aerial vehicles UAV) for pest infestation in tea crops to help the farmers to plan pest control strategies. Under the program development of thermal imaging system, hyperspectral imaging sensor on Unmanned Aerial Vehicle and post processing deep learning algorithm has been completed and initial field testing has been completed. The system has now successfully demonstrated Red Spider Mite, Tea Mosquito Bug infestation on tea leaves.



5.2.2 Technology Development & Demonstration for Indian Industries

5.2.2.1 National Mission on Power Electronics Technology (Phase-III)

The National Mission on Power Electronics Technology Phase-III (NaMPET-III) program is ongoing with an objective to strengthen the power electronics technology base in the country. Various activities like Technology development & deployment, technology transfer, Awareness creation and strengthening the industry interactions with R&D and academic institutes through collaborative research are in progress.

Development of Wide Band Gap Device based magnetic field / Current sensor, design & development of planar magnetic, Low Voltage Direct Current (LVDC) based power pack deployment in house boat, electrical vehicles charging system, Wireless Charger for Light Electric Vehicles, deployment of micro-grid, Interconnection of micro-grids are progressing in different stages. Two products developed under the programme, AC Charger for e-Mobility and LVDC powering for Houseboat hotel load were formally launched by Secretary, MeitY in a function organized at MeitY. The AC Charger installed at MeitY was also inaugurated for charging EVs of MeitY. Twelve short term courses on specialized applications of power electronics have been conducted in different parts of the country.

5.2.2.2 Realization of Series Connection of Silicon Carbide (SiC) Devices in Converters with High Frequency Link Bidirectional DC-DC Converter for Grid Interfaces

To address the challenges in conventional Silicon based power converters in the emerging applications which require high power density, higher efficiency, reduction in energy consumption etc. and to meet the next generation high voltage devices requirement, this project has been progressing at CDAC-T and IIT Madras. Active gate drivers for series connections of SiC devices have been successfully developed and demonstrated with a double pulse circuit. Prototype development has been completed and ToT is in process.

5.2.2.3 Autonomous Last mileVEhicle (ALIVE)

In order to have our own technology for Autonomous vehicles suitable for Indian traffic conditions, this project has been taken up and progressing at IIT Delhi. The offshoot products such as Driver State Monitoring (DSM), ADAS for Indian (electric) vehicles (potentially combined with DSM), Design for Multi-Sensor Placement and Cross-Calibration, Low-cost e-Rickshaw drive-by-wire) etc., have been developed in this project. An e-Rickshaw has been procured and modified for drive by wire activities. The limited live movement of the e-Rickshaw has been demonstrated to MeitY. It will be a prototype autonomous vehicle with limited autonomy to move in a predefined area with forward collision warning system integrated in the prototype. Non-Lane driving warning is under development. The development of an obstacle detection and avoidance system currently under progress.

5.2.2.4 MEAN: Measuring Endocrine Disrupting Chemicals (EDC) and Aquatic diagnostics through Bio-Sensory Network with a special reference to North East India

The project has been initiated under special budget provision made for North-East India, implemented by C-DAC, Kolkata in collaboration with North East Regional Centre, ICAR-Central Inland Fisheries Research Institute, Guwahati, Assam, ICAR-Central Inland Fisheries Research Institute, Barrackpore and Indian Institute of Technology, Hyderabad. The project has culminated in a colorimetry based biosensing system towards EDC detection in aquatic ecosystems. EDCs are insecticides, pesticides and other agrochemicals. These agrochemicals are used for pest control and related purposes in agricultural fields and as agricultural runoff water these EDCs are entering lakes and other water bodies. Presence of these EDCs above maximum residue level (MRL) leads to residual pesticide issues in India. The prototype sensing systems have been deployed at selected locations of North Eastern India and validated with real samples. Also, an ultra-sensitive Biosensors platform for fish pathogenic bacteria detection has been developed by the project team. Presently, the project team is at the Transfer of Technology stage towards large scale deployment and commercialization.



Deployment and User Meet on awareness of pesticide residue monitoring at North East India

5.2.2.5 Shuddha: Design, Development & Deployment of Electronics Quality Assessment System for Edible Oils

Shuddha project has been implemented by C-DAC, Kolkata and Krishi Vigyan Kendra, Akola (MS). A customized e-assay based e-nose system has been developed and deployed at KVK, Akola for screening of groundnut oil based on the quality. Also, an oil extraction unit along with necessary machinery has been developed at KVK, Akola under the project. The setup is functional at present and the project team is demonstrating the setup to startup and entrepreneurs to start their own venture. Performance evaluation report including data is mentioned in the detailed report. Moreover, a model biochemical lab facility has been created at KVK, Akola for quality estimation of vegetable and edible oil. The facility includes large and small instruments like Hot air oven, Water bath, Hot plate with magnetic stirrer, Analytical balance, pH meter, Refractometer, Refrigerator etc. Project teams are arranging stakeholders training and awareness programs on a regular basis.

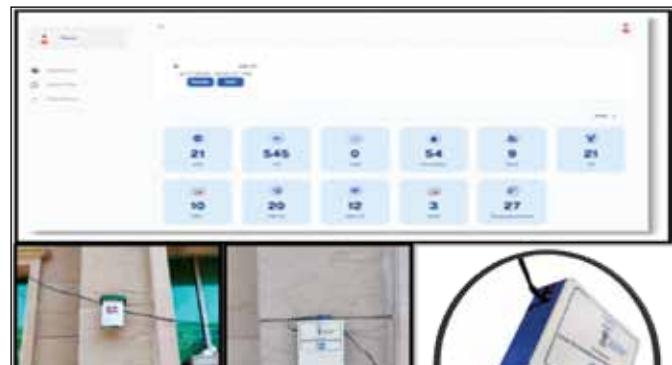


Deployment cum User meet of oil quality monitor system (OFAMS) and showcasing of different products through setting up of oil extraction plant at KVK, Akola

5.2.2.6 AgriEnics: National Programme on Electronics and ICT Applications in Agriculture and Environment

The Ministry of Electronics and IT has initiated a national level programme to reform the agriculture and environment sectors with the interventions of IoT, ICT, machine learning and robotics technology. The objective of this umbrella programme is to encompass the industry, users, academia, R&D institutes working in the allied domains of the thematic areas to make user friendly and market viable technology for dissemination to the masses. The programme is implemented by Centre for Development of Advanced Computing, Kolkata with the help of many renowned institutions across India. The commercialization of products will be taken up by transfer of technology to industries as far as possible by the implementing agencies. Industries will be involved in post-development, post-field trials etc., for market readiness and accreditation of technologies developed under the programme.

5.2.2.6.1 AQ-AIMS: AI based Air Quality Monitoring System



Air Quality Monitoring System and deployment at JM Envirolab

AQ-AIMS developed by C-DAC, Kolkata under the Agri Enics programme in collaboration with TEXMIN Foundation, IIT(ISM), Dhanbad and industrial partners. The developed AI based Air Quality Monitoring System (AQ-AIMS) is a hybrid sensor array(s) with appropriate signal conditioning and data acquisition electronics to acquire real time air quality data. The acquired data processed through AI enabled a pattern recognition engine to signal air quality status on a temporal basis. In addition to monitoring individual pollutants, the overall

air quality index can be estimated through the developed solution. Presently the system is capable of monitoring environmental pollutants PM1, PM2.5, PM 10 SO₂, NO₂, CO, O₃, ambient temperature, and relative humidity. The project team is at Technology transfer process towards nationwide commercialization of the system.

5.2.2.6.2 Users' Awareness Workshop on Vision Guided AI Enabled Robotic Apple Harvester

One day "Users' Awareness Workshop on "Vision Guided AI Enabled Robotic Apple Harvester" was organized by Division of Food Science and Technology, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir (SKUAST-K), Shalimar, Srinagar and Centre for Development of Advanced Computing (C-DAC), Kolkata in association with ICAR-Central Institute of Post-Harvest Engineering and Technology (ICAR-CIPHET), Ludhiana and Indian Institute of Technology (IIT), Kharagpur sponsored by Ministry of Electronics and Information Technology (MeitY), Govt. of India on 19th October, 2022 at SKUAST-K, Shalimar, Srinagar. The aim of the workshop was to raise the apple growers, Controlled Atmosphere (CA) store owners and related stakeholders regarding AI based robotic apple harvester being implemented by the MeitY sponsored project "Vision Guided AI Enabled Robotic Apple Harvester" under AgriEnclsprogramme. 50 participants comprising scientists of MeitY, SKUAST-K, C-DAC Kolkata, IIT Kharagpur, CIPHET Ludhiana, CA store owners and high-density apple orchardists participated in the programme.



Users' Meet at SKUAST, Kashmir attended by Group Coordinator, R&D-E, MeitY

5.2.2.7 Development of DLMS/ COSEM (Device Language Message Specification/ Companion Specification for Energy Metering) testing tool for Smart Energy Meter

The project is being implemented by CPRI, Bangalore in association with CDAC Thiruvananthapuram. The project aims at "Development of an automatic test tool of DLMS/COSEM for Smart Energy Meters of different variants like NAN & WAN communication modules as per standard (IS 15959 series) requirements". The DLMS/COSEM open protocol standard is accepted for communication between various devices involving Smart Meters, Data Concentrator Units (DCU), Meter Data Management Systems (MDMS) and Smart Home Appliances, etc, especially in the case of Advanced Metering Infrastructure (AMI).



Smart Energy Meter for testing of DLMS/COSEM software testing

5.2.2.8 Development of Electric Vehicles (EVs) Sub System (EVSS-01)

Ministry of electronics & IT (MeitY) has initiated a program on "Development of Electric Vehicles (EVs) Sub System (EVSS-I) with broad objective to develop the Electric Vehicle sub- systems in the areas of Electric motor, controller, converters Chargers etc., ranging from small to large vehicles etc., indigenously. The expected outcome of the technology/product has to be cost effective, quality competitive and ready for commercialization. The EV sub-systems development is being taken up in consortium mode consisting of Government institutes/ R&D organization for design and development, industry to commercialize it and vehicle manufacturers to use the developed product in the manufacturing. The government institutes/ R&D organization would lead the project and participating agencies are expected to contribute in

the said development. Technology of 1.2 KW Motor/controller for e rickshaw, 5KW Motor/controller for e Auto and 1KW BLDC motor/controller for e-rickshaw has been developed, tested and transferred the technology to M/s Alphasine, M/s Amber Group, M/s Brushless Motor and M/s Lithion Power for production /commercialization. Currently 14 technology development activities catering the needs of 4W/Heavy vehicle are progressing under the programme. The projects are being executed/implemented jointly with Academic, R&D organization and industry in pan India with coordination from C-DAC, Thiruvananthapuram.



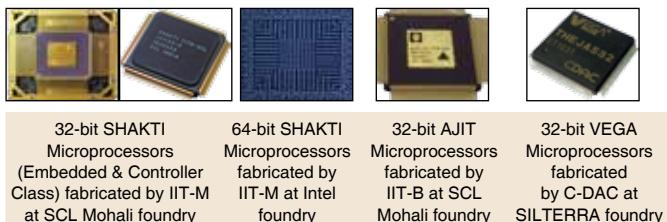
Launching of 1.2kW, 5kW PMSM motor and controller for e-Rickshaw by Secretary MeitY and official launch of BLDC motors and controllers.

5.2.3 Initiatives under Microelectronics Development and Nanotechnology Initiatives Division

Some of the technologies developed/ are being developed indigenously under the R&D projects initiated by Microelectronics Development and Nanotechnology InitiativesDivisions are:

Chips to Start-up (C2S) Programme: has been initiated by MeitY on 1st January 2022, whichaims to train 85,000 number of Specialized Manpower at 100 organizations (including academic institutions, R&D organizations, start-ups, MSMEs) over a period of 5 years in the area of VLSI and Embedded System Design and leapfrog in ESDM space by way of inculcating the culture of Chip/ System-on-Chip (SoC)/ System Level Design at Bachelors, Masters and Research level and act as a catalyst for growth of Start-ups involved in semiconductor design in the country.

Microprocessor Development Programme: Family of 32-bit/ 64-bit Microprocessor indigenously designed using Open-Source ISA (Instruction Set Architecture) along with reusable IP Cores by C-DAC, IIT Madras & IIT Bombay are being explored for their usage by strategic organizations (i.e. IISU (ISRO), IGCAR (DAE) and DRDO):



C-DAC fabricated 32-bit VEGA Processors at 130nm, Silterra foundry. In addition, following successful tapeouts of 32-bit/ 64-bit SHAKTI Processors were earlier carried out at 180nm, SCL foundry & 22nm, Intel foundryby IIT Madras and 32-bit AJIT Processor at 180nm, SCL foundry by IIT Bombay.

Swadeshi Microprocessor Challenge - Innovate Solutions for #Aatmanirbhar Bharat:was announced by MeitY on 18th August, 2020 to promote a culture of innovation and entrepreneurship by taking up complex designs in the country and innovate frugal solutions around home-grown processors (IIT Madras (SHAKTI processors) and C-DAC (VEGA processors)) ecosystem, catering to both global and domestic requirements as a step towards providing further impetus to the strong ecosystem of start-ups, innovators & researchers in the country. Under the Challenge, about 6,170 Teams from Start-ups, Students from Education Institutions & Innovators across the country, participated at various stages of the Challenge. Out of 100 Semi-finalist Teams which were provided with FPGA Boards ported with Swadeshi Microprocessor, 10 winning Teams were supported to incubate start-up for translating the prototypes developed.

Design & development of NavIC Receiver: For effective use of Navigational services based on Indian Constellation of Satellites, named NavIC (Navigation with Indian Constellation), M/s Accord Software and Systems developed integrated NavIC and GPS Chipsets; which has been qualified by ISRO for deployment.

Some of the devices developed/are being developed under the Nanotechnology Initiatives Division are:

For the commercialization of the technology for efficient H₂ production by water electrolysis, a start-up namely IMEDTECH LLP has been incubated at IIT Khargapur and one start-up namely “H2DC12 Avenue” has been registered and being incubated at IIT Delhi.

Technology for the know-how of NO₂, O₂ and N₂H₄ and H₂ sensors developed at IISc Bangalore has been deployed at SDSC-SHAR, ISRO for field trials of extensive burn out and vibration tests.

A Project entitled “Nanoelectronics Network for Research & Applications (NNetRA)” being implemented by IIT Bombay, IIT Delhi, IIT Madras, IIT Kharagpur and IISc Bengaluru has been initiated in collaboration with DST & Implementing agency as an umbrella programme with the vision of making India Knowledge rich in Nanoelectronics. Under NNetRA following are the achievements:

A 500W fiber lasers has been developed, packaged, and demonstrated in a tabletop form factor. Initiatives are being taken to know-how transfer to M/s BEL and ToT to M/s Jiva Sciences Pvt. Ltd., Bangalore. Based on the know-how developed, BEL is prepared to deliver the products as per Lastec requirements.

Gas Sensors for H₂, O₂, NO₂, N₂H₂ have been developed along with transmitters at IISc and deployed at SHAR, ISRO for the validation of complete sensor system and user feedback for further improvements. Continuous monitoring of deployed sensors is being carried out for possible reliability issues.

Around 80 soil moisture sensors have been deployed at various fields to generate data base and reliability. An MoU has been signed with Cognito Networks to interface the soil-moisture sensor to their cloud service.

Prototype of Monolithic Microwave Integrated Circuits (MMICs) and RF modules for strategic and high-end applications using GaN High Electron Mobility Transistors (HEMTs) has been developed at IITB.

Ultrasensitive Magnetic field sensors based on (Super Quantum Interference Device (SQUID) of 1-0.1nT range along-with the associated electronics has been developed at IITD. A MoU with Dr. K.S. Krishnan Geomagnetic Research Laboratory, Jhunshi, Prayagraj, Uttar Pradesh has been signed for measuring magnetic moment of

rocks by using the developed SQUID sensors.

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 for RFID applications. Functioning of a prototype of Flexible rechargeable lithium batteries for flexible electronics has been developed. Batteries are also being customized for the smart watches as per the requirement of a Start-up.

Under the project “Centre for Excellence in Research and Development of Nanoelectronics Theranostic Devices” being implemented by IITG, three technologies (Latent finger print detection method; Portable nerve gas agents detection method; Portable ammonia detection method) have been transferred to RR Animal Healthcare Ltd., Hyderabad.

Under Nanotechnology Initiatives Division More than 400 research papers have been published in National and International journals. Some of the Patents published/filed this year are as follows:

National/International Patent

Some of the notable patents filed/granted this year are as follows:

“Apparatus for varying resonant frequency in a multi-frequency Radio Frequency (RF) micro-electromechanical system (MEMS) switch”, Sarath G., Amitava Das Gupta and Deleep R. Nair, Indian patent Application no: 201641009521; Patent No. 363823

“A Conducting Electrochromic Composite of Metallic Nanowires and Multi-Coloured Thermochromic Materials”, N. Nair, D. Ray, and P. Swaminathan, Indian Patent, Application no. 202041025228, Filed on 16/06/2020.

“Electro-Thermochromic Touch Display Devices”, N. Nair, D. Ray, and P. Swaminathan Indian Patent, Application no. 202141014991,

“A Printable Wi-Fi Transparent Antenna”, N. Nair, D. Ray, P. Swaminathan, Indian Patent, Application no. 201941012467.

"A Method for Patterning of Graphene on a Substrate", Indian Patent Application no. 201931018426, S. Ragul, S. Dutta, D. Ray,

"Method of generating controllably biased random number by OTP devices", U. Ganguly, S. Sadana, A. Lele. Application No. 201821010427

P. Kumbhare, S. Sadana, U. Ganguly "One Time Programmable Memory for Encryption and Reconfigurable Circuits", Application No. 201621031483

"Steerable Plasmonic Nanoantennas", P. Savaliya, N. Gupta, and A. Dhawan Patent Application No: 201911042206

"Membrane-less microfluidic reactor with asymmetric electrolyte for water splitting and process for producing the same", SudhasatwaBasu, Neeraj Khare, Biswajit De, Aditya Singh Patent Application No: 202011022122

"Membrane-Less Two-Phase Flow Microfluidic Electrolysis Cell - Fuel Cell Tandem Operation", SudhasatwaBasu, Neeraj Khare, Biswajit De, Aditya Singh, Anastasia Elias Patent Application No: 202111016631

"Hollow beam bistable MEMS switch", V. Agarwal, B. Mitra Patent Application No: 201811041011

Low-temperature lead-free high performance piezoelectric thin films R. S. Deol, S. Saha, M. Mehra, B. Mitra, and M. Singh Patent Application No: 201811044238

"Low-cost solution-deposited Electrochemical Sensor", P. Vinayak, H. S. Devi, S. Saha, M. Singh, B. Mitra Patent Application No: 2018363412

Nano Heterostructures of Transition Metal Dichalcogenide Sensing Film Based Extended Gate Field-Effect Transistor for the Sensing of Heavy Metals P. Vinayak, Md. Samim Hasan, B. Mitra, S. Sapra, M. Singh Patent Application No: 201911049144

A Self-Regenerated Catalyst for Odor Killer Neeraj Khare, Mohd. Faraz Application no. 201911020974

Design of Photoreactor using nanocomposites for degradation of organic dyes Neeraj Khare, Mohd. Faraz Patent application no. 201911043675

A method of Fabricating a flexible nano-composite film with enhanced triboelectric effect Neeraj Khare, Huidrom Hemojit Singh Patent Application No: 201811022094

Smartphone based blood hemoglobin estimation system. Indian Patent.

"Regioregular Conjugated Polymers Based on 3, 4-b-diheteropentalenes" Anil Kumar, Indian Patent.

"Regioregular Conjugated Copolymers Based on Thieno[3,4-b] thiophene and process for preparation of same" Anil Kumar, Indian Patent.

"Nickel (0) Catalyzed Kumada Chain Transfer Polycondensation" Anil Kumar, Indian Patent.

"A Novel Process to get highly Conducting and Highly Transparent Thin Films and its Applications as Transparent Conductor" Anil Kumar, Smita Mukherjee, Indian Patent.

"Novel Homogeneous Nickel (II) Catalyst" Anil Kumar, Indian Patent.

"Automated Clinical Microscopy by Image based Flow Cytometer for Analyzing Substances and a Method Thereof" by Sai Siva Gorthi and Veerendra Kalyan Jagannadh. Indian Provisional Patent.

"Double Quantum Well Enhancement Mode Nitride HEMT" Indian Patent.

"An Improved Molecular Beam Epitaxy Multi Chamber Cluster Tool and Processes For Integration Of Multiple Growth Combination Of Group III-V Semiconductor Heterostructures". Indian Patent.

Novel Ways of Introducing High Voltage Handling Capabilities in FinFET Technologies – US patent.

Sandwich Tunneling Barrier FET - US patent. An N-Type Tunnel-FET device with strained SiGe layer at source - Indian Patent

A sub-threshold forced plate FET sensor for sensing inertial displacement, a method and system thereof - Indian Patent

A sub-threshold elastic deflection FET sensor for sensing pressure/force, a method and system thereof- Indian Patent

5.3 Centres of Excellence

5.3.1 Nanotechnology Centres

Nanotechnology Initiatives Division at MeitY has established several Centre of Excellence in Nanotechnology to take the basic R&D outcomes to the prototype and then to manufacture Nano devices, subsystems, systems for the social benefits.

Nano Fabrication Prototyping Facility for SMEs and Start-ups in the area of Micro Electromechanical Systems (MEMS) & Nano Electromechanical Systems (NEMS) at IIT Bombay.

A National Prototype facility has been created, commissioned & fully operational to enable researchers and industrial partners/ incubator companies to fabricate and manufacture nano-scale devices. This facility aims to provide facilities for scaling up of nano-manufacturing operations in contamination and quality-controlled environments also it will be an accessible platform to bring technologies from Technology Readiness Level TRL 4 to TRL 9. Fabrication unit processes have been optimized for silicon to release diaphragms, fabrication of microcantilevers and micro-heaters.

Centre of Excellence in R&D in Theranostics Devices at IIT Guwahati

Centre of Excellence in R&D in Theranostics Devices at IIT Guwahati has been established to provide a platform for the scientific and technological developments in the NE region of the country. R&D efforts at this centre have resulted in many publications, patents, proof of concepts, prototypes, transfer of technologies and incubation of start-up based on chemical, biological, and environmental sensors, transistors and MEMS/NEMS applications.

Smart Wearable Advanced nanoSensing Technologies in Healthcare ASICs (SWASTHA) at IIT Guwahati

Aiming for the up-scaling and commercialization of the technologies developed under the Centre of Excellence in Theranostics Devices at IIT Guwahati, a project entitled “Smart Wearable Advanced nanoSensing Technologies in Healthcare ASICs (SWASTHA)” has been initiated. An array of wearable, microfluidic and

nanoelectronics technologies integrated with Application Specific Integrated Circuits (ASICs) for the detection of various diseases are being developed. In addition, a few therapeutic strategies are in process to develop a pilot-scale Primary Healthcare ecosystem which can later be scaled up based on the need of the country, especially in the North-East (NE) region of India.



5.3.2 Centre of Excellence on E-waste Management:

Centre of Excellence (CoE) on E-waste management is established at C-MET Hyderabad on public private partnership (PPP) model with funding ratio of 40:40:20 from Ministry of Electronics and Information Technology (MeitY), Government of Telangana and Private industry. The basic objective of the centre is to create physical infrastructure and cost effective recycling technologies to manage India's e-waste and thereby promote resource efficiency and circular economy in the country. Various e-waste recycling technologies and necessary processing equipment for the same are successfully developed by the centre at pilot plant scale and intellectual properties were protected by filing patents. The major areas of R&D activities under the centre include:

- Recovery of valuable metal contents from discarded lithium ion batteries (LIBs);
- Extraction of rare earth elements (REE) from spent permanent magnets;
- Recycling of spent Printed Circuit Boards for effective recovery of precious metals such as gold, silver, palladium, copper etc., and
- Recovery of valuable materials from End of Life (EoL) Silicon Solar cells.

In addition, the centre also promotes human resource development through M. Tech and PhD. Programmes on E-waste Resource Engineering and Management jointly with IIT Hyderabad.



5.3.3 CoE on Rechargeable Battery Technology (Pre-cell)

Lithium Ion batteries are ideal power source for consumer electronics, e-mobility and power sectors. These batteries are also expected to find niche applications in e-governance electronics such as VVPAT machines. Current energy storage market in India includes applications such as mobile handsets and their accessories, solar rooftop, grid solar integration, wind integration, electric vehicles, inverter back-ups, telecom, UPS, rural micro-grid and off-grid applications, diesel replacement, railways etc. India has vibrant Lead Acid battery manufacturing industry and needs to augment Li-ion battery cell manufacturing to meet current and future demands of energy storage. India primarily imports Li-ion cells and manufactures battery packs of different capacity for various applications. Government support in form of R&D funding for development of cost-effective end-to-end indigenous technology for manufacturing of rechargeable battery (Li-ion and post lithium) suited for Indian environment is vital for meeting the future demands. The support for R&D is expected to lower up-front investment cost, utilize Indian supply chain, improve profit margin and bring SMEs into play for manufacturing industrial units of rechargeable battery cell manufacturing ecosystem. In this direction, MeitY has initiated a self-

sustainable R&D centre entitled “Centre of Excellence (CoE) on Rechargeable Battery Technology (Pre-cell)” at CMET, Pune for scale up and transfer of indigenous technology on Lithium ion battery and Sodium ion battery (post lithium) to Indian SMEs for manufacturing of battery cells.

The centre provides R&D services to industry and indigenous technology solutions from material to cell manufacturing.



5.3.4 CoE on Additive Manufacturing-Optoelectronics Sector

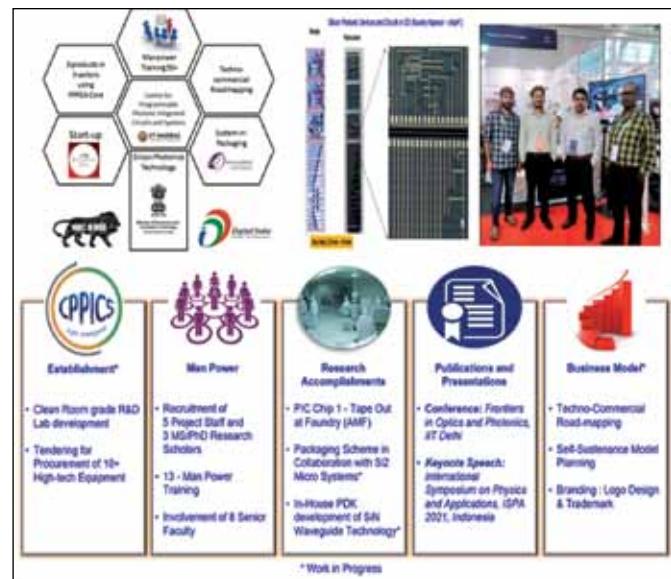
Additive Manufacturing (AM) is disruptive set of technologies which are bringing fundamental change in how manufacturing is carried out in many sectors due to its ability for mass customization. AM is enabler for digital manufacturing which has capability in producing products directly from design data by adding layers of material to obtain the final shape with minimal waste, supporting Industry 4.0. Ministry of Electronics and Information Technology (MeitY) has initiated a Centre of Excellence on Additive Manufacturing at Centre for Materials for Electronics Technology (C-MET), Pune in collaboration with Central Institute of Plastics Engineering & Technology (CIPET), Bhubaneswar. The objectives of the centre are to support Indian Additive Manufacturing Eco-system through focused and coordinated research, design and development in collaboration with 3 participating industries. The centre is expected to achieve self-sustenance and focus on developing indigenous materials and machine technologies for

electronics manufacturing sector. In current phase of the project, 4 technologies with 4 different machines, 13 materials and 4 different electronics application products are slated to be developed. The project is also bringing opportunities for Indian companies to develop their own AM material and machine technologies for global market at much reduced R&D cost for any sector (not limited to electronics) such as aerospace, medical, automotive etc. The centre is also training manpower to support growth of AM economy in India.



5.3.5 Centre for Programmable Photonic Integrated Circuit and Systems (CPPICS)

Field programmable photonic gate array (FPPGA) core technology is a multipurpose photonic processor platform which can cater to multiple sectors with multiple applications such as quantum computing, quantum communication, 5G/6G communications, IoT, radar and avionics etc. Ministry of Electronics and Information Technology (MeitY) has initiated a Centre for Programmable Photonic Integrated Circuit and Systems (CPPICS) at IIT Madras in collaboration with industry to design, manufacture and develop applications based on FPPGA cores using Silicon Photonics. The centre is slated to become self-sufficient in 5 years time, commercialize the products through Start-up and train manpower to boost the ecosystem of such manufacturing. The centre is collaborating with M/s Si2 Microsystems, Bangalore for System-in-Package solutions for the proposed silicon photonics FPPGA cores which will create commercially viable products for proposed start-up.



Currently, the centre is actively involved in photonics chip tape outs through established silicon photonics foundries, namely AMF Singapore and IMEC Belgium. The first chip has been taped out in AMF Singapore.

5.3.6 CoE on Additive Manufacturing: Medical Device Sector

Additive Manufacturing (AM) is disruptive set of technologies which are bringing fundamental change in how manufacturing is carried out in many sectors due to its ability for mass customization. AM is enabler for digital manufacturing which has capability in producing products directly from design data by adding layers of material to obtain the final shape with minimal waste, supporting Industry 4.0. Ministry of Electronics and Information Technology (MeitY) has initiated a Centre of Excellence on Additive Manufacturing at Andhra Pradesh MedTech Zone, Vishakapatnam, Andhra Pradesh which will support Medical Device Sector. The vision of the centre is to make COE at AMTZ a hub (common facility for local AM industry which will offset disabilities for competing with global peers) for medical device innovation in India by nurturing various medical device start-ups through Additive Manufacturing (AM) technology. Through this centre sustainable long-term ecosystem will be provided to start-ups and industries which will enable medical device innovation in India; build skill-sets in the AM industry, in particular AM in the medical industry to achieve competitive advantages in the global market;

promote creation of Indian IPR & facilitate IPR filing activity and offer industry, academia, global linkages to provide market access to the incubated products.



The CoE has shown good results within one year of its establishment: both in skill development and technology development. Over 364 manpower were trained in 3D printing, Medical Device Design, Prototyping and Testing in CoE AM - MDS. CoE is successful in establishing production of materials and products which earlier were under import dependency. One of the key product is UHMWPE, a novel orthoplastic engineered for its weight-bearing properties. This has been the major liner component for orthopaedic implants in hip and knee arthroplasty. The CoE also created capacities to deliver the highest quality small metal components with outstanding levels of chemistry control, strength, and density across a wide range of alloys.

5.3.7 CoE on products based on Li-ion (Post Cell):

Lack of design capability in Indian mobile handset and accessories manufacturing severely hampers domestic companies to introduce new models, customize features for the customers which leaves the market wide open to competitors having this coveted ability. India is also losing valuable foreign exchange to international design hubs in other countries. Thus for long term success of Indian electronics manufacturing, research and innovation supporting design centre needs to be

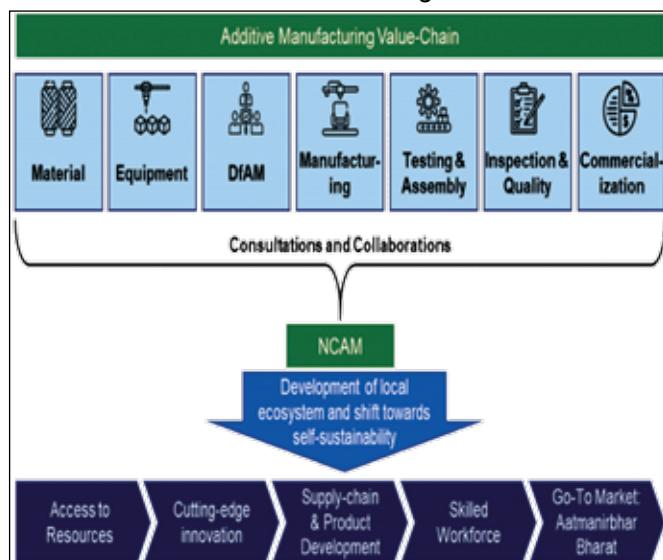
based in India. The setting of industrial parks, creation of ecosystem for electronic industries may be the only solution to reduce the import dependency. To make India self-reliant and AatmaNirbhar in this sector, a Centre of Excellence (CoE) on Post-cell value chain for power bank technology is proposed to be set up at C-DAC Noida with the requisite infrastructure, equipment, R&D facilities etc. The CoE is expected to seed a design hub for SMEs in the power bank industry and other Indian mobile handset and accessories ecosystem products based on Li-ion cells, leading to reduced foreign exchange outgo and employment generation.



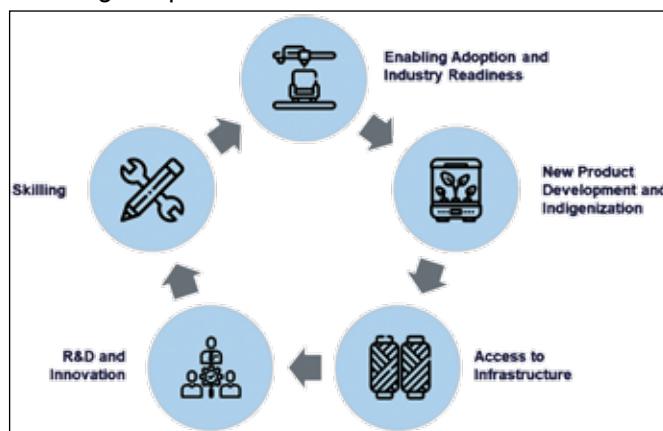
5.3.8 National Centre on Additive Manufacturing (NCAM)

Ministry of Electronics and Information Technology (MeitY) launched a strategy paper entitled "National Strategy on Additive manufacturing (AM)" for promoting various verticals of the AM sector, including machines, materials, software and designs to leverage the untapped business opportunities that will unfold in the near future. The strategy aims at promoting the creation of a conducive ecosystem for design, development and deployment, and to overcome technical and economic barriers for local manufacturers to seamlessly adopt Additive Manufacturing. This is also expected to facilitate the creation of a support base of domestic manufacturers for setting up operations with supporting ancillaries in India by foreign companies as well as Global AM leaders. The strategy on AM identified the need to establish a National Additive Manufacturing Centre to

spearhead the National Initiative for positioning India at the forefront of development and adoption of Additive Manufacturing Technologies. The “National Centre for Additive Manufacturing (NCAM)” has been initiated with Telangana State Government at Hyderabad. The NCAM is a company registered under section 8(1) of the Companies Act 2013. The vision of NCAM is to create and enable a sustainable ecosystem for product innovation in India with emphasis on research, design, development, and testing through collaborative efforts between academia, industry and government using the disruptive technology of Additive Manufacturing. It is aimed to develop a comprehensive Additive Manufacturing ecosystem in the country and position India as a Global AM Manufacturing Hub.



To achieve its mandate of developing the local ecosystem, the responsibilities of NCAM is broadly captured in the following five pillars:



Since its inception the centre has carried out the following:

Finalised the NCAM Roadmap & 5-year charter. The roadmap has been approved by the subcommittee formed by NCAM.

MOU grounding with five key industrial & academic players with clear specific objectives & outcomes. These proposals are to be discussed with ERC for further action accordingly.

Organised 4+ Expert Additive Sessions and upskilled 1000+ working professionals in partnership with AM Chronicle, HITEX, ASTM, HP & Redington.

Organised a knowledge forum on medical 3D printing opportunities in India along with Materialise NV which is the largest medical additive player in the world.

Launched National Skill Development Awareness Marathon and Training Program across 6+ cities in India to train 2500+ individuals. Three sessions have been successfully conducted in partnership with Lovely Professional University Punjab, St. Vincent Pallotti College of Engineering & Technology Nagpur and Marathwada Mitra Mandal's College of Engineering Pune

Organised Start-up as a business opportunity symposium at AMSI event in Bangalore on 15th of October 2022.

The Faculty Development Program on ‘Overview of Global Metal 3D Printing Technology, Current state in India & the Future Research Areas’ was organised in collaboration with Dayanand Sagar Institute Bangalore on the 15th of October 2022 under the AICTE ATAL Faculty Development Programme. In this event, more than 50 faculties joined.



5.3.9 National Centre for Quantum Manufacturing Technology:

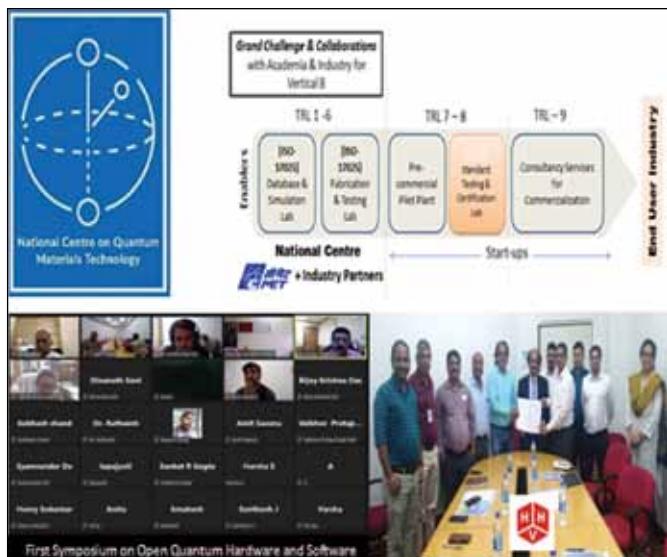
Naturally occurring quantum effects have given humanity electronics that are the basis of controls in telecommunications, media, computing, industrial automation etc which influences our daily digital lives. Engineered quantum effects are the basis of next generation Quantum Technologies (QT) and are expected to have immense impact on finance, defense, aerospace, energy, telecommunication, imaging and computing sectors in the coming decade through core technology advances of precision timing, sensors and computation. In daily life, such technologies are expected to have profound effect through 5G and 6G communications (mobiles and their cyber security) and computing requirements such as big data & supercomputing, in India. To realize the benefit of quantum technologies, India must succeed in converting its research into innovative and marketable products. In this direction, PRIME MINISTER'S SCIENCE, TECHNOLOGY AND INNOVATION ADVISORY COUNCIL (PM-STIAC) MISSIONS includes Quantum Frontier Mission which is focusing on development of quantum computers, quantum chemistry, quantum communication, new materials, quantum sensors, and quantum cryptography. The base of QTs is cost effective materials which will allow room temperature operations and miniaturization of QTs or Quantum Materials (QM). Immediate key challenges for the QMT field in India are:

- R&D Challenges: Quantum Material Technologies (QMT) needs to provide high quality, reliable and reproducible materials which can aid in high temperature operations and miniaturization for QTs with cost effective ways to manufacture. Holding key IPRs on QM and its processing technologies & machinery will be vital for creating marketable products. Sustained joint efforts of Industry and academia are much needed for success of such marketable products. QMT will require a good innovation network, supported by R&D infrastructure from TRL 1 to TRL 9, national & international collaborations which can reduce time to market for QT products. Hence, sustained Government investment and high growth rate of

industry will be required this decade and beyond to help bring QM products to global and local market.

- Manpower development: The transition of QMT into commercial products will require a new generation of quantum engineers – specialists in physics, engineering, photonics, electronics or computer science who are conversant in multi-disciplinary and systems-based approaches, possess the right entrepreneurial and business skills, and are able to adapt to new jobs and roles in the emerging industry and academia. Sustained Government and industry efforts in the development of Quantum workforce that meets the needs of future industry and academia will be vital for building a manufacturing ecosystem of QMT in India.
- Technology Roadmap: QMT is a vast field and for marketable QM Products & technologies focus needs to be maintained during R&D phase. Concentrating on material requirements for core QT fields of precision timing, sensors and computation will provide focus material development which can then be the basis for application development in the fields of finance, defence, aerospace, energy, telecommunication, imaging, cyber security and computing sectors. A persistent roadmapping activity should be part of any Government investment of QMT R&D.

To address these challenges a “National Centre for Quantum Material Technologies” [NCQMT] has been established at CMET, Pune which is expected to deliver aim of development of quantum material technology to applications and their transfer of technology to industry with market acceptable time to market. The centre is slated to encourage R&D in Quantum Technologies by assisting R&D institutes and academia through a Grand Challenge and supply of indigenous materials with in first five years (Phase I). The centre is currently establishing two ISO17025 standard labs: a) Fabrication and Testing Lab and b) Database & Simulation Lab. NCQMT has signed MOU with M/S Hind HiVacuum Company Pvt. Ltd, Bangalore with an objective to manufacture process and machines based on the India Supply Chain for the global market.

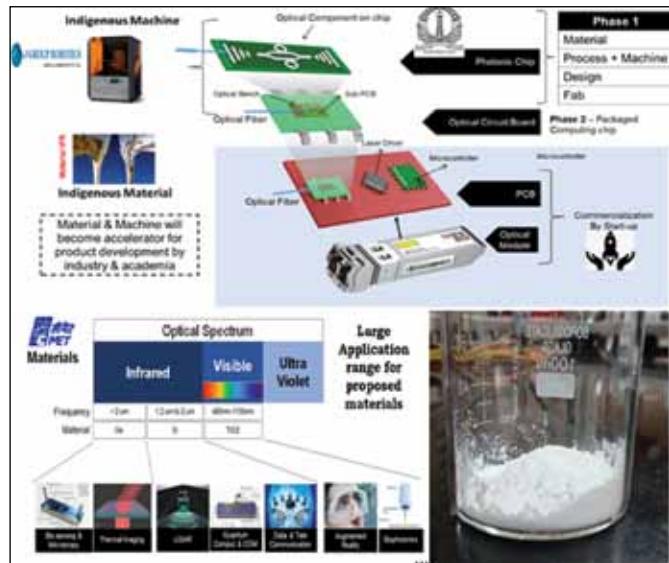


5.3.10 Centre for Promotion of Additive Manufacturing: Optical Computing Chips

Optical computational chips and photonic devices finds application in various fields of technologies such as communication, computation, healthcare, automation, sensor and defence. However, although they have shown plethora of applications, their industrial viability is mainly limited by their fabrication process which involves presence of foundries, numerous process-equipments and steps. In recent years, Additive Manufacturing (AM) processes are bringing fundamental change in how manufacturing is carried out in many sectors due to its ability for scalable, cost effective and sustainable fabrication process. AM is an enabler for digital manufacturing which has capability in producing products directly from design data by adding layers of material to obtain the final shape with minimal wastage. The Ministry of Electronics and Information Technology (MeitY) has initiated a centre on Additive Manufacturing based Cost Effective Optical Computing Chips at Indian Institute of Science, Bangalore (IISc) in collaboration with Centre for Materials for Electronics Technology (C-MET), Pune.

The objective of the centre is to design and fabricate global state of the art 3D printer to achieve sub-micron resolution, indigenous materials for printing and to design and fabricate optical devices for computation. The centre is expected to achieve self-sustenance and focus on developing indigenous materials and

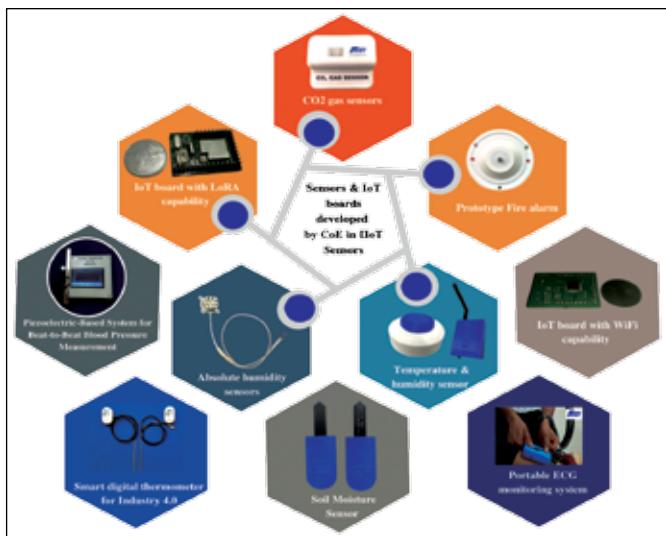
machine technologies for photonics manufacturing sector. The centre is also bringing opportunities for Indian companies to develop their own AM material and machine technologies for global market at much reduced R&D cost for any sector (not limited to photonics) such as aerospace, medical, automotive etc. The centre is also going to train manpower to support growth of AM economy in India.



5.3.11 Centre of Excellence (CoE) in Intelligent Internet of Things (IIoT) Sensors

Centre of Excellence (CoE) in Intelligent IoT Sensors is being established at Centre for Materials for Electronics Technology (C-MET), Thrissur in collaboration with Indian Institute of Information Technology & Management Kerala (IIITM-K). The main objective of CoE is to establish state-of-the-art facilities for sensor manufacturing, intelligent sensor system hardware, AI software development etc. The entre will host an incubation facility for startups in IIoT sensors and promote innovation and entrepreneurship through grand challenges.

A spectrum of IoT products were developed under the centre and are ready for commercialization. Indigenous technology for the development of chip thermistors and chip thermal sensor was transferred to M/s Thermosen Technologies Pvt. Ltd, Bangalore based on the technology developed at C-MET. The grand challenges were floated in the domains of Disaster Management, Robotics & automation and Smart cities



5.3.12 India Innovation Centre for Graphene

The India Innovation Centre for Graphene (IICG) is being implemented at Centre for Materials for Electronics Technology (C-MET), Thrissur in collaboration with Digital University Kerala (DUK) and Tata Steel Limited (TSL). The centre is financially supported by MeitY, Government of Kerala, TSL and industries. IICG is envisioned to investigate the science and technology of graphene and other 2D materials. This centre envisages partnering effectively with industrial-academic activities to promote innovative and adventurous research emphasizing applications. IICG will attract internationally leading research on graphene into India and bridge the gap between scientific development and industrial applications of graphene in our Nation. The institute is under the process of creating class 100 clean room facilities and sophisticated equipments to promote research in alignment with industry requirements.



5.3.13 Centre of innovation & a Manufacturing Ecosystem for Sensors (CIMES) in Industrial IoT

CGCRI Kolkata is implementing a proposal on Establishment of a Centre of Innovation & a Manufacturing EcoSystem for Sensors (CIMES) in Industrial IoT" to promote start-ups/entrepreneur Industry 4.0 in the country. The proposal aims to create Innovative IoT sensors for industrial applications, promote manufacturing ecosystem through a business incubation, commercialization sensors technologies in structural & geo-technical instrumentation areas. Output & Outcome includes a sustainable R&D & manufacturing support to industries working in geotechnical & structural instrumentation & structural health monitoring for industrial IoT. End-to-end solution from materials, technologies, system design, packaging, strategy for field deployment, Creation of start-ups/SMEs with a synergy of Govt. of West Bengal's technology/manufacturing hub & also other states, Services to industries on creation & maintenance of mega civil eng. infrastructure, mining safety, railway infrastructure & automation, Creation of State of art testing lab for standards, certification for components, systems for revenue generation, Creating 500 skilled manpower for relevant industries are other highlights.

Major outcomes also include an incubator facility with > 10 entrepreneurs, Grand Challenge for > 10 products targeted for industrial IoT domain, Creation of > 2 local IPs/ annum to reduce the import burden, Launching of > 5 products, ToT > 10 commercialization ready products to industry, Ensuring self-sustenance through financial contribution from industry, the start-ups and institution in strategic sector in the area of specialty sensors, turnkey project implementation.

Major industry commitment obtained from in the project are from NTPC, BHEL, TATA Steel, L&T, Hindustan Zinc Ltd, Safety & Disaster Mngt Dep. Govt. of WB, ISRO, DRDO. The project has been supported by West Bengal Electronics Industry Development Corporation Limited (WBIDCL) and Indian Institute of Management Calcutta Innovation Park (IIMCIP).



5.3.14 Content on 'Startups Innovation & IPR' Division for Annual Report 2022-23

India has evolved as the 3rd largest startup ecosystem in the world with more than 80,000 startups operating in the country and 107 unicorns with a total valuation of \$ 340.79 Bn. Notwithstanding the raging global pandemic economic duress and other equally precarious challenges, the tech startup and the entrepreneurial ecosystem in the country have shown exemplary resilience and willingness to go beyond the norm. India now also boasts more than 3,000 deep-tech start-ups operating in different segments of emerging technology areas.

Most of these new start-ups have taken up the cudgels for solving myriad problems ranging from governance to education, agriculture to healthcare in the country. Backed by robust efficiencies in the backend and exploiting cutting edge emerging digital technologies such as AI, IoT, Data analytics, machine learning augmented and virtual reality, advanced automation, robotics and mobility among others, these startups are creating new benchmarks for themselves and for the world.

Startups do not exist in a vacuum but are part of a broader business environment. The Startups Innovation and IPR Division of MeitY has unleashed a slew of initiatives for the benefit of technology startups dealing in IT/ITeS and Electronics domains. These initiatives range from Technology Incubation Development for Entrepreneurs (TIDE 2.0) Scheme, domain specific Centres of Excellence (CoEs), SIPEIT for supporting filing of IPRs, SASACT for promoting Covid based innovative solutions are implemented through a clutch of innovation entities such as tech incubators, CoEs, academic institutions,

MeitY's autonomous organizations etc for benefitting startups and MSMEs. Some of the recent initiatives have been elucidated here

GENESIS (Gen-Next Support for Innovative Startups):

MeitY has recently launched an umbrella program GENESIS (Gen-Next Support for Innovative Startups) for the next 5 years to discover, support, grow and make successful startups in Tier-II and Tier-III cities with emphasis on collaborative engagement among startups, government and corporates for promoting digitization based on the principals of inclusivity, accessibility, affordability, leading to growth in employment and economic outputs. GENESIS envisages further scaling up and sustaining the tech ecosystem especially to discover, support, grow and make successful startups. The platform envisages impacting and consolidating 10,000+ tech start-ups over the course of the next 5 years to pave the road for a more equal startup ecosystem, one that evenly represents the aspirations of our ambitious entrepreneurs for inclusive techno-socio-economic development of the country.



MeitY Start-up Hub (MSH): To give wings to MeitY's vision of promoting technology innovation, start-ups and creation of Intellectual Properties, a nodal entity called MeitY Start-up Hub (MSH) has been setup under its aegis. MSH is a dynamic, singular and collaborative platform for tech startup community towards building meaningful synergies in the Indian startup space. MSH's quick value additions to domestic tech startups in terms of improving scalability, market outreach and domestic value addition and setting up innovative partnerships with various stakeholders has been a key differentiator

in MSH's efforts to catapult the tech startup ecosystem in the country. MSH also has a mandate for capacity building of different tech incubation centres pan India, capitalizing on strengths of different centers to pull out moderately weaker centres into mainstream activity. MSH is acting as a hub and ensuring synergies among all the TIDE 2.0 Centres, theme based incubation centres, domain specific Centre of Excellences on Emerging Technologies and other existing platforms for facilitating criss-crossing of technology resources, sharing best practices and ideas across the entire gamut of innovation and startup ecosystem. Today MSH with an aggregation of over 3000 startups, close to 500 around 450 mentors, 22 state of the art domain specific CoEs is ably nurturing MeitY's fledgling tech startup ecosystem. With a rapidly evolving ecosystem of its own MSH has been instituting "Challenges" to identify and award potential disruptive technologies and seeding the tech ecosystem. Till December 2022, MSH has undertaken close to 150 challenges in association with public and private entities for startups to make real world impact with fresh solutions to complex business and societal problems.

TIDE 2.0 Scheme: 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. The Scheme will be 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 organizations, eventually leading to handholding of approximately 2000 tech start-ups over a period of five years. Towards this end TIDE 2.0 has been able to provision an empowering mechanism to establish necessary collaboration among the different actors of tech startup ecosystem to grow and benefit them through complementary strengths. As of now 51 TIDE 2.0 Incubation Centres have been approved and made operational. Under the scheme, a total of 530+ startups have been supported out of this, 220+ were supported with 'EiRs', nearly 210 were provided with 'Grants' while 116 were provided investment support. Upto December 2022, As of now, 650 start-ups engagement activities have been conducted including 60

hackathons, 10 challenge grants, 50 Deep and 230 Low Engagement Programmes and 200 thematic workshops for startups.

Scheme for Accelerating Startups around Post COVID Technology Opportunities (SASACT): MeitY has launched SASACT (Scheme for Accelerating Start-ups Around post-COVID Technology) programme to support electronics hardware/ ICT based tech entrepreneurial initiatives of startups for developing or re-purposing technologies, tools, systems, solutions to respond to the post COVID-19 scenario emerging in the near horizon. Under the programme, eligible startups are being supported to augment and deploy into the market select technology products/ solutions in a span of 11 months. The objective of the medium term scheme is to support electronics hardware/ ICT based tech entrepreneurial initiatives of startups for developing or re-purposing technologies, tools, systems, solutions to respond to the scenario emerging in the near horizon in the aftermath of the pandemic. Immediate action areas are identified as smart/digital manufacturing including 3D printing, safety equipment, Medtech, Edtech, WFH solutions, fintech and the likes. The SASACT programme are being executed by four Implementing Agencies (IAs) pan India for maximum coverage viz. 'Foundation for Innovation and Research in Science and Technology (Start up Incubation and Innovation Centre SIIC), IIT Kanpur'; 'Society for Innovation & Entrepreneurship (SINE), IIT Bombay'; 'Coimbatore Innovation and Business Incubator (Forge Accelerator), Coimbatore' and 'KIIT Technology Business Incubator, KIIT University, Bhubaneswar' through STPI. Under the scheme, the call for proposal for inviting applications for SASACT Scheme was launched and subsequently, 40 proposals from startups have been supported to augment the technology solutions repurposing post covid.

Domain specific Centres of Excellence (CoEs): To improve and transform innovation-led ecosystems in the country MeitY in partnership with various stakeholders has opened a clutch of domain specific Centres of Excellence (CoE) in order to create cohesive technology solutions built around the emerging technologies and support the next wave of budding entrepreneurs pan India. A brief of such initiatives are put forth below :

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 proposed 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 Bhubaneswar by STPI: MeitY has approved ESDM Incubation Centre with the objective of creating a holistic ecosystem to promote ESDM innovation, R&D and create Indian intellectual property in the Eastern Region of the country. The centre will be operated through STPI, Odisha in collaboration with Government of Odisha, IIIT Bhubaneswar and IESA. It aims to leverage 40 start-ups over the period of 5 years. This ecosystem is necessary to develop, promote, incubate, mentor and create breakthrough innovations towards development of product and IP creation in the ESDM sector.

Centre of Excellence (CoE) on Medi-Electronics & Health Informatics at Lucknow : MeitY has initiated a Centre of Excellence (CoE) on Medi-Electronics & Health Informatics at Lucknow to stimulate the establishment and growth of technology-based start-ups in the field of medical electronics and health informatics by providing the necessary infrastructure, mentoring, marketing,

funding and ecosystem required for their success and growth. The Medi-Electronics & Health Informatics CoE is being setup at SGPGI, Lucknow with Department of IT and Electronics, UP Govt. as funding partner, AiMED as industry partner, AMTZ as industry and seed funding partner and Kalam Institute of Health Technology as academic partner. The project aims to support 50 start-ups over a period of 5 years.

Theme based Incubation Centres: With an aim to support the economic development of local region through supporting start-ups and businesses that will lead to creation of a more vibrant local entrepreneurial ecosystem, theme-based incubation centres under the aegis of MeitY has been setup across India. MeitY has initiated the following state of the art Theme based Incubation Centres:

Establishment of Incubator for Electronics Start-ups in Delhi-NCR (Electropreneur Park): The Electropreneur Park established in collaboration with Software Technology Parks of India (STPI), India Electronics & 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, the Electropreneur Park has supported 51 startups till date out of which 42 startups were incubated physically while 9 were incubated virtually. Till date, 28 startups have graduated out with 17 in the revenue generating phase. As an outcome, 43 new products, 33 working prototypes have been developed, 51 patents filed out of which 8 patents granted, 66.3 Cr VC/Grants/CSR received by the onboard startups and 558 number of employment generated by the 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 is completed. Testing and Equipment / IOT, Robotics Lab and Prototyping Room for SMT Assembly Line completed. As an outcome, 137 startups are incubated in the IC out of which 55

startups have reached productisation stage, 52 startups graduated, 84 products and 32 working prototypes generated, 68 Patents filed out of which 13 patents granted in addition 34 copyrights and 27 trademarks registered, 42 companies has got its 1st order, 702 employment generated and 63.4 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. Till date, 72 start-ups have been supported out of which 33 startups are on-board at present including 14 in healthcare and 19 in ESDM sector. As on date, 20 patents have been filed by the startups out of which 5 patents were granted, 22 products and 17 working prototypes have been developed and 150+ employments were generated by the startups excluding their founders.

Support for International Patent Protection in E&IT (SIP-EIT) Scheme for SMEs: Ministry of Electronics & Information Technology (MeitY) had initiated a scheme titled "Support for International Patent Protection in E&IT (SIP-EIT)" that encourages international patent filing by Indian MSMEs and start-ups so as to encourage innovation and recognize the value and capabilities of global IP. Reimbursement provided under the scheme is upto a maximum of Rs.15 lakhs per invention or 50% of the total expenses incurred in filing and processing of patent application upto grant whichever is lesser. A significant component of the SIP-EIT scheme is to provide financial support to academic institutions, industry bodies and MeitY's autonomous societies for conducting IPR awareness workshops pan India in ICT domain which aims to sensitize about Intellectual Property Rights and their protection among various stake holders consisting of students of engineering colleges, academia, startup community and business fraternity

As of now more than 70 applications from startups, MSMEs have been approved for reimbursement and over 80 IPR workshops supported across India under the SIPEIT scheme.

5.4 Cyber Security R&D

Cyber Security is one of major initiatives identified for securing cyber space. R&D in Cyber Security focusses on promotion of applied research in addition to futuristic and blue sky research in the thrust areas of Emerging technologies - 5G, IoT, Data Science, mobile device security, SCADA security, end point security, network and system security, cryptography and cryptanalysis, cyber forensics, threat intelligence and AI based threat modelling.

Grants-In-Aid support is extended to research institutions & academia to promote R&D infrastructure creation, capacity building and enhancement of skills and expertise, specific efforts are made to nurture institutions and capacity enhancement in the entire country with extra efforts for capacity building in the North East Region.

Cyber Security Projects

During the year 2022-23, R&D efforts were continued and strengthened. New projects have been initiated which includes: (i) Centre on Hardware Security: Hardware Security Entrepreneurship Research & Development (HERD), (ii) Centre for Advanced Security Technology development in Cyber Physical Systems, (iii) Cyber-security Risk Management Frameworks through Cyber Insurance, (iv) Initiative for Cyber Security Aware Society in NE States.

The R&D projects funded have resulted in the development of indigenous security solutions which are deployed at user organisations. A few significant outcomes are:

National Centre of Excellence (NCoE) in Cyber Security

National CoE, a joint initiative of the Data Security Council of India and the Ministry of Electronics and IT, had undertaken a range of actions to create an ecosystem for cyber security technology development and product entrepreneurship. It has incubated 32 early-stage startups developing cutting-edge security solutions in the area, such as network security, cryptography, security operations technologies, cloud security, authentication, threat intelligence, vulnerability management, and privacy-enhancing technologies. The National CoE also

supports 100+ lateral stage cyber security start-ups and has undertaken various initiatives to create a robust Indian cyber security technology industry.

The CoE is equipped with technology lab infrastructure to help start-ups in augmenting their technology stack. With the help of mentors from the industry, the CoE is intervening to accelerate the growth of start-ups. The CoE is closely working with leading institutions to promote collaboration among industry, start-ups, and academia. It organises Security Investors' Conference, Security Education, Research, Innovation Conference, and Cyber Security R&D Roadshow to promote research and entrepreneurship. It encourages women entrepreneurship in the niche cyber security area.

The National CoE is running a crypto innovation series to promote research and innovation in cryptology. It has hosted Light Weight Crypto Challenge with the R C Bose Centre of Cryptology and Cyber Security, ISI Kolkata. The National CoE's 5G security initiative selected eight ideas for the acceleration.

Centre on Hardware Security: Hardware-Security Entrepreneurship Research & Development (HERD)

This project is an idea of bringing together researchers and the industry body focussed on cyber security to promote research & develop entrepreneurial momentum in hardware security. In association with leading hardware security institution, IIT Kharagpur and emerging institution in the field IIT Madras, Data Security Council of India, which is creating a national ecosystem for cyber security research and entrepreneurship through National CoE, have submitted this joint proposal for "Secure Hardware Research and Entrepreneurship". IIT Kharagpur, IIT Madras, and DSCI believe the goal of making India the leading nation in hardware security, both in research and entrepreneurship, can be achieved by pursuing the following objectives:

(i) Promotion of Hardware Security Research: Set up a well-devised research agenda in hardware security focussing on contemporary and emerging challenges. Promote hardware security research and ensure concerted efforts for measured and visible progress in the research work.

- (ii) Productisation and Commercialisation of Research IPs:** Create market-ready IPs in hardware security, focussing on productisation and commercialisation of research work. Run a focussed incubation and acceleration program for start-up activities in hardware security. Develop market and investment ecosystem industry adoption and innovation growth.
- (iii) Pool of Hardware Security Researchers:** Develop a pool of resources for hardware security research and product development. Attract minds of engineering students challenges of hardware security.
- (iv) Support to Hardware System Assurance Efforts:** Develop formal methods, tools, and utilities assessing the security and trustworthiness of hardware/cyber systems. Support hardware and embedded assurance efforts with them.
- (v) Methods and utilities for Supply Chain Security:** Close observations on the hardware components, their role in the supply chains, investigate them for security threats, devise utilities for helping assess their security, and evolve methods for managing the risks emanating from them.
- (vi) Sectoral Hardware Security:** Examine hardware and embedded systems deployed in the industry verticals and undertake experimental evaluation/assessment exercises. Develop test cases for testing, carry vulnerability research, and help in devising hardening guidelines.
- (vii) Enterprise Systems for Managing Hardware Security Risks:** Explore ways, methods, and techniques for enterprise systems to manage hardware-level threats on a real-time and continual basis.



Centre for Advanced Security Technology Development in Cyber Physical Systems

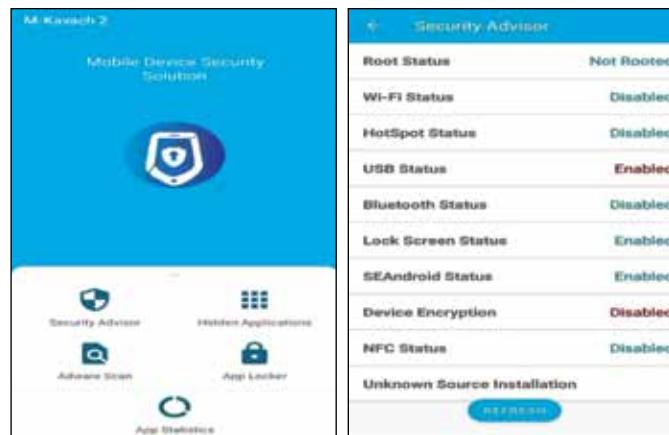
This project will develop expertise, train manpower, and provide technical know-how to various agencies about securing Cyber Physical Systems (CPS). In particular, three areas of CPS will be targeted for specific implementations of (i) Water Distribution Networks with focus on security of PLCs and SCADA, (ii) Vehicular traffic and Vehicular networks with focus on security of the inter and intra- vehicular communications and (iii) Multi-agent systems with focus on swarms of robots, UAV's and their applications in disaster management.

Cyber-security Risk Management Frameworks Through Cyber insurance

The prime deliverables and outcomes of the project are to develop a model as proposed for cyber risk assessment, develop artificial intelligence based models for cyber risk assessment, mitigation and quantification along algorithms. The best model under the given scenarios will be developed & tested and fine tuning of the algorithms will be done to create a software that will be able to (i) assess the cyber-risk management (CRA), (ii) quantify cyber-risk (CRQ), and (iii) mitigate the cyber-risk (CRM) arising due to the attacks on MMOG, banking and crowd sourcing platforms. The model will be helpful to cyber-risk insurance firms to develop the products for online firms. Training will be imparted on the model, as developed to Chief Security officers of firms, internal community members of IIM Lucknow.

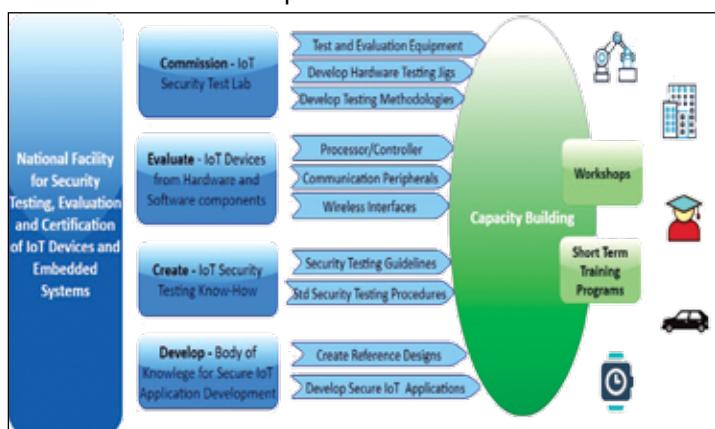
Design & Development of a Mobile Device Security Solution addressing emerging threats

The major efforts in this project is towards design & development of a mobile device security solution addressing emerging mobile device security threats. The mobile app is named 'M-Kavach 2' and is hosted on Google PlayStore. Currently, features supported are: (a) App Locker: (i) This Feature is used to lock installed Applications on the Device, (ii) It prevents unauthorized access. (iii) It protects Social Media Applications; (b) Hidden Apps: This feature helps users to view hidden Apps installed on the Device; (c) Security Advisor: (i) Check Root Status: Shows the Device is Rooted Or Not. (ii) Wi-fi Status: Show Connected Wi-Fi is secure or not. (iii) HotSpot Status: Shows hotspot is enabled or not.



Establishment of a National Facility for Security Testing, Evaluation and Certification of IoT Devices & Embedded Systems leading to Security Assurance

Evaluating the security from an embedded system perspective is of utmost importance and should be undertaken at the device level, as well as, end-to-end system level, to ensure comprehensive security. As part of this initiative, a National Facility for Testing, Evaluation and Certification of IoT Devices and Embedded Systems will be developed, commissioned, and operationalized by CDAC Hyderabad, and STQC, New Delhi for grading and certification of IoT devices and Embedded Systems. The know-how and expertise for performing the security testing of various aspects of IoT devices and Embedded Systems will be developed and established as procedures that can be used to evaluate the security of consumer electronic (CE) devices. Moreover, efforts will be made towards evolving National standards for Security Testing of IoT devices and Embedded Systems and Security by Design. The acquired knowledge would be shared using Hands-on Workshops.



Efforts / activities in North Eastern (NE) States

Ministry of Electronics and Information Technology (MeitY), Govt. of India has taken initiative as per NE Vision 2022, with the broad vision of providing cyber-crime investigation skills effectively. Major project in NE states are:

Initiative for Cyber Security Aware Society in NE States



Cross Platform Mobile Application developed to initiate cyber security aware society

The prime objectives of the project is to raise comprehensive complete awareness about risks in cyber space targeting different sections of society by designing and conducting audience specific campaigns to create impact, so that people before connecting to online world understand the risk and vulnerabilities in cyber space; and would be in a position to make an informed choice, promoting the use of cyber security resources and tools

for carrying out a number of awareness programs with the aim to encourage participation in cyber security focussed activities in each district of the three states, viz. Nagaland, Mizoram and Sikkim and the development of “Cybersmart Citizen” and “Stay Smart online” campaigns catering to different sections of the society. The segments targeted would include general public (SHG/ NGOs/ CSC/ VLEs/ ASHA workers etc.), students, undergraduate student, young professionals, including elderly citizens, government employees and SMEs.

Development of Cyber Forensic Training cum Investigation Labs in North-Eastern States and Cloud based Centralized Cyber Forensics Lab Infrastructure

The prime objective of the project is to (i) Setup Cyber Forensics Training cum Investigation Labs in 8 NIELIT Centre of 8 North Eastern states, (ii) Capacity building of various stakeholders of criminal justice system like Police officers, Prosecutors, Judges, Investigation Officers of all LEAs etc. in each of the 8 NE states, (iii) Develop resource portal with Dash board along with e-learning methodologies over cloud, and creation of MIS based facility for courseware dissemination, information exchange, resource persons/ organizations for sharing of expertise among the eight NE states.



Glimpses of Cyber Forensic Labs created at the NIELIT Centers

5.5 Societal Reach R&D

5.5.1 Medical Tools, Equipment and Software

Design and Development of 1.5 Tesla Magnetic Resonance Imaging (MRI) Systems: The objective of the proposed project is to design, develop and test an indigenous 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. Indigenous sub-systems such as 16kW RF amplifier, Spectrometer, RF Coils, Couch and Pulse Sequence, Software's – Image visualization and construction have been developed successfully & integrated with the procured GE magnet and first set of images obtained for various fruits, phantoms, and dead animals like frog with GRE sequence with head coil and Integration of all sub-systems with Gradient Amplifier and GE Magnet have been completed and it has been tested successfully with GRE pulse sequence. Software for image reconstruction and visualization have also been developed and integrated. Images have been obtained. The entire integrated indigenous system except the magnet is now ready for animal trials which will commence soon.

High energy 30 MeV linear accelerator (LINAC):

The objective of the project is to design & develop a 30MeV electron Linear Accelerator with 5-10kW beam power. The proposed LINAC will generate Medical isotopes (Molybdenum -99) which will be used to elute radioisotope Technetium (Tc-99m). It is envisioned that the High Energy Linear Accelerator (HEL) to be housed at INMAS would produce Mo99, which would then be transported to hospitals for medical diagnostics, industrial applications or for non-destructive testing in strategic sector. The advantages will be production of isotopes without involving hazardous, explosive or fissile materials, almost no nuclear waste and with normalized capital costs. Various sub systems have been designed, fabricated and tested. Integration of the High Energy LINAC system at INMAS is expected by Aug 2023.

Development of Low-Cost Automated Screening System for Cervical Cancer (CerviSCAN-II):

The project targets the development of indigenous Artificial Intelligence (AI) based technology for cost effective, affordable and automated screening for cervical cancer. The development of a complete ecosystem for screening of cervical cancer includes Cyto-Centrifuge, Automated Slide Stainer, Slide Digitizer and AI assisted system for cervical cancer screening has been completed.

Cerviscan product suite automates the screening workflow right from preparation of cervical smear to

AI assisted diagnosis. CerviSCAN suite of products reduces screening cost by 1/5th and improves the screening efficiency of human experts by 8 times and makes screening of cervical cancer practical in India and also for other countries. Systems developed as part of the project were installed at four collaborating institutes. A total of 9367 slides were collected as part of this project. Technology is available with CDAC-Trivandrum for Transfer of Technology (ToT).

CoLOSENS: An Affordable Colorimetric Diagnostic Instrument and Field Validation at Imphal, North-East India:CoLOSENS is being implemented by C-DAC, Kolkata in collaboration with RIMS, Imphal. It aims to develop an innovative affordable diagnostics system for diarrhea towards an on-site multi-plate reader system for clinical samples in health monitoring. Enzymatic and aptamer-based approaches have been explored towards the development of sensing receptors. CDAC, Kolkata developed a suitable aptamer for Escherichia coli detection. The interim working setup of the prototype based on the colorimetric technique has been deployed at RIMS, Imphal and ICH, Kolkata. A microfluidics-based approach has been considered for exploration for further miniaturization of the developed colorimetric platform, which is ongoing at present.

A mobile-based handheld miniaturized prototype development with specialized chips for experimentation and data collection. with a clear vision of miniaturization and field portability with cost-effective diarrhea prognosis



Figure: Mobile-based handheld prototype

Artificial Intelligence in Oncology: Harnessing big data and advanced computing to provide personalized diagnosis and treatment for Cancer patients: The objective is to establish the methodology for early detection of the India centric cancer by interrogating the medical and non-medical data sets using AI technology

(e.g. Machine and Deep-learning) and develop the algorithms that predicts the patient prognosis leveraging the available outcome data. Data collection at AIIMS, New Delhi has been initiated with the patients of breast cancer and ovarian cancer. Hosting of front end website application with WebAPI on the AIIMS server is in process with CDAC developed AI model.

Digitally Connected Tribal Colonies (DCTC): The project envisages the development and deployment of technology solutions to screen highly prevalent Non Communicable Diseases (NCD) including Oral & Cervical cancer, Diabetic Retinopathy and other retinal diseases. The project also intends to build ICT Infrastructure to digitally connect the tribal colonies in the Wayanad District of Kerala for delivering the healthcare & education services with the financial and administrative support from Scheduled Tribes Development Department, Govt. of Kerala. The project also intends to build a robotics system for slide digitization & development of indigenized Fundus cameras. 1st Prototype of Fundus camera and AI for Microscopy & Funduscopy is ready. Annotation collection and AI performance improvement in progress.

C-DAC has developed AI framework and algorithms for early detection of Cervical & Oral Cancer from pap smear images and Eye Diseases from retinal images, where the validation with more samples are in progress. Project ToT discussions are also in progress with the Industry partners who shown interest for Slide digitizer/fundus camera.

Design and Development of Ultrasonic Transducer Probes for Medical Imaging: The objective of the project is the development of transducer probes for ultrasound sound machines used for medical imaging. These transducer probes would be compatible with the Color Doppler Ultrasound machine prototype developed by NIELIT, Calicut. The developed ultrasound Probe will be clinically tried and validated. All functional layers, viz., piezo layer, matching layer and backing layer, fabricated and bonded together under optimized curing and stacking conditions. A single element prototype transducer was developed.

Self contained X-ray blood irradiator system: The project aims to replace high activity radioactive sources that could pose a risk with non-radioisotope based technologies. Radioisotope disposal is also becoming

a big challenge throughout the world. Advanced nations have already migrated to these systems. The project is being implemented by SAMEER, Mumbai. The development of X-ray based systems to replace the current Cesium-137 or Cobalt-60 based Blood irradiation system will have a significant role in national requirements once the product is developed.

Design & Development of EEG Based Real-Time Depth of Anaesthesia (DoA) Monitoring System: The project aims to develop a machine learning model which will be trained using a locally compiled clinical database of Electroencephalogram (EEG) recordings. Since, the proposed DoA monitor will work on a large amount of EEG recordings as well as on the patient specific data, it will improve the accuracy of the DoA estimation without any restrictions on the type of anesthetic drug used or the patient's age. The machine learning model will then be realized on Field Programmable Gate Array (FPGA) to validate the software simulation results on hardware. The proposed DoA system will be an indigenous EEG based Real-Time Depth of Anesthesia Monitoring System. Development of the preliminary Machine Learning Model for DOA Estimation is started with online available data from open source.

Development of focused Compact Microwave Hyperthermia Applicator for small cancerous tumors: The project aims to develop microwave-based hyperthermia therapeutic system with multidimensional tumor models for accurately predicting the temperature distribution in biological tissue with machine learning based thermal dose calculator for effective hyperthermia treatment. The project is just initiated.

Setting up of Medical Electronics Laboratory for Calibration and Maintenance of Medical Electronics Devices & Equipment.: The aim of the project is to set up a Medical Electronics Laboratory at NRTC, Parwanoo to facilitate the hospitals, clinical laboratories, medical institutes and manufacturers of medical devices at Himachal Pradesh and nearby region and to generate skilled manpower by providing training to youth of the state for maintenance of medical electronics equipment. The project is just initiated.

Ministry of Electronics and IT (MeitY), Govt. of India had sponsored the project of indigenous development of Color Doppler Ultrasound scanner with PNNDT

Compliance. NIELIT Calicut has developed various subsystems and lab model prototype of the machine with Prenatal Diagnostic Technique (PNDT) Compliance. The indigenous ultrasound scanner will be a boon for rural India and would be affordable to primarily health centers and Govt. hospitals across the country. NIELIT Calicut has signed the Transfer of Technology agreement with Jupiter Design Technologies, Bangalore for commercialization of indigenous technologies developed under the MeitY funded project.



5.5.2 Agriculture

5.5.2.1 Development and deployment of Knowledge based Integrated Sustainable Agriculture Food Network (KISAN) cloud using Electronic Soil Nutrients Analyser (ESNA)

This project has been initiated under special budget provision made for ST community for development and deployment of soil tester, skill development and entrepreneurship creation. Online web framework for the registration and training of students has been completed. Entrepreneurship Training of the students/locals is under process. Prototype development of ESNA kit for the identified soil parameter is under process.

5.5.2.2 Development of IoT and Drone based Agricultural Monitoring System with Objective of Skill Development of Deprived Community

The project has been initiated under special budget provision made for SC community for development and deployment of IoT and drone based agriculture with Madan Mohan Malviya University of Technology (MMUT) in the area of IoT and Drone. Training has been imparted to a total of 400 students of deprived communities. Some of them have been placed in the related area. Also two start-ups of deprived community students

have emerged from this project. A total of 10 drones including 02 Agricultural Spraying drones of 10 Litre, 01 agricultural drones of 05 Litre and other surveillance drones and data collection drones have been deployed. AI controlled drones have been designed and surface level modeling has been used for class A surfacing in the drones. The drones have been designed with structural analysis for strength for tomato disease detection, crop prediction system based on machine learning and weed identification system therefore, reducing the cost of labor charge and increasing the quality of soil. Consecutively, 6-week summer training focused on this project, has been provided to students about drone design, Internet of Things on Drones, Artificial Intelligence and Machine learning.

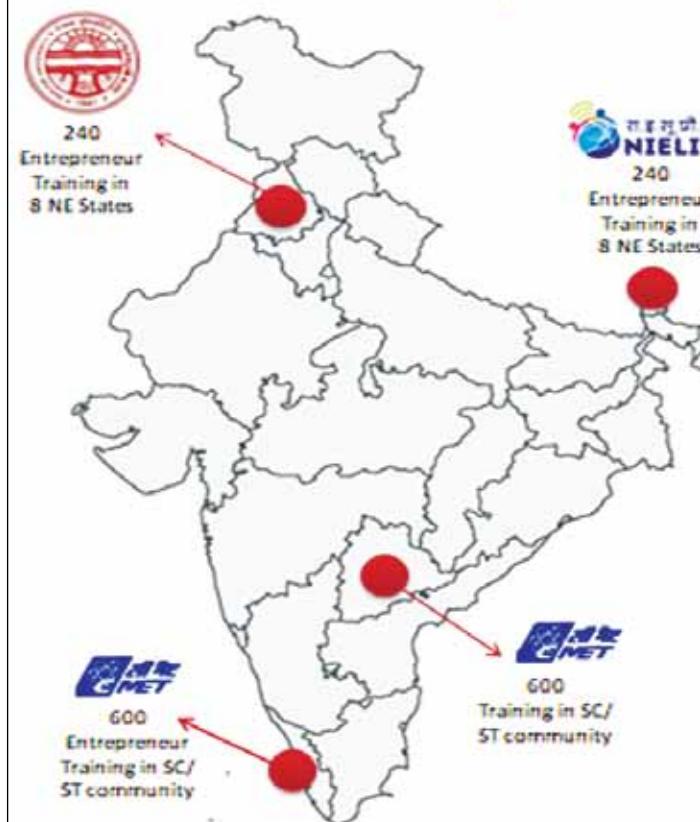


Agricultural Spraying drone, surveillance drone and Agro sensing display and unit

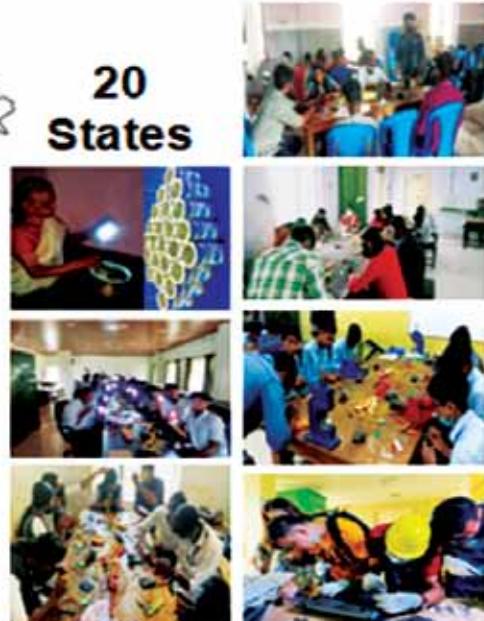
5.5.3 Training Programmes for Scheduled Caste & Schedule Tribe Communities and North East Communities of India:

EMDP programme has been building knowledge on electronics manufacturing for last several decades and as part of its outreach for weaker sections of the societies EMDP has initiated several projects on manpower training among SC/ST and NE communities. These projects are supporting entrepreneurship programmes in the areas of super capacitor based solar lanterns which can be charged in minutes, digital thermometer based on indigenous sensors, and E-waste management. Additionally, training for RoHS laboratory manpower has been initiated. In total, the outreach is for 16,440 citizens in 20 States. State governments are also taking active participation in these projects through State Pollution Control Boards (SPCB) and Institute of Human Resource Development (IHRD). Many batches of entrepreneurship programmes have passed out.

Skill and Entrepreneurship Development



20 States



Electronics Knowledge Helping to build Skills and Business among weaker sections of society

5.5.4 Healthcare

Centre of Excellence at IIT Guwahati has resulted in a Nanotechnology based multi diagnostic kit magic box later renamed as 'mobilab' for providing healthcare parameters such as pancreatic amylase, albumin & creatinine ratio etc. by using a single drop of blood at an affordable low cost.



5.5.5 Societal Miscellaneous Initiatives

5.5.5.1 Collaborative Intelligent Transportation Systems Endeavour for Indian Cities

The indigenous technology/product development in the areas of Intelligent Transportation System (ITS) has been started on the project. The major component of ITS

covered for investigation include the Traffic Simulator, Integrated 3D Driving Simulator, Development of V2X for Better Mobility, Data-driven Models and Decision Support Tools for Advanced Public Transportation Systems (APTS) in Indian Cities, Smart Vision Sensors for Industrial and Road traffic applications, Command, Control and Management Software for Intelligent Transportation Systems (ITS) with Common Service Layer based on Global Protocol, Bus Priority System at

Signalized Intersection and Promotion of Road Safety through Deployment of Driver Assistance and Warning system etc. Under the Project On-board driver assistance and warning system (ODAWS), P Personalized Transit Route Guidance System PTRGS) application, Operational Strategies for Headway Reliability (OSHR), Industrial Smart Camera, Smart Traffic Camera and Driver Simulator with real time traffic has been developed and under lab testing.

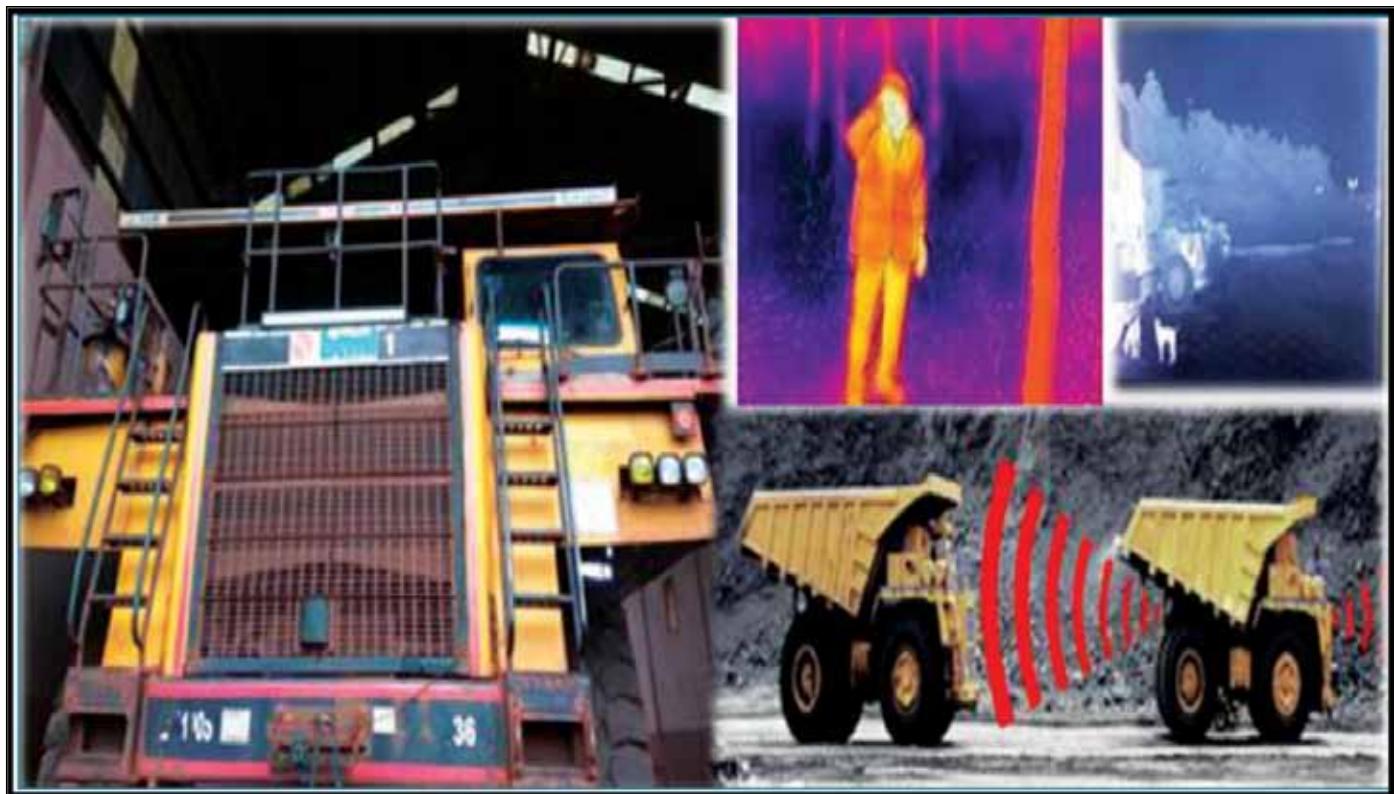


On-board driver assistance and warning system (ODAWS)

5.5.5.2 Development of Vision Enhancement System for Foggy Weather

The Vision Enhancement system will help to reduce the shut-down period in open-cast mines. Under the projects different sub-system that consist of thermal Imaging, Image Processing, Proximity Radar, Anti Collision Laser, Roof & Bumper mounted Fog Lamps,

GPS (Global Positioning System), Adjustable side operated IR cameras, High Intensity LED Rear Lights, Electromagnetic Parking Sensors, Retro reflective LED vest, Helmet mounted thermal camera etc. has been developed and fine-tuned as per the Mine environment. The field testing of the complete system is progressing at Bacheli Mines of Chhattisgarh.



Design and Development of a Microwave Based Compact Cost Effective Brix Meter for the Sugar Industry

The scope of the project includes the design and development of a BRIX meter with an accuracy of $\pm 0.2\%$ Brix. Brix is defined as the percentage of sucrose by weight in a solution. Continuous Brix measurement is required over the entire crystallization process. Brix measurement results in good process control which ultimately leads to the production of high-quality sugar. The Brix measurement is based on microwave measurement technology. The sucrose concentration in the sugar syrup can therefore be determined by measuring the phase shift and/or attenuation compared to that of a reference signal path. Design and development of 5.8 GHz slim antenna/probe for Brix measurement and a 2-way power divider, 90-degree hybrid coupler, bandpass filter, an isolated and compact sensor at 5.8 GHz were developed.

Design and deployment of IoT based Hydroponics System for Agri-research in North East Region BY CDAC-Mohali

The objectives of the project is to design, development and installation of the customized hydro feeding system along with electronic monitoring of all crucial parameters. The application of the developed system may enable research and plant growth studies to evolve suitable practices for local conditions/ priority.

Tea Harvesting Unmanned Robotic Platform For Northeast Indian Tea Plantation (Tulip)

The project is being implemented in a collaborative manner with CDAC-Kolkata as nodal agency and TTRA-Jorhat, Jadavpur University and CIAE-Bhopal as participating agencies. The prime focus of the project is development of low cost Robotic harvester for small and medium scale Tea gardens with the features like selective plucking etc. The project started recently.

Autonomous Bathymetric Survey Vessel (ABSV) for Advanced Glacier Lake Profiling

A project on Design and Development of an Autonomous bathymetric survey vessel for reservoir and glacier lake profiling has been initiated recently through CDAC-Thiruvananthapuram.



Internet Governance and Security of Cyber Space

6.1 Internet Governance Overview:

Internet Governance, broadly defined, is the development and application by Governments, the 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 IP addressing, Domain Name System (DNS), Routing, Technical Innovations, Standardization, Security, Public Policy, Privacy, Legal Issues, Cyber Norms, issues pertaining to Intellectual Properties and taxation.

Achievements:

Some of the significant achievements of MeitY includes 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) promotion of Multistakeholder model of Internet Governance in India etc.

Engagement in International Forums/ Meetings:

IGF- The Internet Governance Forum: Serves to bring people together from various stakeholder groups as equals, in discussions 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, multi-lateral and bi-lateral meetings. With the renewal of its mandate by United Nations in December 2015, the IGF consolidates itself as platform, to bring people together from various stakeholders' groups as equals. While there is no negotiated outcome, the IGF informs and inspires those with policy making power in both the public and private sector 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.

Shri Alkesh Kumar Sharma, Secretary MeitY has been appointed to the inaugural Internet Governance Forum (IGF) Leadership Panel on 16 August 2022, to serve a two-year term during the 2022–23 IGF cycles. The United Nations Secretary-General has established the IGF Leadership Panel as a strategic, empowered, and multi-stakeholder body, to address strategic and urgent issues, and to highlight Forum discussions and possible follow-up actions, in order to promote greater impact and dissemination of IGF discussions.

Engagement with Internet Corporation for Assigned Names & Numbers (ICANN):

MeitY is actively involved with the activity of ICANN and participates in its proceedings through Government Advisory Committee (GAC) and other public engagement fora. The GAC's key role is to advise ICANN on issues of public policy and especially where there may be an interaction between ICANN's activities or policies and national laws of international agreements.

Additional Secretary, Meity, GoI is currently GAC representative from India. He has been appointed as GAC Vice-Chair for the term starting from March 2022 till March 2023. As Vice-Chair, his responsibilities include closely working together with the Chair in matters relating to the GAC functions and operations.

India Internet Governance Forum 2022 (IIGF 2022):

India Internet Governance Forum (IIGF) is a multi-stakeholder forum wherein representatives from various internet stakeholder groups convene together to discuss public policy issues pertaining to the Internet. It plays a pivotal role in representing Indian interests at the larger International policy and stakeholder discussions. This is a national initiative of the United Nations Internet Governance Forum. The second iteration of India Internet Governance Forum was held from 9th– 11th December 2022, in hybrid/online format. The overall theme for IIGF2022 was “Leveraging Techade for Empowering Bharat”.

Multi-stakeholder consultations:

India supports multi-stakeholder model of Internet Governance, which would involve all stakeholders and helps to preserve the character of the internet as unified, dynamic engine for innovation and which encourage equity and innovation.

Promotion of Universal Acceptance:

MeitY is Working towards the implementation of a multilingual internet to enable all Indians to connect to and use the internet by ensuring that Internet domain names in languages other than English (Hindi, Marathi etc.) can be issued and used by all Internet enabled applications, devices and systems. .Bharat (Internationalized Domain Name) is now available in 10 scripts covering 22 scheduled languages of India. With the launch of .Bharat, end users may book domain names in all scheduled Indian languages.

The Research, Development and awareness agenda under Internet Governance:

Various projects have been initiated to have evidence-based research which will build capacity for India's participation in multiple international fora and also strengthening domestic policy related to internet. The projects would lead India to become a model Centre and provide thought leadership in DNS and DNS security

related technologies, conducting high-end research in DNS Security, building internal competencies in DNS Security by offering advanced training programs and establish a test-bed of DNS for research and training. The outcomes of the projects in IG would enable meaningful and sustained engagement in internet governance institutions (International) and processes with particular focus on the Internet Corporation for Assigned Names and Numbers (ICANN), Internet Engineering Task Force (IETF) etc.

Projects under Internet Governance Division:

Advanced Internet Operations Research in India (AIORI) by Software Technology Parks of India (STPI): Project seeks to improve the security, stability, and understanding of the Internet's DNS infrastructure in India by advanced Internet Operations research and it plans to do so by:

- Building relationships among its community of members and facilitate an environment where information can be shared confidentially.
- Enabling knowledge transfer by organizing workshop.
- Research with operational relevance through data collection and analysis.
- Increasing awareness of the DNS's significance.
- Offer useful, publicly available tools and services.

IG SIM- Internet Governance Structured Implementation Module by C-DAC, Delhi: The objective of the project & envisages, providing technical and policy support to conduct of research, training workshops and preparation of white paper, technology reports on various Internet Governance policy and Technology related issues. This will include providing ongoing implementation support to IG related activities of the Government of India, Ministry of Electronics and Information Technology (MeitY) and review the global Internet policy and Technology landscape and provide assistant w.r.t. structured implementation on matters related to Internet Governance, taking into account rapid technical developments and dynamically changing needs.

Centre of Excellence in DNS Security by C-DAC, Bangalore (Funded by NIXI): Objectives of the project are:

- To become a model Centre and provide through leadership in DNS and DNS security related technologies

- To conduct high-end research in DNS Security
- To build internal competencies in DNS Security by offering advanced training programs.
- Establish a test-bed of DNS for research and training

6.2 National Internet Exchange of India (NIXI)

NIXI is a not for profit organization set up under section 25 of the Companies Act, 1956 (now section 8 under Companies Act, 2013) for peering of ISPs 212 Annual Report 2022-23 Ministry of Electronics & Information Technology Internet Governance and Security of Cyber Space among themselves and routing the domestic traffic within the country, with seed funding from Department of Information Technology. NIXI is performing the following three activities.

- Internet Exchange
- .IN Registry and Internationalized Domain Names (IDNs)
- National Internet Registry (NIR)

When the COVID-19 pandemic hit at the turn of 2020-21, it challenged the foundations of social and economic norms around the world. Global and Indian economy faced huge and unprecedented test of resilience, vigor and capabilities.

Pandemic led to the demand shock both through disruptions in the labour market, affected household income not only due to lockdown but also from the uncertainty amidst health crises. Although services sector and production section were hit hardest, India's agricultural remained the silver lining and have been recovering steadily. Government consumption and net exports have cushioned the growth diving further down. Government of India launched major structural reforms in agriculture markets, labour laws and various financial schemes were introduced for MSMEs.

NIXI is committed to environmental sustainability, ecological balance, conservation of natural resources, maintaining quality of air, water and soil. NIXI has taken several innovative initiatives to improve the quality and delivery of internet and broadband services. Introduction of CDNs in Internet Exchange, connecting node like Mumbai to Hyderabad has shown a surge in interest of ISPs towards NIXI. ccTLD domain (.IN) registered as one of the fastest growing domain in Asia Pacific Region

with a growth of more than 24%. NIXI has started offering a bundled service of e-mail and website along with .IN domain to the end customer. Introduction of innovative initiatives like NIXI Academy, NIXI IP Guru and IP Index have shown an extraordinary interest of Affiliates not only to join in large number but also to uptake IPv6 from IPv4. All these efforts are going to prove beneficial and catalysts in the development of nation's 'Digital Economy' in the future.

Internet Exchange:

Forty-two Internet Exchange Nodes are functional at Delhi, Noida, Navi Mumbai, Mumbai, Chennai – 02 nodes, Kolkata, Bengaluru, Hyderabad, Ahmedabad, Guwahati and recently open 07 new locations in Uttar Pradesh. The Internet Exchange nodes have been successful in ensuring peering of ISPs among themselves for the purpose of routing the domestic traffic within the country, instead of taking it 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 1.1 Tbps.

Recently NIXI has introduced bilateral peering along with existing multilateral peering. CDNs are allowed to connect at NIXI exchange points free of cost (zero port charges). Once CDNs are onboard more and more ISPs shall connect at Exchange points.

All functional NIXI nodes are IPv6 ready. NIXI also undertakes training and workshop for Network managers and other Technical engineers in cooperation with Asia Pacific Network Information Centre (APNIC). NIXI has also prepared an audio-visual comparison of IPv6 with IPv4 and launched it on various social media platforms. NIXI has also hired a training agency for providing training on IPv6 fundamentals by way of video recordings.

.IN Registry and Internationalized Domain Names (IDNs): Since 2005, NIXI also manages the .IN Registry (www.registry.in). At present, 175 Registrars have been accredited to offer .IN domain Name registration worldwide to customers. This has Ministry of Electronics & Information Technology Annual Report 2021-22 213 Internet Governance and Security of Cyber Space helped proliferation of web hosting in the country and promotion of Indian language content on the Internet. Over 31 lakhs .IN Domain names have been registered till 30th November 2022.

IDN's in all 22 official languages are launched and over 16,000 IDNs domain names have been registered till date. Following schemes are launched to ensure adoption of IDN domains and inclusive growth of internet in India: -

- Bundled free email with every .Bharat domain
- Free IDN with every .IN

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 30th November 2022 total 4,440 affiliates have joined IRINN. NIXI has delegated over 12 billion IPv6 and over 11.6 million IPv4 addresses till date.

CSR Policy and projects or Programmes

NIXI's CSR Policy intends to:

- Improve quality of life of communities through long-term value creation for all stakeholders
- Strive for economic development by protecting and promoting the interest of the Internet users around the country specifically in the rural areas.

In pursuance to the Companies Act, 2013, NIXI'S CSR activities amongst others, will focus on Education and training and Rural Development Projects. The policy can be accessed at http://nixi.in/images/CSR_Policy.pdf.

The CSR expenditure for 2021-2022 were in the following areas:

- Purchase of medical equipment for medical center of Rs. 29.13 Lakh.
- Promoting Vocational Education by providing training to women.
- Charitable work related to Covid 19 Pandemics by Spreading awareness for Vaccination Drive
- Promoting healthcare by promoting training School
- Transfer to PM Cares Rs. 68 Lakhs.

6.3 Security of Cyber Space:

Cyberspace refers to the virtual computer world and more specifically, is an electronic medium used to form a global computer network to facilitate online communication and dissemination of information. It is a complex environment of people, software, hardware, and internet. Today,

cyberspace is the common platform being used by citizens, civil society, businesses and Governments for messaging, communication, and dissemination of information online, e-services, e-transaction, etc. As the cyberspace is virtual, borderless and offers complete anonymity, attacks can be launched from anywhere in the world with limited possibility of traceback and positive attribution. Emerging technologies such as Internet of Things (IoT), Machine Learning (ML), Artificial Intelligence (AI), 5G, etc., are going to add various connected devices in cyberspace in near future. Cyberspace has been facing many security challenges due to emerging cyber threats and its widespread use for social media and e-transactions. During COVID-19 pandemic, there have been sudden increase in cyber incidents and it is still continuing as cyber space is being used for variety of services such as eGovernance, online banking, telemedicine, e-commerce, online learning, entertainment, etc. The number of cyber incidents is increasing year after year.

Government of India has taken several legal, technical, and administrative policy measures for addressing Cyber Security challenges in the country. This includes National Cyber Security Policy (2013), framework for enhancing Cyber Security (2013), enactment of Information Technology (IT) Act, 2000 and 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, Cyber Security Research & Development (R&D) and Capacity Building in Cyber Security.

6.3.1 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 & 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 secured computing environment and enabling adequate trust and confidence in electronic transactions and guiding stakeholders' actions for protection of cyber space. Considering the developments in cyber technology, delivery of services through cyber space and the changing nature

of cyber threats over the years, Government of India has formulated the National Cyber Security Strategy (NCSS) 2021, which will enhance the objective and implementation of National Cyber Security Policy. The NCSS 2021 is under the process of approval.

6.3.2 Cyber Surakshit Bharat

The “Cyber Surakshit Bharat” (CSB) programme was initiated in partnership with industry consortium in Public-Private Partnership (PPP) mode with the objective to educate & enable the Chief Information Security Officers (CISOs) & 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 and knowledge partners. So far, total of 31 batches of deep dive training have been conducted including both in physical and online modes. Around 1266 CISOs/IT officials from Government, PSUs, banks, and Government organisations have been trained up-to September 2022.

6.3.3 Grand Challenge for Start-ups

To promote innovation and entrepreneurship spirit in the country, Cyber Security Grand Challenge for Start-ups was launched on 15th January 2020 Data Security Council of India (DSCI) was the implementing agency for cyber security grand challenge.

After the completion of process of development of solutions on the given problem statements, Hon'ble MEIT and Hon'ble MoS felicitated the winners of the Cyber Security Grand Challenge on 18th November 2021. The winners of the Grand Challenge were awarded with a trophy each and cash prize money of Rupees One Crore to the winner, Rs. 60 lakhs to the first runner-up and Rs. 40 lakhs to the second runner-up.

Based on the success of Grand Challenge version 1.0, process has been initiated for launch of Cyber Security Grand Challenge (CSGC) ver 2.0. A proposal has been received from DSC to implement CSGC 2.0 and it has been processed by cyber security division.

6.3.4 Notification for Preferential Market Access for Cyber Security Products

In furtherance of the Public Procurement (Preference to Make in India) Order 2017, notified by the Department

for Promotion of Industry and Internal Trade (DPIIT) (erstwhile 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.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 6th December 2019 for promoting indigenous Cyber Security products giving details of (a) indicative categories of cyber security products and (b) a format for self-declaration regarding ‘local supplier’. A revision in the order for Public Procurement (Preference to Make in India) Order 2019 for cyber security products is under process in line with the DPIIT order no. P-45021/2/2017-PP(BE-II) dated 16.09.2020.

6.3.5 Online Cyber Security Training of officials of Government of India

MeitY initiated two types of Cyber Security training courses for officials of Central Government Ministries/ Departments to create awareness about cyber security in Government employees:

Online Generic Training in Cyber Security (Awareness training) of about 6-8 hrs duration for all the officers/staff of Government of India

Online Foundation Training (Advance Level) in cyber security for technically qualified or with requisite aptitude in Cyber Security/IT.

40 batches of Generic (Awareness) level training have been conducted till October 2022 in which 10,700 officials have been trained. Also, 11 batches of Foundation (Advanced) level training have been conducted in which 656 officials have been trained.

6.3.6 Notification of Forensic Labs as ‘Examiner of Electronic Evidence’ under Section 79A of the Information Technology Act, 2000

Section 79A of the Information Technology Act, 2000 mandates the Central Government to notify Examiner of Electronic Evidence for the purpose of providing expert opinion on electronic form evidence before any court or other authority. For identification and selection of Examiner of Electronic Evidence, Ministry of Electronics

& Information Technology (MeitY) has designed and developed a scheme, initially to access and notify Examiner of Electronic Evidence on the pilot basis. Till now, twelve Cyber Forensics Labs have been notified by MeitY.

6.3.7 Cyber Law

MeitY is the custodian of Information Technology Act, 2000 ("IT Act") which is a principal Act governing the entire cyberspace in India. The IT Act was last amended in the year 2008. The comprehensive legal framework of the IT Act, 2000 and its amendment provides for:

- i. Enabling regime for legal recognition of – E-Commerce, E-Governance, Electronic Records & transactions, E-Signature
- ii. Controller of Certifying Authority (CCA)
- iii. Adjudication and Appellate mechanism for cyber contraventions
- iv. Cyber Crimes with criminal punishment/ penalties provided (vis-à-vis physical crimes under IPC). These include- effective deterrence provisions (Sections 43, 43A, 65, 66, 66B, 66C, 66D, 66E, 66F, 67, 67A, 67B, 70, 72 & 72A) in terms of compensation/ penalty and punishment to deal with cybercrimes such as tampering with computer source documents, 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, unauthorized access to protected system, breach of confidentiality and privacy, breach of lawful contract etc.
- v. Internet-enabled businesses ('intermediaries') including Social media platforms and mobile applications: Intermediary Rules
- vi. Cyber Security through institutional framework of CERT-In, NCIIPC. It covers- Collection and sharing of information related to cyber incidents (Sections 69B & 70B) for effective proactive/reactive actions by CERT-In and investigative actions by law enforcement agencies; Protection of critical information infrastructure (Section 70A)
- vii. Blocking of information from public access under section 69A and the rules thereunder in specific conditions, only in the interest of (i) sovereignty and

integrity of India, (ii) defence of India, (iii) security of the State, (iv) friendly relations with foreign States or (v) public order or (vi) for preventing incitement to the commission of any cognizable offence relating to above.

- viii. Privacy & security of data related issues (section 43A) (limited to Sensitive Personal Information) and Breach of lawful contract (section 72A)-

Prescription and implementation of security best practices and guidelines to prevent occurrence and recurrence of security incidents (Section 43A & 70B)

Section 43A of the Act provides for the right of individual regarding protection of sensitive personal data or information and also compensation to be paid to the affected users in case of unauthorized access of information and leakage of sensitive personal information (including financial information such as Bank account or credit card or debit card or other payment instrument details) respectively. Section 43A also provides for the due diligence to be followed by the online platforms (body corporate) and are prescribed in the Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data and Information) Rules, 2011 ("SPDI Rules"). The SPDI Rules mandate that body corporate including social media platforms must provide policy for privacy and disclosure of such information, so that user is well aware of the type of personal data collected, purpose of collection and usage of such information. The rules also specify mode of collection of information, disclosure of information, transfer of information, etc. Also, section 72A of the IT Act provides for punishment for disclosure of information in breach of the lawful contract.

- ix. Takedown / removal of any information appearing on intermediary platforms which are violative of any law for the time being in force by the appropriate Government or its agency under section 79(3)(b).

Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Amendment Rules, 2022:

MeitY has notified the Information Technology (Intermediary Guidelines and Digital Media Ethics Code)

Amendment Rules, 2022 (herein after referred to as "IT Rules amendment, 2022") on 28th October, 2022 by amending the Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021 ("IT Rules, 2021"). The said notification may be accessed at the following link:

https://www.meity.gov.in/writereaddata/files/Gazette%20notification_IT%20Rules%20Amendment%202022_28Oct2022.pdf

While ensuring an Open, Safe & Trusted and Accountable Internet for all Indian Internet Users and Digital Nagriks, the amended IT rules 2022 will provide additional avenues for grievance redressal apart from Courts and also ensure that the Constitutional rights of Indian citizens are not contravened by any social media Platform by ensuring new accountability standards for SSMIs.

Part II of the IT Rules, 2021 provide for robust grievance redressal mechanism with details of Grievance Officers to be published on the concerned intermediary platforms including significant social media intermediaries (SSMIs). Accordingly, for intermediaries, the Grievance Officer shall acknowledge the complaint and dispose off such complaint, whereas for SSMIs, the residential Grievance Officer shall enable the complainant to track the status of such complaint and provide such complainant with reasons for any action taken or not taken by such intermediary in pursuance of the complaint or grievance received by it.

Government has been receiving complaints regarding the decision taken by the Grievance officer of the Intermediaries on removal of content posted by the users / suspension of accounts of users. Therefore, to address concerns towards rights of users (right to free speech and privacy as enshrined in the constitution) and accountability of the intermediaries and in order to have an option/right to appeal by the Digital Nakrik against the decision by the Grievance Officer or resident Grievance Officer of the respective platform, Grievance Appellate Committee (GAC) is introduced to ensure effective grievance redressal mechanism which will allow users to appeal against the decision of the Grievance Officer.

As stated in the rule, GAC (one or multiple) shall consist of a chairperson and two whole time members

appointed by the Central Government, of which one shall be a member ex-officio and two shall be independent members and the GAC functions in digital mode. The Grievance Appellate Committee will become operational within three months from the date of commencement of the IT Rules (Amendment) 2022 i.e. from the 29th January, 2022.

Amendment to the First Schedule of the IT Act, 2000:

Putting the interests of Digital Nagriks at first, a need had emerged to review the restrictions imposed by the entries in First Schedule of the IT Act holistically for ease of Digital Document Execution (DDE), Ease of Doing Business (EoDB), Ease of Living (EOL) for citizens while ensuring necessary safeguards. Accordingly, after necessary Inter-ministerial stakeholder consultation MeitY has notified the amendment to the First Schedule vide notification no. SO 4720(E), dated 26.9.2022, published in the Gazette of India Extraordinary dated 4.10.2022, vide which the said Schedule has been amended against the Entries 1, 2 and 5 as under:

"In the said Schedule,—

for serial number 1 and the entries relating thereto, the following serial number and entries shall be substituted, namely:—

"1. A negotiable instrument (other than a cheque, a Demand Promissory Note or a Bill of Exchange issued in favour of or endorsed by an entity regulated by the Reserve Bank of India, National Housing Bank, Securities and Exchange Board of India, Insurance Regulatory and Development Authority of India and Pension Fund Regulatory and Development Authority) as defined in section 13 of the Negotiable Instrument Act, 1881 (26 of 1881).";

in the entries relating to serial number 2, after the words, figures and brackets "the Powers-of-Attorney Act, 1882 (7 of 1882)", the words "but excluding those power-of-attorney that empower an entity regulated by the Reserve Bank of India, National Housing Bank, Securities and Exchange Board of India, Insurance Regulatory and Development Authority of India and Pension Fund Regulatory and Development Authority to act for, on behalf of, and in the name of the person executing them." shall be inserted;

Serial number 5 and the entries relating thereto shall be omitted.”.

It may be noted that while the said amendment is an enabling provision, the specific safeguards, manner & procedures along with mode of execution are to be governed by the respective Central/ State Departments or their agencies. The said notification for amending the First Schedule of the IT Act may be accessed at the following link:

https://upload.indiacode.nic.in/showfile?actid=AC_CEN_45_76_00001_200021_1517807324077&type=notification&filename=notification.pdf

6.3.8 Indian Computer Emergency Response Team (CERT-In)

The Indian Computer Emergency Response Team (CERT-In) is a Government 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 websites (<https://www.cert-in.org.in> and <https://www.csk.gov.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 2022-September 2022 comprised of the following:

Activities	Numbers (April 2022 to October 2022)
Incidents handled	7,95,939
Security Alerts	389
Advisories	21
Vulnerability Notes	252
Trainings	18
International cyber security drills/exercises	5
Domestic Cyber security drills/exercises	8

Cyber Security Assurance

Under Security Assurance Framework, Indian Computer Emergency Response Team (CERT-In) has created a panel of ‘IT security auditing organizations’ for auditing, including vulnerability assessment and penetration testing of computer systems, networks & applications of various organizations of the Government, critical infrastructure organizations and those in other sectors of Indian economy. CERT-In has empaneled 150 Information Security Auditing organizations, on the basis of stringent qualifying criteria, to carry out information security audit, including the vulnerability assessment and penetration test of the networked infrastructure of government and critical sector organizations. This list of CERT-In empanelled auditing organizations is being consulted frequently by the entities in Government and critical sectors for their auditing requirements. CERT-In also completed technical skills re-verification of already empanelled auditing organizations.

Cyber Crisis Management Plan

CERT-In, MeitY has formulated Cyber Crisis Management Plan (CCMP) 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, CERT-In has developed “Guidance Framework for CCMP” which may be used as a template by various entities including Central Government Ministries/Departments/States/UTs and entities under their administrative control to prepare & implement their own CCMP. 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 10 workshops from April- 2022 to mid-October 2022 to appraise various organizations under the Central Ministries/States/UTs about the implementation of CCMP and cybersecurity best practices and all necessary assistance is being provided to them with regard to implementation of CCMP. Till date, 143 CCMP enabling workshops have been conducted.

Cyber Security Exercises

Cybersecurity exercise is an effective tool to help entities in assessing cybersecurity preparedness to counter cyber-threats and building cyber-resiliency. CERT-In regularly conduct Cyber Security Exercises for critical sector organizations.

a) Table Top exercises

- (i) Exercise "Synergy"- Table Top Exercise "Synergy" was successfully conducted in collaboration with Cyber Security Agency of Singapore (CSA) on 31st August 2022 for 13 countries as part of International Counter Ransomware Initiative. The theme of the exercise was "Building network resiliency to counter ransomware attacks". The exercise was hosted by CERT-In on its exercise simulation platform
- (ii) Table top exercise "Phis-X" was conducted for officials of Ministry of External Affairs on 07th October 2022. The theme of the exercise was "Countering Phishing Attack".

Till date, CERT-In has conducted 74 Cyber-security exercises of different complexities, including table top exercises, with participation from about 990 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.

b) Sectoral Cyber Security Drills

- (i) CERT-In along with RBI (College of Agriculture Banking) conducted a joint exercise for Urban Co-operative banks on 23rd June 2022. The theme of the exercise was "Incident Response and Cyber Security", 31 Urban Co-operative banks participated in the exercise.

- (ii) CERT-In in collaboration with Institute of Development and Research in Banking Technology (IDRBT) successfully conducted two Cyber security Drills on 28th June 2022 & 22nd September 2022, respectively. 41 participants from 20 different banks participated in these events.

- (iii) CERT-In along with RBI conducted joint exercise for finance sector entities on 11th October 2022, Officials from 13 different banks participated in the event.

c) International Cyber Security Exercises

- (i) CERT-In participated in the APCERT Annual drill 2022 held on 25th August 2022. The objective of the drill was to test the response capability of leading Computer Security Incident Response Teams (CSIRTs) within the Asia Pacific economies. The theme of this year's APCERT Drill was "Data breach through security malpractice". CERT-In also acted as exercise coordinator (EXCON) for international CERTs in the Drill.
- (ii) CERT-In participated in Africa CERT Cyber Security Drill 2022 conducted on 08th and 09th September 2022. The exercise comprised of 04 challenge-based scenarios like Phishing, Incident Response, Malware Analysis, Reverse Engineering and Forensic Analysis.

International Cooperation and Collaboration

Memorandum of Understanding (MoU)/Memorandum of Cooperation (MoC)

Strengthening cooperation with all stakeholders to effectively deal with cyber security issues has been one of the main focus areas of the Government. As such, this aspect is being dealt with by way of security cooperation arrangements in the form of Memorandum of Understanding (MoU)/Memorandum of Cooperation (MoC)/Program of Cooperation (PoC) 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 cyber security incidents.

Currently, the Indian Computer Emergency Response Team (CERT-In) has 11 active Bilateral agreements in the form of MoU / MoC / PoC in cyber security with counterpart agencies in Bangladesh, Brazil, France, Israel, Japan, Maldives, Nigeria, Singapore, South Korea, Uzbekistan, and Viet Nam.

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. To deal with the complex, sophisticated cyber-attacks, sharing and exchange of threat intelligence, CERT-In partnered with cyber security organizations from industry for collaboration in the area of cyber security with CISCO India Pvt. Ltd, CloudSEK, Quick Heal, Information Sharing and Analysis Centre (ISAC), Microsoft, MicroWorld Technologies, K7 Computing, Kaspersky and Redinent Innovations Pvt. Ltd.

CERT-In in Multilateral forums

CERT-In is an Operational Member of Asia Pacific Computer Emergency Response Teams (APCERT). APCERT is a regional forum to ensure Internet security in Asia Pacific region.

CERT-In is a full member of Forum of Incident Response and Security Teams (FIRST). FIRST is a global forum for cyber security teams around the globe.

CERT-In is Accredited Member of Task Force for Computer Security Incident Response Teams / Trusted Introducer (TF-CSIRT/TI) from 13th September 2022. TI-CSIRT was established by the European CERT community in 2000 to address common needs and build a service infrastructure providing vital support for all security and incident response teams.

CERT-In leverages these forums for timely resolution of cross border related Cyber security incidents affecting Indian cyber space

Working Groups

CERT-In is the convener of “IoT Security working group”

across APCERT. The first report of the “IoT Security” working groups was completed and circulated to the APCERT operational members and partners in 2021. CERT-In is currently working to release the second draft of the Working Group.

CERT-In is also member of various other working groups under APCERT such as Information sharing working group, Drill working group, Malware Mitigation working group, Tsubame working group and Training Working Group.

CVE Numbering Authority (CNA)

CERT-In has been undertaking responsible vulnerability disclosure and coordination for vulnerabilities reported to CERT-In since its inception. To move a step further in the direction to strengthen trust in “Make in India” as well as to nurture responsible vulnerability research in the country, CERT-In has partnered with the CVE Program, MITRE Corporation, USA. In this regard, Indian Computer Emergency Response Team (CERT-In) has been authorized by the CVE Program, as a CVE Numbering Authority (CNA) for vulnerabilities impacting all products designed, developed and manufactured in India since October 2021.

CVE is an international, community-based effort and relies on the community to discover vulnerabilities. The vulnerabilities are discovered then assigned and published to the CVE List by organizations from around the world that have partnered with the CVE Program. CVE Program Partners publish CVE Records to communicate consistent descriptions of vulnerabilities. Information technology and cybersecurity professionals use CVE Records to ensure they are discussing the same issue, and to coordinate their efforts to prioritize and address the vulnerabilities.

CNAs are organizations responsible for the regular assignment of CVE IDs to vulnerabilities, and for creating and publishing information about the vulnerability in the associated CVE Records within their own specific scopes of coverage. The CVE List is built by CVE Numbering Authorities (CNAs). Every CVE Record added to the list is assigned by a CNA. The CVE Records published in the catalog enable program stakeholders to rapidly discover and correlate vulnerability information used to protect systems against attacks.

Sectoral CERTs and State CSIRTs

Under Sub-section (IV), clause (e) of the National Cyber Security Policy, 2013 proposed to create mechanisms for Security threat early warning, vulnerability management and response to security threats, CERT-In functions as the umbrella organization in enabling creation and operationalization of Sectoral and State CSIRTs as well as facilitating communication and coordination actions in dealing with cyber crisis situations.

CERT-In operates as a nodal agency for coordination of all efforts for cyber security emergency response and crisis management. CERT-In is issuing the necessary guidelines for setting up of sectoral CSIRTs and state CSIRTs.

CERT-In facilitated officials from Power sector CSIRT to attend Industrial Control Systems Joint Working Group (ICSJWG) to facilitate information sharing and reducing the risk to Industrial Control Systems, organized by Cyber security and Infrastructure Security Agency (CISA), USA during September 2022

CERT-In is sending out fortnightly report on vulnerable services and botnet infections through its Cyber Swachhta Kendra (Botnet Cleaning and Malware Analysis Centre) to sectoral CSIRTs, Ministry of Power and other stakeholders in Power sector.

CSIRT-Fin

CSIRT-Fin under CERT-In has been assigned the responsibility for coordinating and supporting the response to a computer security event or incident within the financial sector constituency. CSIRT-Fin is the incident response force which focuses on mitigation processes, providing on-site awareness, expertise, and recovery oversight.

The snapshot of activities performed by CSIRT-Fin this year, is as follows:

Handling of security incidents in collaboration with CERT-In which included security incidents related to vulnerable services, botnets, open services and phishing incidents. Entities have also been onboarded to CERT-In's Cyber Swachhta Kendra (CSK) for providing automated feeds regarding malware infections, botnets and vulnerable services

Issuing of vulnerability notes and virus alerts along with CERT-In.

Tailored threat intelligence alerts for proactive measures were sent to financial sector constituency and entities have been onboarded on CERT-In's automated threat intelligence platform.

Cyber Swachhta Kendra (Botnet Cleaning and Malware Analysis Centre)

Cyber Swachhta Kendra (CSK) - The Botnet Cleaning and Malware Analysis Centre has been setup with an eye 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. CSK is covering about 94% of Indian internet users as well as 668 organizations across sectors.

Cyber Swachhta Kendra is a citizen centric service operated in PPP model and provided by CERT-In, which extends the vision of Swachh Bharat to the Cyber Space.

Cyber Swachhta Kendra aims to secure India's digital IT Infrastructure by creating a dedicated mechanism for providing timely information about Botnet/Malware threats to the victim organization/user and suggesting remedial actions to be taken by the concerned entity. The center aims to maintain cyber hygiene in ICT infrastructure of the country.

CSK is playing a very proactive and pivotal role in a continuously evolving cybersecurity environment through identifying new botnet/malware, understanding their threat level and subsequent information dissemination to organizations with suggestive remedial actions.

In order to reach out larger audiences in the country, the website of Cyber Swachhta Kendra was re-launched in Hindi language and a new domain "www.सीएसके.सरकार.भारत" was created in the beginning of this year. Hindi website of CSK received positive response and became very popular among citizens. CSK also started notifying end users about botnet/malware infection in their digital devices via Internet Service Providers (ISP) in Hindi as well as English language. This activity was also appreciated by users.

During the year 2022, over 500 botnet/malware family were tracked and reported to collaborating ISPs/organizations. The type of Malware/Botnet infections include Trojans, IoT bots, Ransomware, Cryptocurrency miners, POS Malware, Worm, Botnets, Adware, Exploitkit etc. Moreover, systems with vulnerable services that

could be exploited to carry out cyber-attacks were also reported to various critical sector organizations. The vulnerabilities could also have severe impact such as information disclosure, launch DDoS attacks, unauthorized access etc. CSK suggests about solutions/patching of the vulnerabilities.

Besides the core activity mentioned above, CSK also participate in various cyber security events/awareness programs in collaboration with Government agencies/Academia/ ISP etc. to create cyber security awareness& hygiene among the users/ organizations in country.

During February 2022, CSK celebrated "Cyber Swachhta Pakhwada 2022" to create cyber security awareness among internet users across the country. CSK coordinated with ISPs, Anti-Virus companies to reach out and inform end users of internet about malware attacks, implications and safe guard their interest in cyber space. Around 1.91 lakh Free Bot Removal Tool downloads were observed during February 2022.

CSK also published cyber security awareness information during "Cyber Jaagrookta Diwas (CJD)" on its website as and when it is celebrated (First Wednesday of every month) so that the useful information about cyber security awareness may be reach out to citizens of country.

During 04th to 10th July 2022, Cyber Swachhta Kendra participated in "Digital India Week 2022 (DIW 2022)" at Gandhi Nagar, Gujarat. CSK set up a stall demonstrating several activities/services of CSK for the benefit of citizens with the theme "Safe & Trusted Internet". CSK also exhibited and demonstrated Free Bot Removal Tools for Windows & Android platforms. CSK team explained the details of cyber threats, basic cyber security measures and best practices to the visitors. A huge footfall was observed at CSK stall. Around 4000 people visited and get benefitted with information provided.

CSK also demonstrated its roles, responsibilities, and services in the event "CiSO Connect 2022" organized by MeitY and NIC. The program was organized for Chief Information Security Officers (CISOs) and Deputy CISOs from various Ministries/ Departments. During the event, CSK explained about the basic cyber hygiene practices and safe use of internet.

CSK is committed to enable users getting their digital devices secure against any cyber infection. CSK also

strives to collaborate with Indian entities/ cyber security companies to come up with good security solutions/ AVs. Extending to these efforts, CSK, CERT-In signed a MoU and collaborated with Antivirus Company "K7 Computing Pvt. Ltd." to provide its third Free Botnet Removal Tool (FBRT) to citizens through its portal/website for disinfecting Microsoft Windows based systems/devices. With this inclusion, CSK is now providing FBRT for Windows as well as for Android platform. The FBRT K7 security downloads tally reached to more than 17000 till August 2022. The overall count of no. of downloads of all the FBRT (total 3 in numbers) till September 2022 stands at 21.24 lakh.

The FBRTs are regularly updated with latest malware signature of recent botnet/ malware so that citizens can be safe against evolving cyber malware.

For the future endeavor of CSK, it is planned to reach out to more sectors for outreach of CSK, so that, more no. of organizations may get benefitted by CSK services. CSK envisages coordination and collaboration with entities working in the field of cyber security (such as Antivirus companies, Academia, Govt. agencies or Private Players etc.) for the welfare of ICT users in the country, enable users/organizations to keep their network secure against cyber infections.

Infrastructure Group CERT-In

Data centre protection has been enhanced by deploying anti-bot and e-mail security blades in the Unified Threat Management appliance (UTM) deployed at the CERT-In data centre. State of the art next generation e-mailing solution has been designed and implemented for effective communication.

Intrusion prevention systems and web application firewalls have been augmented for enhancing application layer security for critical applications. A virtual private network (VPN) has been designed for selective applications, so as, to enable work-from-home operations in case of emergency situations. Redundant bandwidths have been integrated with load balancing through multiple internet service providers with Distributed Denial of Service protection, so as, to achieve 100% uptime and security.

Wide area network has been enhanced through encrypted point-to-point channels interlinking CERT-In offices and disaster recovery site in multiple locations across states.

Cyber Forensics Lab

Cyber Forensics Lab, CERT-In is equipped with the state-of-the-art equipment and tools to carry out data retrieval, processing and analysis of the raw data extracted from the digital data storage and mobile devices using sound digital forensic techniques. The primary task of the Lab is to assist the Incident Response (IR) team of CERT-In on occurrence of a cyber-incident and extend digital forensic support to carry out further investigation. In addition, the Cyber Forensics Lab assists different Law Enforcement Agencies and Intel Departments viz. NIA, CBI, IB, Delhi Police Special Cell, ATS/STF of state polices in digital forensic data retrieval and analysis which is being extensively used in investigation of the cases of terrorism, anti-national activities etc. that involves unlocking and bypassing of security features of high end digital exhibits in a forensically sound manner such that the report can be presented in the Court of Law.

Officers posted in Cyber Forensic Lab, CERT-In impart training through training workshops organized 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. The Cyber Forensics Laboratory, Indian Computer Emergency Response Team (CERT-In) has been notified as Examiner of Electronic Evidence in exercise of the powers conferred by section 79A of the information Technology Act, 2000 in Computer Forensics and Mobile Device Forensics as its scope.

CERT-In Threat Intelligence eXchange -Proactive Threat Intelligence Sharing Platform

CERT-In is operating an automated cyber threat exchange platform for proactively collecting, analysing, and sharing tailored alerts with organisations across sectors for proactive threat mitigation actions by them.

Based on analysis, CERT-In releases Indicators of Compromises (IoC's)- operational, tactical and strategic-, Alerts, Advisories & Vulnerability notes to update the Government and critical sector organizations majorly about the threats and suitable necessary actions to counter those threats. The threat intelligence shared catering to incident response teams, Security operations Center [SOC] teams, Vulnerability management Teams,

Risk Analysis teams of various BANKS and other BFSI, GOI Ministries, Other CISRTs, State Data Centers, Critical Industries from Space, Atomic Energy, OIL and Gas, Health Sector, Power Sector etc.

CERT-In has been sharing actionable threat intelligence with its stakeholders and counterparts since September 2015 in its CERT-In Malware Threat eXchange activities. More than 2000 alerts have been sent to CISO's /POCs of critical organizations including threat intelligence communities, GOVT organizations, BFSI sectors, Defense, Defense production and Private Entities.

During the year 2022, 309 such CERT-In Malware eXchange [CMTX] alerts were shared from 1st April 2022 to 30th September 2022 which contains around 7100 indicators of compromise [IOCs] in the form of Hash, IP, Domain, and URL. CERT-In also keeps a close watch on the different malware families, Threat actor's activity, large scale/active exploitation of Vulnerability and Ransomware group active in cyber landscape and share their recent Tactics, Technique and Procedure, Exploit kit etc. detail to its stakeholders via regular reports in these CMTX Alerts. During 2022, CERT-In shared around 82 such reports from 1 April, 2022 to 30 September 2022.

CERT-In via its established automated Cyber Threat Intelligence Sharing Platform [CTIS] in 2018 to facilitate bidirectional sharing of operational, strategic, enriched tactical threat intelligence to various counterparts and stakeholders, so as, to help enhance the effectiveness of security and IT teams in reducing exposure by attempt to uncover unknown threats and informing better, faster decisions. The platform collects, correlates, enriches, contextualizes, analyses, integrates, tags with Traffic Light Protocol (TLP) and pushes to the partners in near real time. The shared data can be consumed by the recipients into their automated workflows, so as, to streamline the threat detection, management, analysis, and defensive process and track it through to completion by leveraging its powerful API integrations with supporting SIEMs, firewalls, and other endpoint protection solutions.

CERT-In envisages that implementing threat intelligence profoundly elevates Government/Critical organization's security posture, enabling the respective security team to understand and effectively predict the cyber threats that imperil their organization's key assets. Empowering organizations to anticipate who may attack next, and how, allows security teams to focus on prioritizing resources so they can respond effectively to future cyber-attacks

6.3.9 National Cyber Coordination Centre (NCCC)

National Cyber Coordination Centre (NCCC) project has been launched by CERT-In with the objective to generate situational awareness of existing and potential cyber security threats and enable timely information sharing for proactive, preventive, and protective actions by individual entities. Phase-I of NCCC was made operational in 2017. Full implementation of NCCC is going on.

The project is facilitating various organizations and entities in the country to mitigate cyber-attacks and cyber incidents on a near real time basis. NCCC aims to create a structured system to facilitate coordination effort among stakeholders by sharing with them inputs in terms of information about threats/attacks and possible extent which in turn enables immediate remedial actions by the stakeholders.

Security awareness, skill development and training

As part of its mandate, CERT-In is regularly carrying out various activities for development of cyber security capacities, skill building, awareness and citizen sensitization with respect to cyber-attacks and cyber frauds. To create security awareness within the Government, Public and Private Sector organizations, CERT-In regularly conducts trainings / workshops to train officials of Government, Public and Private sector organizations across all sectors and citizens on focused topics of Cyber Security.

The training/workshop programs focus on technical topics with technology presentations & demonstration/ Hands-on sessions for technical cyber community. The target audience of CERT-In training and capacity building programs are System/Network Administrators, IT/Cyber Security Professionals, C-Level and Board Level officials from Government, Public and Private sector organizations across all sectors and citizens.

CERT-In organized online trainings/workshops on various topics relating to cyber security. During the period of April 2022 to October 2022, CERT-In has conducted 18trainings on various specialized topics of cyber security. About 5908 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.

As part of services of CERT-In, for creation of awareness in the areas of cybersecurity as well as training / upgrading

the technical knowhow of various stakeholders, CERT-In observing the Cyber Security Awareness Month during October of every year, Safer Internet Day on 1st Week Tuesday of February Month every year,

Swachhta Pakhwada from 1 to 15 February of every year and Cyber Jagrookta Diwas (CJD) on 1st Wednesday of every month by organising various events and activities for citizens as well as the technical cyber community in India.

As per the guidelines from MeitY& MHA, CERT-In is observing Cyber Jagrookta Diwas(CJD) on 1st Wednesday of every month through various training programs and awareness campaigns. CERT-In conducts an awareness program every month in collaboration with Skills DA for Industry and college students as a part of its Cyber Jagrookta Diwas (CJD) activities. CERT-In officials provide Cyber security and Cybercrime frauds awareness sessions to different Ministries, Government Departments, Educational institutions, and Industry across the country. CERT-In observed the National Cyber Security Awareness Month during October 2022 NCSAM2022) by organising various events and activities for citizens as well as the technical cyber community in India with a theme of "See Yourself in Cyber". During NCSAM 2022, CERT-In conducted various technical training programs for technical cyber community through technical sessions and hands-on demonstrations by CERT-In experts, collaboration partners and Industry. CERT-In carried out various cyber security awareness campaigns in the form of hosting cyber security quiz in collaboration with C-DAC, Hyderabad under ISEA project of MeitY on MyGov platform, awareness sessions on cyber hygiene to Government Ministries, Departments, PSUs, Private sector organizations and Academia in collaboration with its partners. CERT-In also shared safety and security tips and awareness posters, infographics and videos through its official websites and social media handles such as Facebook, Twitter, Koo, and Pixstory for sensitising internet users on cyber frauds and cybercrime and prevention measures. The total outreach of National Cyber Security Awareness Month October 2022 is 71,16,62,930.

6.3.10 Online capacity-building on Cyber Law, Crime Investigation and Digital Forensics

Under the flagship programme of Digital India, the Ministry of Electronics and IT (MeitY), Government of India has launched an online capacity building program

namely- Online capacity-building on Cyber Law, Crime Investigation and Digital Forensics through Learning management system (LMS) to deal with the increasing cybercrime rate and to address significant challenges being faced currently by law enforcement agencies (LEAs). The goal of the Programme is to enable Police Officers, State Cyber Cells, Law Enforcement Agencies, Prosecutors and Judicial Officers with the requisite skills to deal with Cyber Forensics Cases efficiently & effectively as per the Indian Cyber Law while adopting global best practices, standards and guidelines using the digital transformation. This Programme is offering a Post Graduate Diploma of 9 months in a phased manner to 1000 officials (2 batches of 500 each) of Police, State Cyber Cells, Law Enforcement Agencies, Prosecutors and Judicial Officers through Learning Management System (LMS).

Expected outcome:

- PG Diploma In Cybercrime Investigation And Digital Forensics awarded to 1000 participants
- A Cyber Forensics Lab as per the MeitY Guidelines for continual training
- Minimum 100 hrs e-Content developed for further training purpose
- Increase in number of Qualified Resources with Police/LEAs

6.4 CERT-In Initiatives towards Security including Digital Payments

389 Alerts, 21 Advisories and 252 vulnerability notes have been issued by CERT-In to enable organisations and users to secure their systems and data during April 2022 to October 2022.

CERT-In has empaneled 150 Information Security Auditing organizations to carry out technical information security audit, including the vulnerability assessment and penetration testing of ICT infrastructure of government and critical sector organizations.

Government has formulated Cyber Crisis Management Plan for countering Cyber-attacks and Cyber terrorism for implementation by all Ministries/Departments of Central and State Governments, Critical Sectors and their Organizations.

CERT-In is conducting cyber security training programs for Government, Public, Critical Sector organisations, on

latest cyber security threats and mitigation measures. 18 programs were conducted from April 2022 till October 2022 covering 5908 participants.

CERT-In along with RBI conducted joint exercise for finance sector entities on 11th October 2022, Officials from 13 different banks participated in the event.

Cybersecurity exercise is an effective tool to help entities in assessing cyber security preparedness to counter cyber-threats and building cyber-resiliency. CERT-In regularly conduct Cyber Security Exercises for critical sector organizations. Till date CERT-In has conducted 74 Cyber security exercises of different complexities, including table top exercises, with participation from about 990 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/ IT-eS/ BPO sectors and State Data Centres.

CSIRT-Fin under CERT-In has been assigned the responsibility for coordinating and supporting the response to a computer security event or incident within the financial sector constituency. CSIRT-Fin is the incident response force which focuses on mitigation processes, providing on-site awareness, expertise, and recovery oversight. CSIRT-Fin issues vulnerability notes and virus alerts along with CERT-In.

All authorized entities/banks issuing PPIs in the country have been advised by CERT-In through RBI to carry out special audit by empanelled auditors of CERT-In on a priority basis.

Financial sector Entities are onboarded to CERT-In's Cyber Swachhta Kendra (CSK) for providing automated feeds regarding malware infections, botnets and vulnerable services

CERT-In along with RBI (College of Agriculture Banking) conducted a joint exercise for Urban Cooperative banks on 23rd June 2022. The theme of the exercise was "Incident Response and Cyber Security", 31 urban cooperative banks participated in the exercise.

CERT-In in collaboration with Institute of Development and Research in Banking Technology (IDRBT) successfully conducted two Cyber security Drills on 28th June 2022 & 22nd September 2022 respectively. 41 participants from 20 different banks participated in the event.



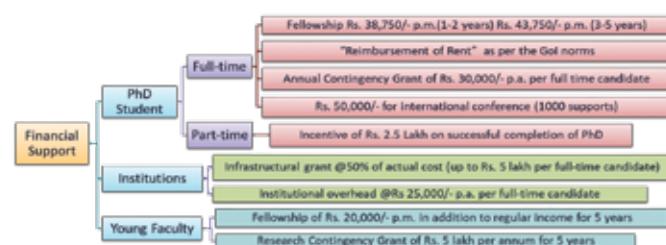
Skill India – Capacity Building

Activities of HRD Division, 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. 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), and Centre for Development of Advanced Computing (C-DAC). In addition, the various organisations /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. The following schemes/activities pertaining to Human Resource Development for Electronics and ICT sector are under implementation:

7.1 Visvesvaraya PhD Scheme for Electronics & IT

MeitY has entrusted DIC with implementation of Visvesvaraya PhD Scheme for Electronics & IT Scheme to enhance the number of PhDs in Electronic Design & Manufacturing (ESDM) and IT/IT enabled Services (ITES) sectors.

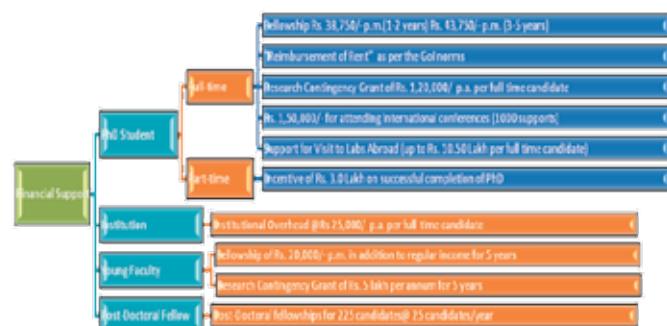
Financial Components under “Visvesvaraya PhD Scheme Phase-I”



Status of the implementation of Phase-I of the Scheme:

- The scheme has supported 1019 full-time and 330 part-time PhD candidates at 97 institutions (IITs, NITs, Central & State Universities etc.) in 25 states and 4 Union Territories.
- 386 full-time and 46 part-time PhD candidates have completed their PhD
- 206 full-time and 33 part-time PhD candidates have submitted Theses but they are yet to be awarded PhD
- 317 full-time and 230 part-time PhD candidates are currently pursuing PhD
- 158 Young Faculty Research Fellowships (YFRF) were awarded under the Scheme. These 158 awards consist of 26 awards for 2 years, 80 awards for 3.5 years and 52 awards for 5 years.
- 71 Patents filed by PhD Candidates & YFRF awardees
- 5416 Research Papers have been published by PhD Candidates & YFRF awardees
- 118 full-time PhD candidates have been provided support for attending 130 International Conferences listed under the scheme

Workshops held for assessment of quality of research:



5 research workshops held for PhD Fellows. 3 research workshops held for awardees of YFRFs. Status of the implementation of Phase-II of the Scheme: Phase-II of the scheme for 9 years, was launched on Sep 17, 2021 by Hon'ble MEIT, Shri Ashwini Vaishnaw with an aim to support 1000 full-time PhD Candidates, 150 part-time PhD Candidates, 50 Young Faculty Research Fellowships and 225 Post-Doctoral Fellowships.

Financial Components under “Visvesvaraya PhD Scheme Phase-II”

The online proposals were invited from the institutions for allotment of PhD seats for Academic Year 2022-23 through PhD Scheme portal. Digital India Corporation (DIC) has received proposals from 70 institutions for allotment of 2,142 full-time and 700 part-time PhD seats. Implementation orders for 200 full-time PhD seats have been sent to 70 institutions. Acceptance of Terms and Conditions including SoPs & Surety Bonds (wherever applicable) is being received. Subsequently PhD Candidates would be enrolled on the allocated seats by the institutions.

7.2 Graduate-Level Scheme of Financial Assistance for setting up of Electronics and ICT Academies

Ministry of Electronics and Information Technology (MeitY) had setup seven (07) Electronics and ICT Academies at premier and leading academic institutions viz. (i) IIT Guwahati (ii) IIT Kanpur (iii) IIT Roorkee (iv) IIITDM Jabalpur (v) MNIT Jaipur (vi) NIT Warangal and (vii) NIT Patna to address the requirement of training the faculty in the latest as well as upcoming/emerging areas of Electronics and ICT for Engineering and other streams. These academies have been conducting the ‘Faculty Development Programs’ (FDPs)/ courses in Conventional Classroom mode, NKN mode and online mode. The duration of the scheme is up to 30th November 2022 with the target to train 92,800 faculties. As on 31.10.2022 under the scheme, 3,41,669 beneficiaries have been trained under 1,950 faculty development programs (Faculty: 1,09,972; Students/ Others: 2,31,697) by these academies.

7.3 Vocational Skill Development Level

(i) Two Schemes on Skill Development in ESDM sector are under implementation:

MeitY has approved following two schemes for Skill Development in ESDM Sector to facilitate creation of an ecosystem for development of ESDM Sector in the entire country.

Scheme for Financial Assistance to select States/UTs for Skill Development in Electronics System Design and Manufacturing (ESDM) sector (Scheme-1) and Skill Development in ESDM for Digital India” (Scheme-2)

Both the Schemes are being implemented through Training Partners (TPs) affiliated with Key Implementing Agencies Electronics Sector Skill Council of India (ESSCI), Telecom Sector Skill Council (TSSC), National Institute of Electronics & IT (NIELIT) and Healthcare Sector Skill Council (HSSC) and both the above Schemes are being implemented concurrently. The schemes are aimed facilitating creation of an ecosystem for development of ESDM Sector in the entire country by training 4.18 Lakh beneficiaries (Scheme-1: 90,000 beneficiaries; Scheme-2: 3.28 Lakh beneficiaries). As on 31.10.2022 under both the above schemes, a total of 4,28,510 candidates have registered/ trained, out of which, 3,09,721 candidates have been certified. Details of the Schemes may be seen at <http://meity.gov.in/esdm/hrd> and <https://esdm-skill.deity.gov.in/>.

(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 (ES-SCI)
- ii. Telecom Sector Skill Council (TSSC)
- iii. IT- ITeS Sector Skill Council (NASSCOM)

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, TSSC and NASSCOM IT/ITeS Sector Skill Council in the area of Electronics and IT.

7.4 Capacity Building in Niche Areas

- i) **Information Security Education and Awareness (ISEA) Project Phase-II:** The Information Security Education and Awareness (ISEA) Project Phase-II was approved with the objectives of capacity building in the area of information security, training of Government personnel and creation of mass information security awareness for various user segments. The project aimed at training of 1.14 lakh candidates in various formal and non-formal courses, faculty training, etc., and training of more than 13,000 Government officials in the area of information security, besides creating mass awareness for approximately 3 crore internet users through direct/indirect mode. A total of 52 institutions are carrying out the implementation of academic activities under the project.

Under the project so far, a total of 85,847 candidates have been trained/under-going training in various formal/non-formal courses in Information Security through 52 institutions (further, 5 Technical Universities participating under the project have reported around 2.85 lakh candidates as trained/under-going training in formal courses in their respective affiliated colleges). Besides this, 25,752 Government Officials have been trained in various short-term courses through direct/e-learning/VILT mode, which inter-alia includes 12,017 Government personnel of Central Ministries/ Departments trained in one day Generic programme (11,412) and five days intensive Foundation Programme (605) on Cyber Security through Virtual Instructor Led Training (VILT) mode as of August 2022. As a part of Awareness, 1,438 awareness workshops have been conducted across the country through direct/virtual mode covering 2,79,541 participants. In addition, 1.24 lakh school teachers have been trained as Master Trainers in 42 training programmes. Besides this, around 5.75 crore (estimated) beneficiaries have been covered under indirect mode through 15 Cyber Safety and Security awareness weeks organized in select cities; 27 editions of bi-monthly newsletters

published; 110 programs broadcasted through Doordarshan/All India Radio on various Cyber Security related topics; multilingual awareness content in the form of handbooks (16), multimedia short videos (73), posters (128), cartoon stories for children (65), etc. published and disseminated through print, electronics & social media and also made available for download through www.infosecawareness.in. multilingual awareness content in the form of handbooks (16), multimedia short videos (73), posters (128), cartoon stories for children (65), etc. disseminated through print, electronics & social media and also made available for download through www.infosecawareness.in. Further, a self-paced 3 module e-learning course on 'Cyber Hygiene Practices' has been made available through ISEA awareness portal www.infosecawareness.in in which 50,038 participants have been registered and 22,435 participants have been certified. Online quiz competitions on cyber hygiene/cyber security aspects have been organized regularly under the project, under which as on 31.10.2022, a total of 3.35 lakh candidates have participated out of which 1.87 lakh candidates have completed the same.

ii) **Future Skills PRIME (Programme for Re-skilling/ Up-skilling of IT Manpower for Employability)**

Future Skills PRIME (Programme for Re-skilling/ Up-skilling of IT Manpower for Employability), is a joint initiative by MeitY and NASSCOM which aims to provide re-skilling/ up-skilling opportunities in 10 Emerging Technologies – Augmented Reality/Virtual Reality, Internet of Things, Big Data Analytics, Artificial Intelligence, Robotic Process Automation, Additive Manufacturing/ 3D Printing, Cloud Computing, Social & Mobile, Cyber Security and Block chain.

Under the programme IT-ITeS Sector Skills Council (SSC) NASSCOM is the Key Implementing Agency. To strengthen physical and digital connectivity, the existing pan-India presence & skilling capabilities of training providers (SSC NASSCOM, NIELIT, C-DAC etc.) is also leveraged. Towards this, 40 C-DAC/ NIELIT Centres are identified as Lead &

Co-Lead Resource Centres (RCs) to institutionalize the blended-learning training programmes in a hub and spoke mode for the 10 emerging technologies. The envisaged target for the project is 4.12 Lakh beneficiaries (4 Lakh Professionals, 10,000 Government Officials and 2,000 Trainers). As on 31.10.2022, under the programme, a total of 9.67 Lakh candidates have signed-up on the FutureSkills PRIME portal (<https://futureskillspprime.in/>), and around 4.28 Lakh candidates have got enrolled in various courses, out of which, as on 31.10.2022, a total of 1.47 Lakh candidates have completed the courses. Around 7.16 Lakh unique learners have collectively earned 43.89 Lakh 'badges' in recognition of having completed bite-sized digital fluency content. Also, the Resource Centres (Lead/ Co-Lead Centres), have trained 7107 Government Officials (GoT) and 606 Trainers (ToT) as on 31.10.2022.

- iii) **Capacity building for human resource development in Unmanned Aircraft System (Drone and related Technology):** MeitY has approved the project entitled "Capacity building for human resource development in Unmanned Aircraft System (Drone and related Technology)" on 11.07.2022. The project, implementation is being carried out by 30 premium institutions, in a hub-and-spoke mode, comprising 5 Resource Centres; 15 Academic Participating Institutes (PI-Academic); and 10 C-DAC/NIELIT Participating Institutes (PI-C-DAC/NIELIT) Centres.

The primary objective of the programme is to leverage collaborative activities in human resource development through capacity building in education and training in the area of UAS. The programme is conceived to achieve the broad objectives which includes (i) To enhance capacity & capabilities of select institutions in identified WTs on Unmanned Aircraft Systems, (ii) To institutionalize a collaborative ecosystem through identified Resource Centres (RCs) and Participating Institutions (PIs) for synergy of capabilities & expertise (iii) To foster development of competent human resources at various levels including Post Graduate & Graduate programs, PG

Diploma/Certificate programs, Faculty Updation and Master Trainers in niche areas of UAS (iv) To promote entrepreneurial mindset and nurture technical talent among the student community (v) To nurture technical talent and ideation among the student community through IPR generation, Competitions, Workshops / Conferences, etc.

iv) **Chips to Startup (C2S) Programme**

The C2S Programme aims to train 85,000 number of Specialized Manpower at about 100 participating Institutions (including Academia, R&D Organization, Startups, MSMEs) over a period of 5 years in the area of VLSI and Embedded System Design and leapfrog in ESDM space by way of inculcating the culture of System-on-Chip (SoC)/ System Level Design at Bachelors, Masters and Research level and act as a catalyst for growth of Start-ups involved in fabless design.

The programme would not only generate 85,000 number of Specialized Manpower at B.Tech, M.Tech & PhD level in Chip design area; but also results in the development of 20 Systems/ 175 Chips/ 30 reusable IP Cores and incubating 25 startups in this area. Details of the Programme are available at <http://c2s.gov.in/>

Broad Objectives of the C2S Programme:

- Generating Industry-ready manpower in System/ SoC Design area for creating vibrant fabless chip design ecosystem in the country.
- Promoting industry-led R&D, translational research and strengthening Industry-Academia collaboration.
- Leapfrogging in ESDM space by way of inculcating the culture of developing reusable IP Cores & developing ASIC/ SoC/ Systems for societal/ strategic sectors.
- Broaden the base of ASIC / IC design in the Country by accommodating more academic institutions, start-ups for design of IPs / ASICs / Systems/ SoCs.
- Protection of Intellectual Property generated etc.

- To inculcate the culture of entrepreneurship among students & researchers by way of incubating startups.

v) **M.Tech and M.Des Programme in Electronics Product Design:**

To train manpower in the area of Electronics Product Design for designing innovative products, rapid prototyping & development and hands-on experience with cutting edge technology and processes, MeitY has initiated following programme with an objective to promote indigenous design and development of Electronics System in the country.

- a) M.Des programme/Executive development programme in Electronics Product Design: M.Des programme/Executive development programme in Electronics Product Design has been initiated at IIT Guwahati in March 2021 to graduate 120 M.Des students and 4 PhD Student in Electronics Product Design over the period of 5 years. Besides this, Executive Development Programme will be conducted for 200 Industry experts.
- b) Special Manpower Development Programme (SMDP)- M. Tech. in Electronic Product Design and Skill Development : M. Tech. in Electronic Product Design and Skill Development has been initiated at IISc Bangalore in March 2021 to train 305 Students/Faculty (125 students via M.Tech Programme, 144 Students via Short-term Certificate/Workshop and 36 Faculties via Faculty Development Programme) over the period of 5 years.

vi) **Indian Nanoelectronics Users Program -idea to Innovation (INUP-i2i)**

Based on the grand success of project “Indian Nanoelectronics Users Programme (INUP)-Phase I” and Phase II”- a joint project at IISc, Bangalore and IIT Bombay, an umbrella project entitled Indian Nanoelectronics Users Program -idea to Innovation (INUP-i2i) is being implemented by IISc, Bangalore, IIT Delhi, IIT Madras, IIT Kharagpur, IIT Guwahati and IIT Bombay.

The project INUP-i2i is supporting researchers in the area of nanoelectronics across the country by organizing the hands-on workshops as well as to train researchers/ users by undertaking the R&D projects on different aspects of nanoelectronics and mentor the start-ups in nano area. The approach adopted under this project has been to make available large research facilities created at nanoelectronics centres.

So far more 23 familiarization/Hands-on-training workshops, 4 Industrial trainings and 1 Hackathon has been conducted. More than 1400 skilled manpower has been trained and around 100 R&D projects are being supported under the project.

7.5 Work Based Learning (WBL) programme

MeitY has approved the project entitled “Work Based Learning (WBL) programme to Strengthen and Empower SC/ST/Women/EWS Graduate Engineers through MeitY Institutions” to provide an opportunity to 6240 candidates (SC/ST:3120, Women/EWS: 3120) to acquire Technical Knowledge Expansion, Real-time Working Skills, Technology Use, Problem Solving Skills, Reasoning, Ideation, Analytical Thinking, Interpersonal Skills, etc. in a professional work environment. The WBL program is being implemented across the seven (7) organizations of MeitY i.e. CERT-IN, C-DAC, NIELIT, STQC, CMET, ERNET and SAMEER.

The WBL programme has been linked with AICTE internship portal (<https://internship.aicte-india.org>) and advertisement for the WBL project is being published through AICTE internship portal. As on 31.10.2022, a total of 3793 applications have been received against 604 Vacancies for 68 centres of participating organizations and out of which a total of 205 candidates have been selected.

7.6 Grass Root Level Initiative - PMGDISHA

The Government of India 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). To ensure equitable geographical reach, each of the 2,50,000 Gram Panchayats across the country are registering an average of 200-300

candidates. Special focus of the said Scheme is on training the beneficiaries on use of Electronic Payment System. The outcome measurement criteria include undertaking at least 5 electronic payments transactions by each beneficiary using UPI (including BHIM app), USSD, PoS, AEPS, Cards, Internet Banking. PMGDISHA Scheme is being implemented as a Central Sector Scheme by MeitY through an Implementing Agency, namely, CSC e-Governance Services India Limited, with active collaboration of all the State Governments and UT Administrations.

As on 31st October, 2022, a total of 6.51 crore beneficiaries have been enrolled, out of which training has been imparted to 5.59 crore beneficiaries, out of this more than 4.15 crore beneficiaries have been certified under the PMGDISHA Scheme.

7.7 Create skill development facilities in deprived areas through strengthening of National Institute of Electronics and Information Technology (NIELIT)

MeitY is implementing a Project approved by the Cabinet. The project objective includes up-gradation of the three existing NIELIT centers located at Imphal, Aizawl, Gangtok; Setting up of seven new Extension centers at Senapati and Churachandpur in Manipur; Dibrugarh, Jorhat and Kokrajhar in Assam; Lunglei in Mizoram; Pasighat in Arunachal Pradesh; and Upgradation of two existing extension centers 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. As of now the annual training capacity of these centers (including six centers operational from temporary locations at Guwahati and Silchar in Assam; Itanagar and Tezu in Arunachal Pradesh; Shillong and Tura in Meghalaya) is around 20,000 candidates. Presently all the NIELIT Centres/extension centers are operational from permanent/temporary premises. Six NIELIT Center's i.e. Imphal, Aizwal, Churachandpur, Kokrajhar, Tezpur and Chuchuyimlang had been inaugurated on 16th and 17th September, 2021; another 4 centres viz. Pasighat, Senapati, Jorhat and Dibrugarh had also been inaugurated on 6th May, 2022 and are operational from their permanent campuses; remaining 02 NIELIT Centres/Extension Centres are at different stages of construction under the project. As on 31.10.2022

under the project a total of 2.23 lakhs candidates have been trained in various Electronics & ICT courses.

7.8 Capacity Building in IECT in the NE States

The project 'Capacity Building in IECT including training in Digital Skill sets and Current Industry Demanding Technologies for various sections of society in the NE States:' was approved on 02.02.2022 for a period of two years with an objective to undertake the following activities in the fields of Computer Science, Information Technology and Electronics:

- To provide awareness and training in IECT to citizens spread across different sections of the society by 08(eight) NIELIT Centres located in the NE Region using mobile ICT labs to reach out to all places including remote corners of the North Eastern States to provide essentials training
- To promote awareness & training related to Digital Inclusion/ Digital services to common citizens including Farmers, Women, Elderly persons, School and College students, school dropouts.
- To impart job oriented value addition courses to the Graduates, polytechnic diploma holders / students in the utility areas such as Digital marketing, Solar Technology, Computer Applications, Computerized Accounting, Cyber Security, AR-VR, Blockchain, IoT, Machine Learning, AI, Drone Piloting Technology, Multimedia etc., to fulfil the local needs.
- To train the graduate in current Industry demanding technologies such as Programming or coding, Web or Mobile, Database, System Administration and Security, Software Testing/ QA/ Management, Technical Support and BPO Expert etc. to improve the employability.
- Upskilling and reskilling of NIELIT staff and school teachers in emerging and future technologies.
- To create and promote an ecosystem for local startups and entrepreneurship development in the NIELIT Campuses of NE Region.
- To training of 1,66,500 candidates.

The project was proposed to provide training programmes in four different levels to cater to different sections of

target users belonging to the 08 states of the North Eastern Region of India, including awareness and short-term courses as per the classification details of which includes (i) One day to Six days' awareness training to Level-1 users (Farmers, Women, Elderly persons, School and College students, School dropouts) (ii) 100 hours to 400 hours Training programmes for Level-2 users (Graduates and diploma students) (iii) 200 hours of training in current industry demanding technologies to Level-3 users (Technical graduates/ graduates) (iv) 50-100 hours of training in IT applications to school teachers and staff of NIELIT (v) Hands-on organizational, management and requirement based training to budding entrepreneurs to assist creating successful startups to bring up the ecosystem in NE States.

7.9 IT for Masses Programme

IT for Masses Programme under the Manpower Development scheme of Digital India Programme (Umbrella Scheme) is aimed at narrowing the digital divide by initiating/promoting activities in ICT for focus groups (Women, Scheduled Caste, Scheduled Tribe, Senior Citizen, Differently Abled & Economic Weaker Section) and underprivileged areas (North Eastern Region, Backward Districts and Blocks & Districts having more than 40% SC/ST population) for inclusive growth of IT Sectors through Infrastructure Creation, Deployment of IT tools, Training, Capacity Building & Entrepreneurship Creation activities in IT domain.

Ministry is earmarking funds for Development Action Plan for Scheduled Caste (DAPSC), Scheduled Tribe Component (STC) and General component. The Programme caters exclusively for the benefit/development of focus groups i.e. Women, Scheduled Caste, Scheduled Tribe, Senior Citizens, Differently Abled & Economic Weaker Section.

Till 31st July, 2022, around 2045 (SC: 1377, ST: 512 & Women: 156) nos. of candidates have benefited. The following projects are ongoing:

(i) Development of Weaker Sections

Projects are listed as under covering Scheduled Caste (SC)/Scheduled Tribe (ST), Differently Abled (PWD) and Senior Citizens

- Empowerment of SC/ST Youth & Women on Enhancement of Livelihood activities using IT & Tool and PMU for IT for Masses – West Bengal
- Skill Development Training of Unemployed SC & ST youths of Tripura towards enabling entrepreneurship & sustainable development – Tripura
- Training of Visually Impaired Persons in Manipur on “Course on Computer Concepts (CCC) of NIELIT – Manipur
- Skill Development Training for the Masses under ICT – Maharashtra
- Creation of R&D culture in Electronic Materials among SC/ST and Women students from the remote areas in Maharashtra – Maharashtra
- Awareness Campaigns/Events for empowerment of Senior Citizens in e-Services through ICT Tools – Maharashtra
- Skill Development of youths in Aspirational Districts in the area of IECT leading to enhancement in Employability – PAN India
- Enhancement of livelihood activities for SC candidates of Delhi NCR Through Capacity Building using ICT – Delhi
- Skill Training programme for Empowering SC/ST in Kerala and Karnataka – Kerala and Karnataka
- Capacity Building Programme to enhance employability of the Engineering Graduates in emerging technologies – Tamil Nadu
- Skill Development Training for the Masses under ICT – Karnataka
- Capacity Building in Information Technology for SC candidates in State of Haryana – Haryana
- Facilitating Skill Development and Enhancing Employability in IT-ITES Sector for SC/ST Candidates – PAN India

- IT enabled Incubation Centre for Handloom and Handicraft Sector – Ladakh UT
- Up-skilling program in “IoT Technologies” for candidates belonging to SC/ST category by offering training programs in the online/blended mode and conducting practical workshops in collaboration with NIELIT and IEEE India – PAN India
- Self-employment Capacity building of the Engineering pass-out students belonging to Scheduled Caste/Scheduled Tribe community – Bihar, Andhra Pradesh, Telangana and Uttarakhand
- Set up of Real Time Cyber Security Scenario based Self-Paced Learning training Facility (Cyber GYAN) for SC, ST and Economically Weaker Section Computer Science/Electronics Undergraduate and Post-graduate Students of Government Colleges of 8 North Eastern States and 4 other States of India – Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Uttar Pradesh, Haryana, Gujarat and Kerala

(ii) Development of Women/Girls using ICT

Gender Empowerment through ICT has been one of the major initiatives of the Government. MeitY has also been implementing various ICT training/capacity building projects for the empowerment of women in different States/UTs. The following projects initiated/ongoing:

Projects covering Gender (Women) beneficiaries

- Skill Development Training for the Masses under ICT – Maharashtra
- Creation of R&D culture in Electronic Materials among SC/ST and Women students from the remote areas in Maharashtra – Maharashtra
- Skill Development of youths in Aspirational Districts in the area of IECT leading to enhancement in Employability – PAN India

(iii) Fee-reimbursement Programme

As per the directions and guidelines received from NITI Aayog (erstwhile Planning Commission) by MeitY (erstwhile DeitY) vide their communication No.D.O.No.M-13054/2/2005-BC dated 05.09.2007, no fee should be charged from the SC and ST candidates for educational and skill development programmes by the Government and autonomous institutions and the expenditure for the Scheme should be accounted for from the SCSP and TSP fund of the respective Ministries/Departments.

Since 2007-08, the National Institute of Electronics and Information Technology (NIELIT) is implementing the “Fee Reimbursement to SC/ST” programme. The aforesaid programme is a DBT on-boarded scheme in which free training is being provided to the SC/ST candidates in various formal, non-formal and IT literacy courses at NIELIT’s own centres under budgetary support of MeitY.

For the direct benefit of beneficiaries, MeitY has issued Gazette Notification on 13.08.2019 for the use of Aadhaar as mandatory for any SC/ST candidate desirous of availing the benefit under the aforesaid programme. Further, the Guidelines for Fee Reimbursement to SC/ST has been issued on 20.04.2020 for better implementation of the programme and an MIS portal has been developed and on-boarded for constant monitoring of the programme. Also, the aforesaid programme has been on-boarded on the UMANG portal.

During the F.Y.2021-22, a total of 1,588 Scheduled Caste and 4,721 Scheduled Tribe Candidates have benefitted under the Fee reimbursement programme.

7.10 Establishment of intelligent educational Infrastructure (Smart) in Schools

MeitY approved the project “Establishment of intelligent educational Infrastructure (Smart) in Eklavya Model Residential Schools (EMRSs)” to be implemented by ERNET India. The Objective of the project is

- Setting up of intelligent educational Infrastructure (smart) in Eklavya Model Residential Schools(EMRSs)by creating echo system using latest tools and technologies ,which helps to improve the learning outcome.

- To provide the Internet connectivity in Eklavya Model Residential Schools (EMRSs)

Under the project infrastructures have been installed, commissioned and operational at 43 Nos. of EMRSs for education system which will enhance the learning and productivity of students by deploying the intelligent educational Infrastructure (Smart).

7.11 Olabs NextG (OLabs Next Generation)

OLabs portal (<http://www.olabs.edu.in>) is a resource point for access of online Labs which covers all experiments as per CBSE curriculum for Physics, Chemistry, Biology, and also activities under Maths and English. These are available through regional languages namely Hindi, Marathi, Malayalam, etc. Olabs NextG (OLabs Next Generation) which is aligned with the New Education Policy 2020 has approved and jointly funded by MeitY and Ministry of Education (MoE). OLabs NextG is being implemented by C-DAC Mumbai and Amrita Vishwa Vidyapeetham.

The objective of the project is to design and develop 500 Online Labs and upgradation of existing 173 labs using latest tools/technologies for the students of classes VI-XII for various subjects, training of 10,000 teachers/students from 200 schools on using of Online Labs, to organise Hackathons to contribute to design and develop labs and to translate these 500 Labs to Hindi; and, 237

new Physics, Chemistry, Math and Biology, to Marathi and Malayalam. Further, the Labs developed in Olabs NextG will be available for access via online and will be integrated in existing OLabs website – www.olabs.edu.in; for Offline version, Offline Installer will be provided for Windows for selected labs and also Android App will be available for access for selected Olabs from handheld devices

7.12 MedSIM 2.0 (Online Skills Lab and Virtual Patient Cases)

MeitY has approved a project titled 'MedSIM 2.0 - Online Skills Lab' and Virtual Patient Cases for development of Medical Simulation platform for medical students being implemented jointly by CDAC, Thiruvananthapuram, Amrita University and AIIMS Bhubaneswar. MedSIM (Medical Simulation platform for Medical Students) is a simulation-based medical education platform that allows medical students to enhance their clinical reasoning and judgement skills. Key objectives of the MedSIM (2.0) (<http://medsim.in>) is to design and develop Preclinical and Paraclinical Online Skills Lab, develop New Virtual Patient Case Simulations to cover the entire MBBS curriculum, Aligned with MBBS Regulations 2020, National Medical Commission, enhance existing MedSIM (1.0) platform with Authoring tool, Learning Analytics, Assessment & Feedback, and training of 5,000 medical students and 1,000 medical faculty from 500 medical colleges.



STATUTORY ORGANISATIONS

Statutory Organisations

8.1 Controller of Certifying Authorities (CCA)

The United Nations Commission on International Trade Law adopted the Model Law on Electronic Commerce in 1996. The General Assembly of United Nations by its Resolution No. 51/162, dated 30th January 1997, recommended that all States should give favorable considerations to the said Model Law when they enact or revise their laws. India being signatory to it revised its laws as per the said Model Law. Keeping in view the urgent need to bring suitable amendments in the existing laws to facilitate e-commerce and with a view to facilitate Electronic Governance, the Information and Technology Bill was introduced in the Parliament.

The Information Technology Act was enacted on 9th June 2000. The provisions of the Act came into force from 17th Oct 2000. And, the Act was subsequently amended in 2008, the amendment to the Act came in to force from 27th Oct 2009. The jurisdiction of the Act extends to whole of India. The main purpose of the Act is to facilitate e-Commerce and e-Governance in the country and provide a legal framework for recognition of electronic records and digital signatures.

The Controller of Certifying Authorities (CCA) has been appointed by the Central Government under section 17 of the Information Technology Act (IT Act 2000) for purposes as defined in the Act. The Office of the CCA came into existence on November 1, 2000. Since then, Office of CCA is executing its statutory functions under the administrative control of Ministry of Electronics and Information Technology. It aims at promoting the growth of E-Commerce and E- Governance through the wide use of digital signatures.

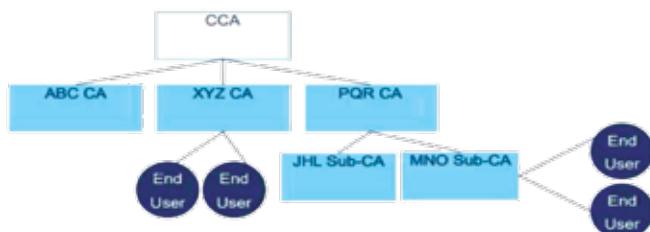
The Information Technology Act, 2000 facilitates acceptance of Electronic Records and Electronic Signatures through a legal framework for establishing trust in digital transactions.

The Controller of Certifying Authorities (CCA) established the Root Certifying Authority (RCAI) of India under section 18(b) of the IT Act to digitally sign/certify the public keys of Certifying Authorities (CA) in the country. The RCAI is operated as per the standards laid down under the Act. The CCA certifies the public keys of CAs using its own private key, which enables users in the cyberspace to verify that a given certificate is issued by a licensed CA. The IT Act provides for the Controller of Certifying Authorities (CCA) to license and regulate the working of Certifying Authorities. The Certifying Authorities (CAs) issue digital signature certificates for electronic authentication of users in cyber world.

8.1.1 Root Certifying Authority of India

Root CA

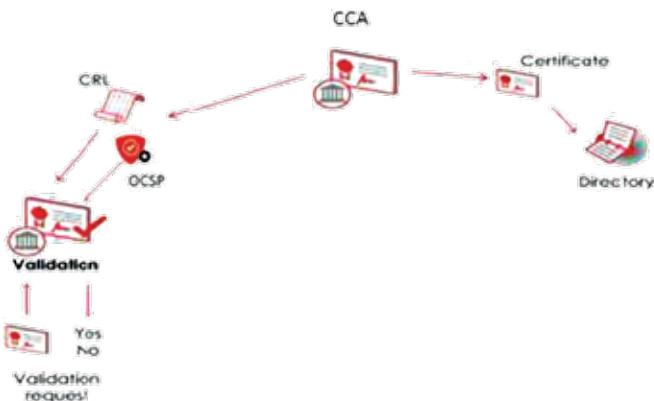
The model adopted by India is a hierarchical PKI with the trust chain starting from the Root Certifying Authority of India (RCAI). RCAI is operated by the CCA, Government of India. Below RCAI there are Certifying Authorities (CAs) licensed by CCA to issue Digital Signature Certificates under the IT Act



Hierarchical structure of RCAA

The IT Act provides for the Controller of Certifying Authorities (CCA) to license and regulate the working of Certifying Authorities (CA). The following are some of the functions of CCA

- Function as Root Certifying Authority of India
- Certifying the public keys of the CAs.
- Laying down the standards & Guidelines to be followed by the CAs,
- Licensing Certifying Authorities (CAs) and exercising supervision over their activities.
- Addressing the issues related to the licensing process
- Approving the Certification Practice Statement (CPS)
- Auditing the physical and technical infrastructure of the applicants through a panel of auditors maintained by the CCA.
- Resolving conflict of interest between CAs and subscribers



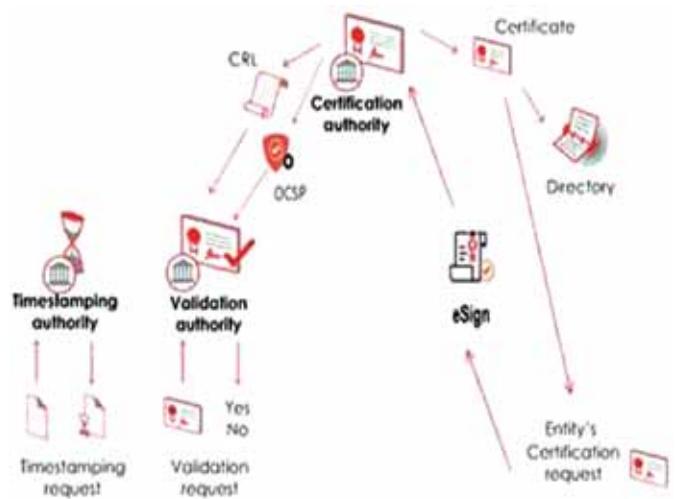
Overview of Technical Operations as Root CA

The Root Certificates of CCA is the trust anchor of all the CA certificates and DSCs issued by Licensed CAs. In the year 2022, two new self-signed Root certificates with a key size of 4096 RA have been created. CCA India 2022 will be used for certifying the CA who issue end-entity digital signature certificates and CCA India 2022 SPL will be used for certifying the CAs who issue Certificates. 18 CAs have been certified under CCA India 2022. The enrollment of root certificate in Adobe and Microsoft products is in progress

Certifying Authorities

CAs can be private sector companies, Government departments, public sector companies, or Non-Government Organizations (NGOs). These are also called Licensed CAs. At present there are twenty CAs licensed by Root CA and all of them are operating under same policy, standards, and verification methods, subjected to be audited by the criteria set by Root CA. The policy ids of certificates are also same for all CAs. CAs are required to provide CRL, OCSP and Timestamping Services. CAs are also not allowed to issue certificate other than that mentioned in the CPS which is approved by CCA. The certificates issued by Licensed CAs are legally valid in India. A Certifying Authority can create sub-CAs to meet the business branding requirement. These sub-CAs, which will be part of the same legal entity as the CA, will issue certificates to the end entities or subscribers. The CAs are allowed to create ONE level of sub-CA only. CA are required to operate under the provisions of Act, Rules, Regulations, and orders issued by CCA. The orders issued by CCA are published in the form of Guidelines.

The licence is issued for a period of 5 years. CAs are required to renew the licence after the expiry of licence. The licence is subject to suspension, revocation, and renewal. The terms and conditions for the renewal are same as fresh licence. The licence is issued based on the eligibility criteria like net worth, paid up capital and compliance to technical and physical infrastructure in accordance with the provision under Act.



Overview of Technical Operations as Certifying Authorities

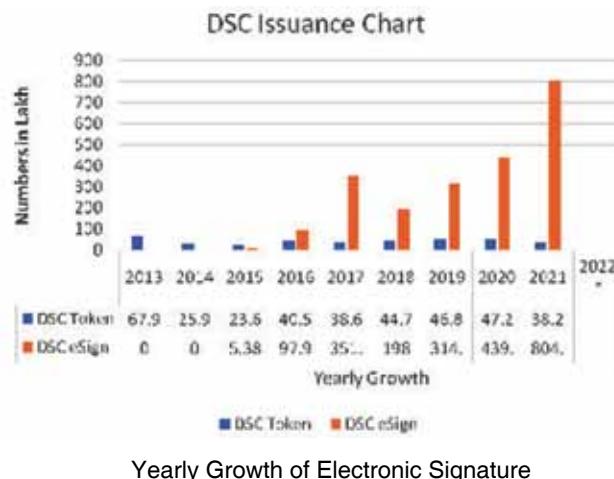
During 2022, Licence has been granted to three new CAs, Reliance Payment Solutions Ltd. (RPSL) CA, ProDigiSign CA and SignX CA. The renewal of IDRBT CA and Safe script CA were also carried out during this period.

Electronic Signature Certificates

- To obtain an Electronic Signature certificate from CA, the applicant needs to undergo a verification process as mentioned in the Identity verification Guidelines (IVG) issued by CCA and upon successful verification.
- To issue Digital Signature Certificates (DSC), KYC of DSC applicants are carried out by CA. In the current scenario, the submission of DSC application and verification by CA are fully electronic. For KYC, the option available include online Aadhaar verification, Aadhaar offline eKYC, banking eKYC, organizational eKYC, PAN based eKYC or a direct verification. End user electronic signature certificates are strictly issued in a Hardware Crypto Token for a period of 1-3 years.

CA create an eKYC account and issue electronic Signature certificate to the applicant. As the verification process are online, the certificate can be obtained within 2-3 hours. For all categories of applicants, email id, mobile number, photo, scanned copy of proof of identity and scanned copy of proof of address are required to be submitted to CA. The in-person verification is carried out by video verification or biometric based online Aadhar eKYC services. The applicant can opt for different verification mode like Online/Offline Aadhaar, PAN, Banking and Organizational. The certificates are also issued to foreign nationals after similar verification carried out by CA on their identity, address and video.

The total number of Digital Signature Certificates (DSC) issued in the country grew to more than 34.45 crore (out of which 31.08 crore DSCs are for eSign) by June, 2022 & continues to grow rapidly and is expected to increase significantly with the launch of various e-Governance/e-Commerce programmes.



Time stamping

Time stamping The National Physical Laboratory, India (NPLI), is responsible for maintenance and development of the Indian Standard Time (IST). NPLI maintains the time scale of Indian Standard Time (IST) with the help of a commercial cesium atomic clock. The time scale maintained by NPL is designated as UTC. CAs are required to derive time from national time source for their use in issuance of electronic signature certificate and eSign Service. Also, the time included in the time-stamp token shall be synchronized with Standard Time Source within the accuracy of ± 1 second CA are providing time stamping service in compliance with RFC 3161. The time stamp token include a representation (e.g., hash value) of the datum being time stamped as provided by the time stamp requestor/subscriber. The Guideline was also issued in this regard by CCA.

OCSP & CRL

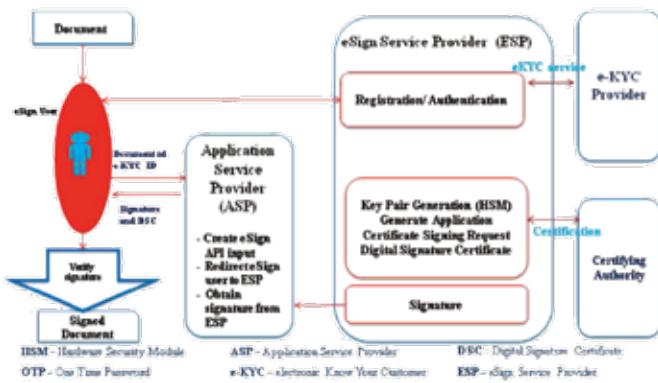
Digital certificates are used to create trust in online transactions. The usage of certificate related functions is deemed as valid only if the certificate is valid at the time of usage. The validity of the certificate is determined through Certificate Revocation List (CRL) or Online Certificate Status protocol (OCSP). CA issues certificates with a validity period up to 3 years. Within the validity period, the certificate may be revoked by CA under certain circumstances. CA periodically issue the revocation list and publish it on the website of CA. Certifying Authorities publishes the Certificate Revocation List (CRL) in accordance with the provisions of Information

Technology Act and Guidelines specified by the Office of CCA. Relying parties can verify revocation status of DSC in an offline mode, by periodically downloading CRLs or by accessing CRLs from the CAs website.

To provide more timely status information, all CAs provide an Online Certificate Status Protocol (OCSP) Service to enable relying-party application software to determine the status of an identified Certificate in an online mode. The CAs are required to operate their OCSP service as per the requirements specified under the Guidelines issued by CCA.

eSign

eSign is an online Electronic Signature Service, based on successful authentication of individual using e-KYC services, the key pairs generation, the certification of the public key based on authenticated response received from e-KYC services, and digital signature of the electronic document are facilitated by the eSign online Electronic Signature Service provider instantaneously within a single online service. The key pairs are used only once and the private key is deleted after one time use. The Digital Signature Certificates are of 30 minutes validity, and this makes verification simple by eliminating the requirements of revocation checking. Document that is signed using eSign will contain a valid digital signature that can be easily verified using standard methods.



eSign service

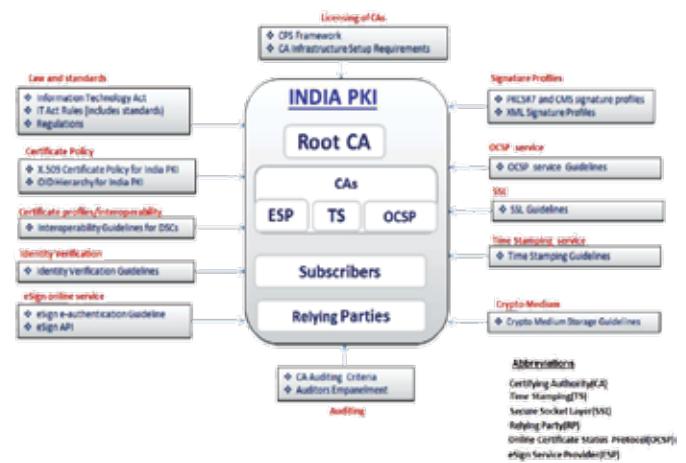
With eSign Service users are expected to submit the document hash and provide Aadhaar authentication or CA authentication. Upon successful authentication, CA generates a key pair for user, obtain certificate from CA, generate Certificate, create electronic signature and send

the signature and Electronic Signature Certificate to the signer for affixing in their document. The keys are deleted immediately after the signature creation. The signed information is packaged in a format as requested by user. CA include all the information required for verification of signature like CRL OCSP response along with Signature. This enable relying parties to verify the signature without making external information provided that the Root certificate is locally available in the trusted store. eSign was started with eKYC service provider as UIDAI where applicant provide OTP or Biometric authentication to UIDAI and in response eKYC information received by CA. Subsequently the enabling provision under IT was amended to include other eKYC services. Now CA can also verify the applicant and maintain eKYC information which is used by subscribers for subsequent eSign service or DSC issuance.

MeitY, in consultation with UIDAI, approved the use of online Aadhaar authentication & eKYC for issuance of DSC as specified under Rule 4 of the Aadhaar Authentication for Good Governance (Social Welfare, Innovation, Knowledge) Rules, 2020. With this, the adoption of eSign service are rapidly increasing.

Electronic Signatures Policy Framework

A pictorial representation and a brief description of policies applicable to CA, electronic Signature Certificate and Electronic Signature are given below:



Policy Framework

In India PKI hierarchy, have two separate trust chains one for one end-entity certificates and one for SSL.

There are twenty Licensed CAs which are operated in the different parts of the country.

CAs are operated under single India PKI Policy. There is no separate policy for any of the licensed CA by Root CA.

The verification requirements prior to issuance end-entity certificates are governed by Identity Verification Guidelines specified by Root CA. Licensed CAs are required to adhere to these Guidelines for issuance of any certificate.

The certificate policy for India PKI covers the policy Id given to each class of certificates which are common across all CA and adhere to India PKI CP.

To facilitate interoperability, Root CA has specified "DSC interoperability Guidelines for issuance certificates under the Root Chain. A detailed specification for end entity and SSL certificates are covered under DSC 10 / 15 interoperability Guidelines specified by Root CA and the same is followed by each sub-CA.

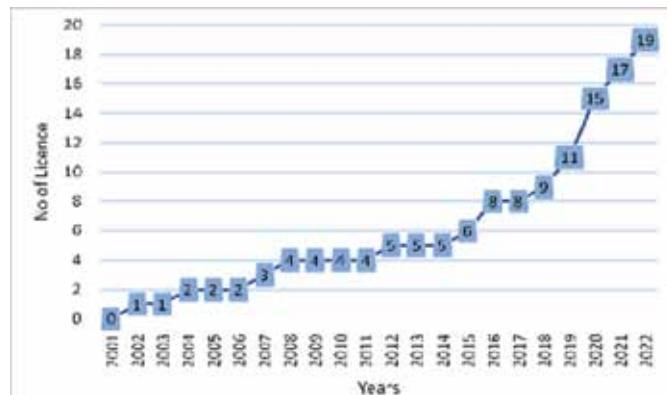
Under the provisions of IT Act Controller to license the Certifying Authorities and also to ensure that none of the provisions of the Act are violated. Audits are carried out to ensure the adherence to Information Technology Act 2000, the rules and regulations thereunder, and guidelines issued by the Controller from time-to-time. Auditing of the physical and technical infrastructure of CA is carried out through a panel of auditors by the CCA. The audit reports are submitted to Root CA directly by auditors. The criteria for the audit include WebTrust and CAB requirements.

In order to establish a single national policy, Root CA has already laid down common CPS template for sub-CAs. Each CA will have their own CPS and have provided links to policy, procedure, guidelines of Root CA. The CPS are available in the disclosure records of each CA published on the website of CCA.

To streamline the activities of Registration Authorities engaged by CAs, Office of CCA included the guidelines with respect to enrollment and operation of Registration Authorities in the Identity Verification Guidelines. Now the RAs are under ambit of audit and liable for action by CAs in the case of dishonest activities.

Licence granted/renewed to operate as Certifying Authority

CCA grant Licence to organization to operate as Certifying Authority and CA issue Digital Signature Certificates to end users. The progress in the licensing of Certifying Authorities are below



Services offered by Certifying Authorities

The licensed Certifying Authorities offer services to public depending on their Organizational policy. A brief overview of the different services offered by the certifying authorities are in the table below

Licensed CAs	Class I-3 DSCs	eSign	SSL and Code Signing Certificates	Time stamping
Safescrypt	✓	✓		✓
IDRBT	✓ Only to Banks		✓ Only to Banks	✓ Only to Banks
(n) Code Solutions	✓	✓	✓	✓
e-Mudhra	✓	✓	✓	✓
CDAC		✓		
Capricom	✓	✓		✓
NSDL e-Gov		✓		
Vsign (Veravas)	✓	✓		
Indian Air Force	✓ Only to IAF			✓ Only to IAF
CSC		✓		
RISL (Raj Comp)	✓	✓	✓	✓
Indian Army	✓ Only to Army	✓	✓ Only to Army	✓ Only to Army
ID Sign	✓	✓		✓
CDSL Ventures		✓		
Pantaship	✓	✓		
Xtra Trust	✓	✓		
Indian Navy	✓ Only to Navy	✓	✓ Only to Navy	✓ Only to Navy
Pro Digi Sign	✓	✓		
SignX	✓	✓		
RPSL		✓		

*The Root CA Certificate of Indian it listed only in Microsoft products (Including IE)

Next Generation PKI for Smart Application

As part of its promotional role for boosting the electronic transactions for e-Commerce and e-Sign application, the Office of CCA conducts awareness programmes. Training programs on Digital Signature and Public Key Infrastructure are continuously being organized across

the country for various target audience groups. These awareness programmes are conducted across the length and breadth of the country. CDAC, Bangalore has identified as awareness partner, through grant-in aid project CDAC, Bangalore has conducted various awareness programs on behalf of CCA India.

A series of Digital Signature and Public Key Infrastructure events were organized during 7-10 September 2022 in Bangalore. The events organized include:

- An International Workshop on Cross Border Certification was organized on 07 September 2022.
- A Tech Expo was organized on 08 September 2022.
- International Conference on Public Key Infrastructure and its Applications - PKIA 2022 (9-10th September 2022)

8.1.2 Digital Locker Authority (DLA)

Under the Digital India Programme, 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 on a real-time basis. These mechanism of ‘e-Document repositories’ and ‘Digital Lockers’ will greatly improve citizen 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)’.

A new digital locker service providers (DLSP) data exchange model has been proposed as the existing framework of Digital locker was having dependency on Aadhaar and usage of same was restricted by the verdict given by Supreme Court of India. This new model allows each DLSP to be in conformity to the updated Aadhaar act and still be able to provide their users access to issuer data within the Digital Locker ecosystem. Each DLSP will be free to further add more documents from these issuers to their system, while also providing users access to documents available via MeitY DigiLocker system.

8.2 Unique Identification Authority of India (UIDAI)

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). The Aadhaar Act 2016 has since been amended by the Aadhaar and Other Laws (Amendment) Act, 2019 (14 of 2019) which was notified on 24th July, 2019 and its provisions came into force on 25th July, 2019.

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 & 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 (No. 18 of 2016); the Aadhaar and Other Laws (Amendment) Ordinance, 2019 (No. 9 of 2019) and the Aadhaar and Other Laws (Amendment) Act, 2019 (14 of 2019)

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 or the Consolidated fund of the State, 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.

The Aadhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Bill, 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 12th July, 2016 and 12th September, 2016.

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, Justice 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 26th September, 2018 by a five Judge Constitution Bench of the Supreme Court, upholding the constitutional validity of Aadhaar with few restrictions and changes.

Following the judgment, a decision was taken to bring necessary changes in the Aadhaar Act to incorporate safeguards to ensure privacy, prevent misuse of personal information and prevent denial of services and benefits to eligible persons as per the directions of the Supreme Court and recommendations of Justice B.N. Srikrishna (Retd.) Committee. Besides, changes were also required in the Indian Telegraph Act, 1885 and Prevention of Money Laundering Act, 2002 to allow voluntary uses of Aadhaar authentication for obtaining SIM cards and opening of bank accounts respectively. Accordingly, the Aadhaar and Other Laws (Amendment) Bill, 2019 was passed by the Lok Sabha on 4th January 2019 but could not be taken up by the Rajya Sabha as it was adjourned sine die. Later, the Aadhaar and Other Laws (Amendment) Ordinance, 2019 (No. 9 of 2019) was promulgated by the President on 02.03.2019 and came into force at once.

Subsequently, the said Ordinance was replaced by the Aadhaar and Other Laws (Amendment) Act, 2019 (14 of 2019). This amended Act inter-alia provides for use of Aadhaar authentication by the State Government, for the purpose of establishing identity of an individual as a condition for receipt of a subsidy, benefit or service for which the expenditure is incurred from, or the receipt therefrom forms part of, the Consolidated Fund of State.

8.2.1 Salient features of the Aadhaar and Other Laws (Amendment) Act, 2019

- To provide for alternate numbers generated by the Authority to conceal the actual Aadhaar number of an individual
- To give an option to children to cancel their Aadhaar number on attaining the age of eighteen years

- To provide for voluntary use of Aadhaar number in physical or electronic form by authentication or offline verification or other mode(s)
- Authentication or offline verification of Aadhaar number can be performed only with the informed consent of the Aadhaar number holder
- Prevention of denial of services for refusing to, or being unable to undergo authentication
- To place safeguards and restrictions on performing authentication
- To lay down the procedure for offline verification
- To confer power upon the Authority to give such directions as it may consider necessary to any entity in Aadhaar ecosystem
- For establishment of Unique Identification Authority of India Fund
- To enhance the restrictions on sharing of information
- To provide for civil penalties, its adjudication and appeal
- To omit Section 57 of the Aadhaar Act
- To allow the use of Aadhaar number for authentication on voluntary basis as acceptable KYC document under the Telegraph Act, 1885 and the Prevention of Money-Laundering Act, 2002
- To allow the State Government also for the purpose of establishing identity of an individual as a condition for receipt of subsidy, benefit or service for which the expenditure is incurred from the Consolidated Fund of State under Section 7 of the said Act.

8.2.2 Rules/ Regulations notified under the Aadhaar Act, 2016

- Unique Identification Authority of India (Terms and Conditions of Service of Chairperson and Members) Rules, 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) [superseded by the Aadhaar (Authentication and Offline verification) Regulations, 2021 (No. 2 of 2021)]
- 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)
- The Unique Identification Authority of India (Returns and Annual Report) Rules, 2018
- The Unique Identification Authority of India (Form of Annual Statement of Accounts) Rules, 2018.
- The Aadhaar (Pricing of Aadhaar Authentication Services) Regulations, 2019 (No.1 of 2019) [superseded by The Aadhaar (Pricing of Aadhaar Authentication Services) Regulations, 2021(No. 1 of 2021)]
- The Aadhaar (Enrolment and Update) (Seventh Amendment) Regulations, 2019 (No. 3 of 2019),
- The Unique Identification Authority of India (Appointment of Officers and Employees) Regulations, 2020 (No.1 of 2020)
- The Unique Identification Authority of India (Salary, Allowances and other Terms and Conditions of Service of Employees) Regulations, 2020 (No.2 of 2020)
- The Aadhaar Authentication for Good Governance (Social Welfare, Innovation, Social Welfare, Innovation, Knowledge Rules, 2020)
- The Aadhaar (Enrolment and Update) (Eighth Amendment) Regulations, 2020 (No. 3 of 2020).
- The Aadhaar (Pricing of Aadhaar Authentication Services) Regulations, 2021 (No. 1 of 2021).
- The Unique Identification Authority of India (Adjudication of Penalties) Rules, 2021
- The Aadhaar (Authentication and Offline verification) Regulations, 2021 (No. 2 of 2021)
- The Unique Identification Authority of India (Appointment of Officers and Employes) (First Amendment) Regulation 2021, (No. 3 of 2021)
- Aadhaar (Authentication and Offline Verification) (First Amendment) Regulations, 2022 (No. 01 of 2022).
- Aadhaar (Enrolment and Update) (Ninth Amendment) Regulations, 2022 (No. 2 of 2022).
- Unique Identification Authority of India (Appointment of Officers and Employees) (Second Amendment) Regulations, 2022 (No. 3 of 2022)
- Unique Identification Authority of India (Appointment of Officers and Employees) (Third Amendment) Regulations, 2022 (No. 5 of 2022).

8.2.3 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. 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.

Approach and Strategy: Enrolment Ecosystem

The first Aadhaar of a resident was created in September, 2010. As on 31st October 2022 134.96 crore Aadhaar have been generated against the projected population (2022) of about 137.29 crore. However, the actual number of Aadhaar holders would always be lesser due to deaths. Hence, the concept of "Live Aadhaar" has been introduced to estimate the number of alive persons holding Aadhaar. As such, 129.20 crore Live Aadhaar have been generated since inception in September, 2009. Thus, UIDAI has covered 94.10% of the projected population. The statistics as of 31st October, 2022 with information in respect of children in the age group 0 < 5 years and 5 < 18 years is provided as below:

Age Band	Population (Projected 2022)	Live - Aadhaar Generated	Aadhaar Saturation
Overall	137.29 cr.	129.20 cr.	94.10%
Population 5<18 years	31.05 cr.	29.42 cr.	94.78%
Population 0 < 5 years	11.47 cr.	3.95 cr.	34.48%

As majority of the adult population has already enrolled for Aadhaar, UIDAI is also focusing on Aadhaar update. UIDAI is providing assistance for successful Aadhaar enrolment and mandatory biometric update done through its Permanent Enrolment Centers (PECs) opened by scheduled banks, India Post, CSC, State Registrars, IPPB, etc.

The aforementioned PECs are providing both enrolment and updating facilities to residents. Consequent to the saturation in Aadhaar Enrolment, Aadhaar update has become a major activity at such PECs. While some update requests will be necessary as per the Aadhaar's process, may arise based on needs of individuals.

The following categories of residents require to update their Aadhaar :

a) Mandatory biometrics update

- i) Children on 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 due to life events such as change of name on marriage, change of address on migration to a new location, etc.
- ii) Change of mobile number or email

c) Document update

Aadhaar number holders may, on completion of every 10 years from the date of enrolment for Aadhaar, update their supporting documents in Aadhaar, at least once, by submitting Proof of Identity (POI) and Proof of Address (POA) documents.

Aadhaar Seva Kendra (ASK)

The Unique Identification Authority of India (UIDAI) has set up exclusive 'Aadhaar Seva Kendra' or ASK as a one stop destination for all Aadhaar services for the residents. The ASK offer dedicated Aadhaar enrolment and updation services to residents in a state-of-the-art environment.

As on 31st October, 2022, 88 ASKs have been made operational. These ASKs are functioning in 72 major cities across the country. ASKs offer a comfortable air conditioned environment to residents. They are wheelchair friendly and have special provisions to service the elderly or specially-abled.

Residents can visit any ASK for the following services:

- Aadhaar enrolment
- Update of any demographic information in their Aadhaar-Name, Address, Gender, Date of Birth, Mobile number or Email Id
- Update of biometric data in their Aadhaar – Photo, Fingerprints and Iris Scans
- Update document in their Aadhaar data base
- Download & Print Aadhaar

These services are available for any resident of India (including NRIs) at all ASKs across the country.

In addition to ASK, CSC-SPV has been permitted to provide Aadhaar enrolment/update services to the residents from its own State/UT level offices and from those district level offices, where ASKs are not present. Accordingly, 25 State/UT level CSC ASKs and 536 District level CSC ASKs are operational.

With the easing of COVID 19 lockdown, the Aadhaar enrolment/update activities are resuming and more than 66,000 enrolment stations are operational across the country under various Registrars as on 31st October 2022.

To make Aadhaar update easier for residents, UIDAI has permitted those CSCs which are designated Banking Correspondents (BCs) of Banks to offer Aadhaar update services. This will allow more than 20,000 such CSCs to offer demographic update service to the residents, out of which 15,067 centers are operational.

The online SSUP portal my Aadhaar Portal has been upgraded for residents to update their Address, Name (minor correction), Date of Birth, Gender and Regional Language, for which the residents will be charged at the rate of ₹ 50/- per request. If the resident furnishes request to update more than one field at a time, the same shall be considered as one request.

In order to cater the expected demand for mobile number integration with Aadhaar, UIDAI has onboarded India Post Payments Bank (IPPB) as its Registrar to provide mobile number update facility to the residents through its 1.5 lakh Postmen equipped with tablet and single fingerprint scanner using Child Enrolment Lite Client (CELC). Out of this, 52,808 Operators are on-boarded and 98,084 machines activated on 31.10.2022. Out of this more than 28,600 operators were active during the month.

Customer Relationship Management & Logistics

Aadhaar Support Services – Aadhaar Sampark Kendra

UIDAI has set up an Aadhaar Sampark Kendra (Contact Centre) which facilitates in resolving residents' queries and grievances related to Aadhaar life cycle and related services. Main objectives of Aadhaar Sampark Kendra are as follow:

- To provide a pan India accessible Toll Free Number and email, using which the Residents can contact Aadhaar Sampark Kendra.
- To provide support in multiple regional languages to cater to complaints and queries from all parts of India.
- To provide an Interactive Voice Response (IVR)

System for residents calling the Aadhaar Sampark Kendra.

- To provide residents facilities to interact with Aadhaar Sampark Kendra executive in case they wish to do the same.

The Residents can also log the complaints through Resident Portal of UIDAI.

- 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 :

Toll-free-number 1947: Toll Free Number '1947' is accessible from anywhere in India. This short code '1947' is a category –I toll free number allotted by DoT to UIDAI. DoT has also approved use of the short code '1947' for inbound and outbound SMS services.

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. The IVRS interacts with the callers in duplex mode through synthesized recorded voice in Hindi/English/Regional Languages depending on 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 enrolment 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.

Chatbot Services

UIDAI has introduced an AI/ML based chat solution which is available on UIDAI's Official website (www.uidai.gov.in) under tagline "Ask Aadhaar-Mitra". This chatbot is trained to respond to the resident's queries based on the predefined Standard Response Templates (SRTs) and aimed at improving the resident's experience. Chatbot also has additional features like locate Aadhar Center, Check Aadhaar enrolment/ update status, Check PVC Card Order status, file a complaint, Check Complaint status and video frame integration. Aadhaar chatbot is available in English and Hindi languages. On an average Aadhar Chatbot is receiving 50,000 queries on daily basis.

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 a printed and laminated document with a photograph, date of birth, demographic information of the resident, Aadhaar number and secure Quick Response (QR) code digitally signed by UIDAI containing photograph and demographic details for the purpose of Offline verification of identity of resident.

For the printing of Aadhaar letters, UIDAI has on-boarded two printers at different locations. Currently, Aadhaar letter is printed in 13 different regional languages.

The Department of Post is the partner for delivery of the Aadhaar letters to the residents at the registered address provided at the time of enrolment/updation through First Class Digital franking mode.

UIDAI sends Aadhaar letters for new enrolments as well as for updates. Since inception and till 31st October 2022, more than 134.26 crore Aadhaar letters have been printed and dispatched to the residents for new enrolments through India Post as First Class Digitally Franked articles. Similarly, 46.01 crore Aadhaar letters have been updated and dispatched to the residents through India Post as First Class Digitally Franked articles from inception till 31st October 2022.

e-Aadhaar

UIDAI provides e-Aadhaar portal for downloading the

Aadhaar letter in PDF format from its official website (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. As such, the e-Aadhaar, which is digitally signed, is a valid and secure electronic document treated at par with the printed Aadhaar letter and Aadhaar PVC card. E-Aadhaar also contains secure Quick Response (QR) code, digitally signed by UIDAI containing photograph and demographic details. In the Aadhaar system, the resident's details can be verified through an established online authentication process. Therefore, e-Aadhaar is acceptable as a valid proof of identity. The relevant circulars have been posted on the website of UIDAI. e-Aadhaar downloads till 31st October 2022 were 173.39 crore.

Order Aadhaar PVC Card

UIDAI provides "Order Aadhaar PVC Card" service on its website www.uidai.gov.in to facilitate the residents to obtain/receive their Aadhaar PVC card delivered through the Speed Post Service of India Post by paying a nominal charge of ₹ 50. Aadhaar PVC card is durable and convenient to carry. It contains multiple security features like Hologram, QR code, ghost image, Guilloche pattern, embossed Aadhaar logo and Print date. All forms of Aadhaar (Aadhaar letter, e-Aadhaar, mAadhaar and Aadhaar PVC card) are equally valid. The resident has the choice to use any of these forms of Aadhaar issued by UIDAI.

8.2.4 Authentication Ecosystem

Aadhaar Authentication

Aadhaar authentication means the process by which the Aadhaar number, along with 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 otherwise, 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 the 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 October 2022, 22 ASAs were 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 October 2022, 177 such entities are live in UIDAI ecosystem as AUAs and 8,420 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 31 October 2022, 168 KUA entities are active on Aadhaar platform, and 1,320.68 crore e-KYC transactions have been performed.

The Aadhaar Authentication for Good Governance (Social Welfare, Innovation, Knowledge) Rules, 2020

In accordance with the Section 4(4)(b)(ii) of the Aadhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Act, 2016, the Aadhaar Authentication for Good Governance (Social Welfare, Innovation, Knowledge) Rules, 2020 have been notified by MeitY on 05.08.2020. Rule 3 of these Rules provides that the Central Government may allow Aadhaar authentication by requesting entities in the interest of good governance, preventing leakage of public funds and enabling better access to services promoting ease of living, for the following purposes, namely:-

- usage of digital platforms to ensure good governance;
- prevention of dissipation of social welfare benefits; and
- enablement of innovation and the spread of knowledge.

The Ministry or Department of Central/State Government desirous of utilizing Aadhaar authentication for a purpose specified in Rule 3 shall prepare a proposal along with justification and submit the same to MeitY (as Central Government). MeitY, on recommendation of UIDAI, may allow Aadhaar authentication to the applicant Government for the approved purpose. In this regard, Circular dated 18.08.2020 has also been issued by MeitY providing application proforma and guidelines for submission of proposals.

8.2.5 Training, Testing and Certification ecosystem

For success of any program, 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 Enrolment Operators (ECMP and CELC). 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 Programs are adopted by the UIDAI. This has led to well-organized enrolment and close to almost 100% enrolment in most of the States.

Master Training on Aadhaar Authentication, Offline Verification and Aadhaar Seeding:

This training ensures creating a pool of trainers at the respective Regional Offices who in turn will be responsible for delivering the training to Enrolment Operators (ECMP and CELC), under their jurisdiction. A total of 72 Master

Training sessions has been conducted from 1st April 2022 to 31st October 2022, in which 2,910 officials were trained.

Mega Training & Certification Camps:

UIDAI undertakes an exercise through Mega Training & Certification camps to create a large pool of certified Enrolment Operators to ensure that there is no disruption of momentum in enrolments. A total of 43 Mega Training and Certification camps on Aadhaar Enrolment have been conducted from 1st April 2022 to 31st October 2022, in which 1,403 individuals were trained and certified.

Orientation Program:

Orientation programs are being carried out for newly appointed Enrolment staff to make them well versed with the enrolment process. 127 Sessions have been conducted from 1st April 2022 to 31st October 2022, in which 7,065 individuals were imparted training.

Refresher Program:

This program is conducted to refresh the knowledge of the active/certified Enrolment Operators and keep them updated on the latest policy changes in the process. 903 programs were conducted from 1st April 2022 to 31st October 2022, in which 47,595 individuals were trained.

Details of Training Imparted (01.04.2022-31.10.2022)

S. No.	Type of Training	Participants	No. of Sessions	Number of Participants Trained
1	Orientation program	New/ Fresh Enrolment Staff	127	7,065
2	Mega Training Certification	Government Officials nominated to become Enrolment Staff	43	1,403
3	Refresher Training	Existing Enrolment Staff	903	47,595
4	Master Training	Government Officials and Enrolment Staffs nominated to become Trainers	72	2,910
Total		1145		58,973

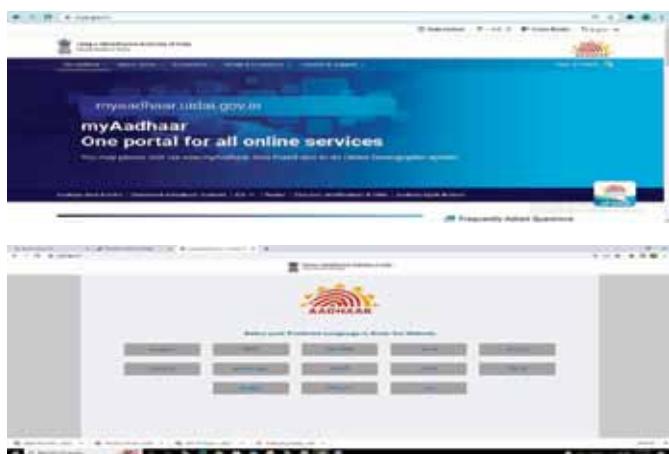
During the period 01st April 2022 to 31st October 2022, approximately 82,627 candidates got certified as Enrolment Operators (ECMP and CELC). This includes certification of candidates from Private/PSU Banks, Department of Post, Education Department, BSNL, Health and other Departments/Ministries.

8.2.6 Knowledge Management System

Knowledge Management Module (KMS) is an online community based platform developed by National Informatics Centre (NIC) to promote internal communications, better information exchange and teamwork amongst UIDAI staff. KM System has KM Dashboard where latest office orders, circulars, tenders, other UIDAI related documents, etc. are uploaded by various divisions, Regional Offices and Managed Service Provider.

8.2.7 UIDAI Website

The UIDAI website (<https://www.uidai.gov.in>) is 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 seeks 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, the UIDAI website and Aadhaar service portals have recently been revamped and made multi device friendly. In addition, the information is available in English, Hindi and 11 Indian regional languages for 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 ensure that the residents get access to the right information at the right time.
- Informative documents on Aadhaar enrolment, authentication technologies, UIDAI ecosystem that provide administrative and technical details on enrolment and authentication systems/processes and various Aadhaar services 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 contact details of various divisions and functionaries at the Headquarter 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 guidance 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 related to the total numbers of Aadhaar generated and authentications 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's Social Media Channels.

UIDAI Website as Common Repository

The UIDAI website functions as a common repository of the following:

- Policies, guidelines, checklists and other on-boarding documents which 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 an Enrolment Centres
- Book an appointment
- Check Aadhaar Status
- Download Aadhaar
- Retrieve Lost or forgotten UID/EID
- Order Aadhaar PVC Card
- Check Aadhaar PVC Card status
- Update Aadhaar at Enrolment/update Centre
- Check Aadhaar update Status
- Update Demographics Data and Check Status
- Aadhaar Update History
- Verify an Aadhaar Number
- Verify Email/Mobile Number
- Retrieve Lost or Forgotten EID/UID
- Virtual ID (VID) Generator
- Aadhaar Paperless offline e-KYC (Beta)

- Check Aadhaar/Bank Account Linking Status
- Lock/Unlock Biometrics
- Aadhaar Authentication History
- Aadhaar Lock and Unlock service
- Aadhaar Services on sms

Aadhaar Dashboard:

The analytic dashboard displays the big data for Aadhaar enrolment, update, and authentication and e-KYC services.

8.2.8 Unified Mobile App:

UIDAI has released an upgraded version of mAadhaar App that unifies the previously developed mobile applications (mAadhaar, Resident App and QR Code scanner) into one unified application. The Smart Phone Application is available in both Android and iOS version and features an array of Aadhaar services. The application provides a personalised section for the Aadhaar holder which provides the mobile based Aadhaar which is equivalent to Aadhaar letter, eAadhaar and Aadhaar PVC card. Residents with or without Aadhaar can install this Application on their smart phones. However, to avail of the personalised Aadhaar services, the resident will have to register their Aadhaar profile through the application, by registering the Mobile Number in the UIDAI Database. The Application has been made available in 11 regional languages apart from English and Hindi.

8.2.9 Security and privacy of Aadhaar

Privacy and Security of Aadhaar data is of utmost importance to Government:

UIDAI has a well-designed, multi-layer robust security system in place and it 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.

Utmost priority is accorded to privacy of Aadhaar data which is evident from the 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 of the Act. Unauthorized access to Central Identities Data Repository (CIDR) is punishable with imprisonment up to 10 years (Section 38). Tampering of data in CIDR is also punishable with imprisonment up to 10 years (Section 39).

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 enrolments 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 2021 have been framed to ensure that authentication is done in a secure form.

Privacy and Security by Design:

Security and Privacy of personal data have been fundamental in design of Aadhaar system. The Aadhaar system only collects minimal data necessary to provide unique identity, issues the Aadhaar number after biometric de-duplication and manage lifecycle changes of that identity record. Certain Application Programming Interface (API) are also available for verifying the identity (online authentication) through various applications using identity verification. 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 for 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 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 using UIDAI software under a highly robust, controlled, non-repudiable and secure process. Residents are enrolled for Aadhaar across the entire country through certified operators, who are selected based on a rigorous examination and testing process. The operator also has to obtain his own Aadhaar number first and then sign each and every enrolment through his own fingerprints 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 and only when no match is found, Aadhaar numbers are generated. All enrolment data including biometrics are encrypted using 2048-bit encryption key at the time of enrolment and is not accessible to any agency, except UIDAI, which can access these data only through a secure decryption key available to UIDAI. So far, not a single incident has come to the notice wherein core biometrics of an enrolled resident 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 their 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, Driver's License Number, PDS card number, EPIC number, etc.) to any other system. This design allows transaction data to reside in specific systems through a federated model. This approach allows resident information to stay in distributed architecture across many systems owned by different agencies.

Authentication:

Aadhaar authentication response for the CIDR is only a 'yes/no' token. Aadhaar authentication allows applications to verify the identity claim by the resident while servicing them and 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 enables residents to authorize UIDAI to share electronic version of their Aadhaar for authentication. The Aadhaar e-KYC request is only processed after successful resident authentication.

Optimal Ignorance:

Authentication is designed in such a way that neither the "purpose" of authentication nor any other transaction context captioned in the UIDAI CIDR. This design is primarily to ensure "zero-knowledge" and protection of privacy.

No Location Awareness:

UIDAI authentication system does not capture location attributes, i.e. Aadhaar authentication is oblivious to the location from where the authentication request is made, thereby eliminating the risk of a resident being tracked.

Federated Data Model & One Way Linkage:

By its very design, Aadhaar database does not have 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 references to the UIDAI (through the use of the Aadhaar number), but the UIDAI does not maintain 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.

UIDAI certified as ISO 27001:

UIDAI has established the Information Security Management System and been certified as ISO 27001:2013 early by STQC.

UIDAI certified as ISO/IEC 29100:2011 & ISO/IEC 27701:2019

UIDAI complies to ISO/IEC 29100:2011 (Information Technology – Security Techniques – Privacy Framework for Central Identities Data Repository (CIDR) and ISO/IEC 27701:2019 (Privacy Information Management System)

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 are 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. UIDAI-CIDR has also been declared as "Protected System" by National Critical Information Infrastructure Protection Centre (NCIIPC) adding another layer of Information Technology security assurance.

Governance Risk Compliance and Performance Service Provider (GRCP-SP):

The aim of GRCP framework is to facilitate creation of a robust, comprehensive, and secure environment for UIDAI to operate. The GRCP-SP provides UIDAI management with oversight of partner ecosystem in terms of visibility, effectiveness, and control. It also performs the duties of a third-party Auditor.

Information Security Assessment of External ecosystem partners:

UIDAI's security has been enhanced further through regular Information Security assessments of various ecosystem partners, and through an audit by other external auditors.

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 substantially.

8.2.10 Aadhaar - A Tool for Governance Reform

Aadhaar and Financial Inclusion:

Aadhaar is a unique digital identity which remains unchanged throughout the lifespan of an individual. When linked with a bank account of an individual, Aadhaar becomes a financial address of that individual which helps to accomplish the country's goal of financial inclusion. The 12-digit Aadhaar is sufficient to transfer any payments to an individual. Till few years ago, to transfer money to a beneficiary, the Government needed to know the bank account of the beneficiary along with other details like IFS Code, bank branch details etc, which are prone to changes. However, with the introduction of Aadhaar, direct benefit transfer (DBT) to an individual's bank account takes place by just using his Aadhaar number without being affected by any changes in his bank account. Different types of payment systems which use Aadhaar number are described below:

a) Aadhaar Payment Bridge (APB):

This is largely a Government-to-Citizen (G2C) and Business-to-Consumer (B2C) platform for remitting funds to an Aadhaar holder by just quoting his Aadhaar number. Bank account linked with Aadhaar automatically receives the funds coming through APB. Currently, some of the flagship schemes with large number of beneficiaries viz. DBTL (PAHAL), PM-KISAN, MGNREGS, NSAP, various Scholarship Schemes and TPDS etc., are transferring cash benefits and subsidies directly to the beneficiaries' bank accounts through APB.

As on 31st October 2022, 75.20 crore unique Aadhaar holders have linked their Aadhaar with multiple bank accounts across 1187 banks including all nationalized banks, RRBs and many cooperative banks. An amount of 7,56,596 crore has been remitted so far through over 999.36 crore successful transactions. (Data source: NPCI).

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 are 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 October 2022, 1573.48 crore successful transactions have been done cumulatively on this platform across nearly 44.99 lakh microATMs. (Data source: NPCI)

c) 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. Several DBT schemes are leveraging APB to transfer cash benefits to the Aadhaar linked bank accounts of the beneficiaries. As on 31st October 2022, multiple schemes including PAHAL had paid over 7,56,596 crore across 999.36 crore successful transactions. It has been made possible by linking Aadhaar with the bank accounts of the beneficiaries. (Data source: NPCI)

Notifications issued under section 7 of the Aadhaar Act 2016 by central Ministries/ Departments for DBT Schemes

In order to use Aadhaar of the beneficiaries under various schemes which are funded from the Consolidated Fund of India, the concerned Department/Ministry administering the Scheme is required to issue a Gazette notification under Section 7 of the Aadhaar Act 2016. As per the decision of the Cabinet Secretariat, UIDAI has been mandated to facilitate the Ministries/Departments in drafting and issuance of such notifications by them in compliance with the Aadhaar Act 2016, with due vetting by the Ministry of Law and Justice. Till 31st October 2022, UIDAI has coordinated with 48 Ministries/Departments to issue 183 notifications under Section 7 of Aadhaar Act covering a total of 318 Schemes (Centrally sponsored or Central sector). (Data source: Compiled from eGazzette.nic.in)

Use of Aadhaar under section 7 of the Aadhaar Act 2016 (as amended by the Aadhaar and Other Laws (Amendment) Act, 2019) by the State Governments for the schemes funded out of Consolidated Fund of State

Post passing of the Aadhaar and Other Laws (Amendment) Act, 2019 (notified on 24th July 2019) by the Parliament, which inter-alia, amended section 7 of the Aadhaar Act 2016 to include Consolidated Fund of State, UIDAI issued detailed guidelines to all States on 25th November 2019 regarding use of Aadhaar under section 7 of the Aadhaar Act 2016 by the State Governments for the schemes funded out of Consolidated Fund of State. The guidelines included two templates of section 7 notifications for the adult and children beneficiaries separately. As on 31st October 2022, about 680 schemes have been notified by a total of 18 States.

8.2.11 Implementation of Official Language policy in UIDAI

UIDAI is implementing Official Language Policy of Govt. of India in its Headquarters as well as in its all 8 Regional Offices and ensuring the compliance of the various provisions envisaged in the Official Languages Act and the 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 year 2022-23, two meetings of Official Language Implementation Committee were held at Headquarters under the Chairmanship of CEO, UIDAI,

in which among other items/subjects, progressive use of Hindi was discussed and decisions were taken to increase the use of Hindi in Headquarters and as well as in Regional Offices of UIDAI. Necessary guidelines were issued for promoting the use of Hindi as per Government directions specially for original correspondence in Hindi to Region A, B, and C according to the targets prescribed in Annual Programme 2022-23 of Department of Official Language, Ministry of Home Affairs. UIDAI, Hqrs. representation was made in the meeting of Town Official Language Implementation Committee, Delhi (Central-2) held on 19th August 2022.

During the period under review, two Hindi training workshops were organized for sensitizing officials of UIDAI on Official Language Policies/Rules and other subjects. More than 60 officers and staff participated in these workshops from Headquarter and Regional Offices.

The 2nd Sub Committee of Committee of Parliament on Official Language inspected Regional Office, Chandigarh of UIDAI on 30.04.2022 and gave suggestions to propagate use of Hindi in day today official functioning. Assurances given during the inspection of RO Chandigarh have been fulfilled and compliance report has been sent to MeitY for onward submission to Committee of Parliament on Official Language.

Hindi Pakhwara was organized from 16th to 29th September, 2022 in UIDAI Headquarters and its Regional Offices. On the occasion of Hindi Diwas, a Hindi sandesh from the desk of Chief Executive Officer was circulated to all offices/personnel of Authority. During Hindi Fortnight five Hindi competitions were organized

in which 221 officers/employees of UIDAI Headquarters actively participated. Annual Prize Distribution Function was organized on 29th Sep, 2022 at UIDAI Headquarters and cash prizes & certificates were awarded to 29 winner officers/employees of Headquarters by the Chief Executive Officer, UIDAI.

To promote use of Official Language in official work, every year UIDAI carries out an incentive scheme for noting and drafting in Hindi separately at Headquarter and its Regional Offices. Under this scheme seven employees of Headquarters were found eligible for cash prizes as per scheme and winners were awarded cash prizes & certificates in Annual Prize Distribution Function held on 29th Sep, 2021.

8.2.12 Details of Budget & Expenditure (from 1st April 2022 to 31st October 2022)

During 2022-23 (upto 31st October 2022), an expenditure of ₹ 799.53 crore has been incurred against Budget Estimate of ₹ 1,110.00 crore. Since inception, the total expenditure incurred is ₹ 15,238.60 crore.

8.3 Indian Computer Emergency Response Team (CERT-In)

The Indian Computer Emergency Response Team (CERT-In) is a Government organisation under Ministry of Electronics and Information Technology (MeitY), 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.

The further details are available in Chapter 6.



Attached Offices and Societies

9.1 CDAC

Centre for Development of Advanced Computing (C-DAC) is a premier R&D organization 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 expanded to various other areas such as Cloud Computing, Multilingual Computing, Heritage Computing, Professional Electronics and Quantum Computing, 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 high-end training in Electronics and IT in the country.

During the year 2022-23, C-DAC made significant advancements in carrying out research and development in electronics and information technology, developing and deploying various solutions, collaborating with organizations of repute both at national and international level, providing trainings and organizing events etc.

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) and National Supercomputing Mission (NSM)

Under NSM (approved by Cabinet Committee on Economic Affairs (CCEA) in 2015), C-DAC is engaged in the design & development of the Indigenous Supercomputing ecosystem in a phased manner: from “Assembly” to “Manufacturing” to “Design and Manufacturing” of HPC systems. C-DAC is carrying out frontier research in design and development of HPC Components (HPC processor, Server node, Interconnect switch, Cluster, and Liquid cooling system), HPC System

Software, HPC Applications, and HPC Solutions and Services along with deployment of peta-scale computing infrastructure across the country. **The details may be seen at Chapter 5.**

9.1.2 National Level Initiatives

9.1.2.1 Digital India RISC-V Program (DIR-V)

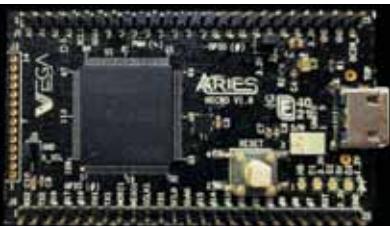
In furtherance of the vision of Aatma Nirbhar Bharat and positioning India as the global hub for Electronics System Design and Manufacturing, Govt. of India has launched the Digital India RISC-V (DIR-V) Program with the aim of developing a portfolio of RISC-V based Microprocessors and its compute ecosystem.

C-DAC has completed the design and development of the VEGA series of microprocessors including India's first indigenous 64-bit multi-core RISC-V based Superscalar Out-of-order Processor. The VEGA series comprise of 32/64-bit Single/Dual/Quad Core superscalar Out-of-Order high performance processor cores based on RISC-V Instruction Set Architecture along with a robust ecosystem and five processors are currently available in the VEGA series.

Development and fabrication of several SoC chips integrating the VEGA Processor is also envisaged. The first VEGA microprocessor-based SoC chip ‘THEJAS32’, a 32-bit Single core SoC has been successfully fabricated and available.

A series of fully indigenous “Made in India” development boards named “ARIES” have been built upon the RISC-V ISA compliant VEGA Processors comprising easy-to-use hardware and software for development of embedded systems for wide range of applications including Sensor fusion, Smart Meter, System supervisors, Remote sensors, Small IoT devices, Wearable devices, Toy and electronic education equipment, Industrial networking

and storage. The VEGA SDK provides a full ecosystem with numerous examples and support documentation.



ARIES development board ARIES micro development board

'THEJAS64' a 64-bit Single core SoC chip is being fabricated at the Indian foundry SCL, Chandigarh. The design implementation and fabrication of 'DHRUV64' 64-bit Dual core, SoC, 'DHANUSH64' and 'DHANUSH64+' 64-bit Quad core SoC variants are also scheduled.

9.1.2.2 Emergency Response Support System (ERSS)

Emergency Response Support System (ERSS) is the vision of Govt. of India to launch 'One India One Emergency Number - 112' as the common emergency number for citizens to seek instant assistance on distress. Emergency signals (Voice, SMS, E-Mail, Panic signals, Social Media, etc.) triggered by citizens shall converge at a centralized State Emergency Response Centre (SERC), quickly processed and delivered to multiple services (Police, Health, Fire, Disaster Management, Railways etc.) for instant assistance to the service requester within the 'Golden Hours'. ERSS-112 is a totally indigenous, Make-In-India solution, developed by C-DAC as per the guidelines of MHA, Govt. of India. The ERSS-112 system is operational in 28 states/UTs. C-DAC has now initiated the Next Generation ERSS-112 development process. Automation of WHL-181 and CHL-1098, as well as Integration with ERSS-112, are current key development initiatives.

9.1.2.3 National Mission on Power Electronics Technology (NaMPET)

NaMPET is a National level R&D Programme facilitating Research, Development, Deployment and Commercialization of Power electronics Technology. More than 20 Academic Institutions and about 25-30 Industries are actively participating in technology developments and manufacturing through ToT.

C-DAC Vehicle Control Unit (VCU) technology has crossed 100 crore worth production for Indian Railways and rated as one of the most reliable platforms in

operation. Indigenous TCN controller development is initiated.

Smart Energy Meter (SEM) technology has been accepted by 8 Industries.

Major technology developments for comprehensive EV charging solutions, Power Quality centre for Smart grid, Planar magnetic design for high frequency, Wide Band Gap (WBG) device-based converter & sensor developments etc. are underway.

Commercial turnkey deployment of 1MW Power Plant and 48VDC powering for 5 storied building with C-DAC technologies are getting commissioned for Agency for New and Renewable Energy Research and Technology (ANERT) and Kerala Development and Innovation Strategy Council (KDISC), First of the kind indigenous Power system real-time simulator being configured for IISc.

Power amplifier development for Sonar application initiated for NPOL, DRDO. High voltage (100kV) power supply for X-Ray will be a crucial development for the medical sector.

9.1.2.4 Solutions for Smart Cities

Delhi Safe City

A safe city is the vision of the Ministry of Home Affairs (MHA), Govt. of India, to launch CCTV Surveillance in public places to aid Delhi Police to combat women's safety-related challenges in Delhi and at the same time reduce the overall criminal activities in the city.

During the year, MeitY has accorded the approval to C-DAC for the award of the contract to the Selected Master System Integrator (MSI) and Internet Service Provider (ISP) for the implementation of the project. C-DAC is engaged with identified industry partners to implement the same. Joint Survey to freeze the location for installation of field equipment etc. for phase-1 is completed.

InTranSE Phase-II

C-DAC is executing InTranSE Phase-II project in collaboration with IIT Bombay, IIT Madras and IISc Bangalore. As a part of the same, following products have been developed:

On-board Driver Assistance and Warning System (ODAWS) is developed to instrument automotive vehicles and evaluate driving behavior leading to driver

assistance and warning systems to prevent accidents. Industry tie-up has been firmed up for the field evaluation of ODAWS.

Bus Priority System at signalized intersections The field implementation of the Bus Priority System was carried out in Chennai. The bus priority system algorithm is integrated with the C-DAC traffic controller and the product is launched at the ITS conference conducted in Delhi.

A mobile app-based Departure Time Traveler is developed to provide travel time information for commuters to plan their travel efficiently. The product was launched at the ITS conference conducted in Delhi.

Data-driven Models and Decision Support Tools is developed for Improved Transit Reliability for Advanced Public Transportation Systems (APTS) under demand variability and operational uncertainty present in Indian cities. PTRGS is a mobile Application to the passengers with optimal or customized routes based on real-time information about location of buses and passenger demand.

Common Service Layer software framework (CoSMiC) is developed for ITS devices and applications. WiTraC, CUTE, TraMM-EnV, EmSerV, PeSCo and other third-party products data from IUDX platform has been integrated and tested for interoperability using CoSMiC platform. The product is launched and preparation of the EOI documents for TOT is in progress.

Advanced Traffic Management Solution (ATMS) Suite has three components – Traffic controller hardware (model: CUTE) and ATMS software - Traffic Signal Remote Monitoring and Management Software (TraMM-EnV) & Composite Signal Control strategy (CoSiCoSt-EnV). EOI process for the Transfer of Technology (ToT) of Advanced Traffic Management Solution (ATMS) Suite with CUTE, TraMM-EnV & CoSiCoSt-EnV have been completed. Eight Indian companies have taken ToT for TraMM-EnV software, Five Indian companies have taken ToT for CoSiCoSt-EnV software and Five Indian companies have taken TOT for CUTE hardware. Deployment of these products are being done directly by C-DAC or through our technology partners and presence of the C-DAC ATMS solution is available in around 25 cities in India.

Fleet Management Service (FMS) is developed having features like dynamic Fleet Registration & Real-time

Tracking, control centre functionalities like track and trip view, map services to provide real time plotting of point of interest, geofencing, route management, alert messages on speed violation, route-based alerts, VLT tampering, geofence alerts and report generation. This product is being deployed to SupplyCo, Kerala State Civil Supplies Corporation.

Intelligent Traffic Management System (ITMS) for Delhi Police. ITMS is a vision of Delhi Police under the jurisdiction of Ministry of Home Affairs (MHA), Govt. of India, indents to undertake the modernization and upgradation programme by implementing a versatile, comprehensive, integrated, data centric, scalable ITMS that leverages state of art technologies in Smart Traffic Signals and Automated Enforcement & Prosecution.

9.1.2.5 Strategic Electronics

C-DAC has developed many systems of strategic importance such as the following:

- Indigenisation of Naval systems- Development and field trials of Echo sounders and Doppler Velocity log for Submarine class of Indian Navy ships were completed.
- Indigenisation of Avionics module-C-DAC is indigenizing Avionics modules in collaboration with Hindustan Aeronautics Limited (HAL). The development of Engine starting control unit of Artouste Engine for Chetak helicopters and Speed switch of Garrett engine for Dornier aircrafts are completed with Centre for Military Airworthiness and Certification (CEMILAC).
- Indigenisation of systems for Indian Army- Developed Acoustic Gunshot Detection System that detects and conveys the location of gunfire using an array of acoustic sensors. These systems can be used by military, law enforcement and security agencies to identify the direction of gunfire. Development of Vehicle mounted configuration is completed and ToT being initiated.
- Indigenisation of Space systems-Ultrasonic Solid propellant Burn rate Measurement System developed for the measurement of the burning rate of solid propellant specimens of rocket motors used in space flights by ISRO is now offered to Defense sector for missile applications. Multiple orders were received from Defense labs across the country.

9.1.3 Quantum Computing

9.1.3.1 Metro Area Quantum Access Network (MAQAN)

MAQAN aims to demonstrate secure key generation, key management, and secure communication over India's first quantum network; develop indigenous hardware, firmware, and software for deployment over MAQAN; study well-known QKD protocols (like BB84, COW and RR-DPS) parameter characteristics and suitability for MAQAN and develop new protocols for use on MAQAN and to Establish MAQAN as a public testbed to test and validate quantum key distribution hardware.

During the year, setup of a time synchronization network based on White Rabbit protocol and new chassis development based on ZCU Ultrascale+ architecture has been completed. Field demonstration of a 1 x 2 MAQAN network at Chennai and Setup of a QKD at C-DAC Bangalore is in progress.

9.1.3.2 QSim - Quantum Computer Simulator Toolkit

QSim allows researchers to explore and develop Quantum Algorithms and applications. These algorithms and applications can run without many modifications on actual Quantum Hardware when available in future. It is being executed collaboratively by C-DAC, IISc Bangalore and IIT Roorkee. QSim is accessible via web portal and is currently set up with the PARAM SHAKTI supercomputing machine as the backend. It is also available as a standalone system as PARAM SHAVAK QSim. The indigenous simulator is also ported for running quantum simulations on GPU. QSim has attracted several start-ups working in the field of quantum technologies as well as other sectors where quantum computing might play a significant role in the future.

9.1.3.3 Centre of Excellence in Quantum Technology

It aims to develop FPGA based control and measurement hardware for characterization of a quantum computer testbed, Complete Python based software framework for real-time control and data acquisition from the quantum measurement hardware for characterization of a quantum computer testbed and development of project website. During the year, design, development and testing of a Python based software framework for measurement instruments has been carried out for two instruments based on QCoDes (script and UI based). DDR memory read and write with hardware trigger using Python script has been tested.

9.1.4 Artificial Intelligence, Language Computing & Heritage Computing

9.1.4.1 Natural Language Translation Mission (NLTM)

NLTM is a collective effort of Government, Academia and Startups to nurture language technology eco- system. C-DAC is working on English-to-Indian Language Machine Translation and among Indian language pair namely Machine Translation System from English to Indian Languages [Hindi, Marathi, Odia, Gujarati, Kannada and Malayalam] and vice versa and Vidyaapati: A system for bidirectional Machine Translation involving Bengali, Konkani, Maithili, Marathi, and Hindi using the Neural Machine translation (NMT) framework.

9.1.5.2 Language & Heritage Computing Technologies

Translation Memory Based English to Hindi & vice-versa Translation System (Translation Memory- कठरश्य) "Kanthast"; is a Translation memory system that allows a translator to re-use the already translated segments while translating a new file, either through a complete match or partial match. Available as Standalone and web version. This system is made available to all by the Department of Official Language, Ministry of Home Affairs, and Government of India, free of cost.

The enhanced and updated version namely Kanthast 2.0 was launched by Honourable Union Home Minister, Shri Amit Shah on September 14, 2022 on the occasion of Hindi Diwas held at Surat, Gujarat.

Launch of Museums of India Mobile App

The Museums of India Mobile App developed by C-DAC was launched by Shri G. Kishan Reddy, Hon'ble Minister for Culture and Tourism at New Delhi. The Museums of India Mobile App provides a digital showcase of 750 objects from 8 National Museums across the country.

Launch of 3D Hologram of Dr. Ambedkar

C-DAC developed the 3D Hologram of Dr. Ambedkar for Symbiosis Society's Dr. Babasaheb Ambedkar Museum and Memorial at Pune, which was inaugurated by Dr. Virendra Kumar, Hon'ble Minister for Social Justice and Empowerment, Govt. of India at a special function organized on May 6, 2022.

9.1.5 Health Informatics

9.1.5.2 Telemedicine Solutions

eSanjeevani OPD

eSanjeevani is an innovative, indigenous, cost-effective and integrated cloud-based telemedicine system developed by C-DAC maintained for the Ministry of Health and Family Welfare. eSanjeevani has been implemented in two variants namely, eSanjeevani AB-HWC (doctor to doctor telemedicine platform for assisted telemedicine) and eSanjeevani OPD (patient to doctor telemedicine platform). At present, eSanjeevani is operational in all States and Union Territories across India.

Till now 1,03,701 Health & Wellness Centres (HWC) in rural areas and 12,226 Hubs at tertiary level hospitals, Medical Colleges in the States have been enabled in the eSanjeevani. This innovative solution has served over 6.5 Crore patients across the country and is currently serving over 2,50,000 patients on a daily basis. Over 2,08,432 medical specialists, doctors and health workers have been trained and on-boarded on eSanjeevani to serve the Indian populace remotely. At present, 1124 online OPDs are hosted on eSanjeevani OPD.

The National Telemedicine Service has already been replicated & the portal for India's defense personnel & their dependants. The Indian Defence Ministry has set up as Services eHealth Assistance & Teleconsultation (www.sehatopd.gov.in), SeHATOPD uses eSanjeevani's telemedicine technology. eHIVCare, a specialized telemedicine network for PLHIVs (People Living with HIV/AIDS) has also been set up for NACO, India.

Mercury™ Nimbus Neo Suite – An enterprise Telemedicine solution

Mercury™ Nimbus Neo Suite is a 5G enabled cloud-based Telemedicine, Tele-ICU, EMR/EHR-centric teleconsultation solution that can scale from clinic to multi-hospital deployment scenarios. It's real-time image collaboration tool, CollabMedImaging is ranked in the top 30 under the 5G hackathon conducted by the Department of Communication, Govt. of India. 5G enabled solution was tested on CWEiT, IITM 5G testbed, and C-DAC's own 5G simulation environment. The solution is fine-tuned for a better user experience.

Mercury™ Nimbus solution continued its Telemedicine services to Odisha state and the NTPC telemedicine

network. Under the Odisha Telemedicine network, 05 State Specialty Hospitals are connected with 30 district hospitals, and 13 e-ICU centers to provide consultation to remote patients where approximately 5000 Teleconsultations were carried out to date. It has also been deployed at NTPC Data Centre, Noida, and 17 remote healthcare centers of NTPC located across India to interconnect with the 02 Specialty healthcare centers benefiting NTPC employees and their families. Approximately 2500 Teleconsultations were carried out to date.

9.1.5.2 Healthcare Solutions

e-Upkaran -Equipment Maintenance & Management Solution

C-DAC's "e-Upkaran" is a web-based Equipment Management and Maintenance System for the Management and Maintenance of Biomedical Equipment in the healthcare system of the country. With inclusion of UPMSCl Uttar Pradesh, e-Upkaran deployment tally has increased to 11 Instances in India covering 10 States and 01 Union Territory. The same is also being deployed at Directorate of Insurance Medical Services, Andhra Pradesh.

e-Aushadhi - web-based Supply Chain Management System

C-DAC's "e-Aushadhi" is a web-based Supply Chain Management System for the distribution and supply of drugs and vaccines in the healthcare system of the country. During this year, with inclusion of OSMCL Odisha & Lakshadweep, e-Aushadhi deployment tally has increased to 29 Instances in India covering 20 States, 03 Union Territory, 05 National Program under MoHFW and 01 Program under DGAFMS, Ministry of Defence.

e-RaktKosh - Blood Bank Management System

"e-RaktKosh", an initiative from MoH&FW, is a centralized Blood Bank Management System. It is a comprehensive IT solution for streamlining the standard operating procedures, guidelines and workflow of blood banks complying with the guidelines / standards of NACO and NABH. e-RaktKosh has onboarded 2785 blood banks across 34 States and UTs in the country. e-RaktKosh has been upgraded to the next level by compliance with ABDM Building Blocks and integration of the citizen centric functionalities with COWIN App and PayTm App.

e-Sushrut - Hospital Management and Information System

C-DAC has indigenously designed and developed the “e-Sushrut”, a full-fledged Hospital Management Information System that provides an indispensable mechanism for digitizing and streamlining the workflow of various hospital services. During the year, e-Sushrut deployment in the country has taken another step forward by covering additional States under State-wide deployment viz. States of Uttar Pradesh, Arunachal Pradesh, Goa, Sikkim, Himachal Pradesh. With inclusion of these States, e-Sushrut State-wide deployment tally has reached to 09 States across India. Additionally, C-DAC has been awarded contract for rollout of e-Sushrut HMIS at 22 Health Institutions of National Hydro Electric Power Corporation (NHPC).

AAKANKSHA - Radiation Treatment Planning System (TPS)

Radiation physicist at Tata Memorial Centre (TMC) used Aakanksha Brachytherapy TPS, generated radiation treatment plans, verified the planning process, and dosimetry for different types of applicators that suits Intra-cavity and interstitial-based treatments. The results were benchmarked with the existing TPS systems at TMC. Further, new features were added to the system. The TPS system was deployed at Tata Memorial Centre on a pilot basis for verification and validation of the system for dosimetry, overall planning process, accuracy, and efficacy of treatment planning.

9.1.5.3 National Resource Centre for EHR Standards (NRCeS)

National Resource Centre for EHR Standards for India is established as a Centre of Excellence by the Ministry of Health and Family Welfare (MoHFW), Govt. of India to accelerate and promote the adoption of EHR standards in India. NRCeS contributes to the adoption of EHR standards through six different activities; Training and Promotion, Tools Development, Implementation Support, National Releases and Extensions, Liaison with Standards Organization, and Advisory and Consultation.

Major activities carried out during the year include:

FHIR Profiles and FHIR Implementation Guide for Ayushman Bharat Digital Mission (ABDM): Over 38 FHIR profiles and 19 value sets based on ABDM Health Data Interchange Specifications 1.0 are developed and the FHIR Implementation Guide (IG) for NDHM are made available on NRCeS website.

Common Drug Codes for India: NRCeS further enhanced the contents and coverage in 2022 with releases on June 03, 2022, July 15, 2022, and August 30, 2022.

India AYUSH Extension: SNOMED CT was further enhanced with the releases on June 15, 2022, and August 24, 2022. The content of this extension is developed by Central Council for Research in Ayurvedic Sciences (CCRAS), the Central Council for Research in Siddha (CCRS), and the Central Council for Research in Unani Medicine (CCRUM), Ministry of AYUSH, Govt. of India.

India Patient Instruction Language Extension for SNOMED CT: To support medical information in the local language, NRCeS released India Patient Instruction Language Extension for SNOMED CT. The release provides the patient instruction terms in Hindi and covers frequency of dose, route of administration, dose units, and dose instructions that are generally given in the 900 concepts covering concepts.

9.1.6 Emerging Technologies, Cyber Security and Cyber Forensics

9.1.6.1 Unified Blockchain Framework

C-DAC along with consortium partners have evolved the National Blockchain Framework (NBF) with technology stack supporting the following capabilities: (i) End-to-end rapid application development (ii) Interoperability across the Blockchain platforms & applications (iii) Offering Blockchain as a Service (BaaS) (iv) OpenAPIs for seamless integration (v) End-to-end Security Assessment of Blockchain applications along with Technology stack and (vi) Geographically Distributed Blockchain Infrastructure. The stack supports both Single and MultiNode Blockchain Network setup based on Hyperledger Fabric and Sawtooth spread across geographically located distributed nodes. The setup supports Bring Your Own Infrastructure (BYOI) capability. The framework hosts generic smart contracts for various applications such as supply chain, certificate management, multi-stakeholder document signing and so on. It supports authentication through ePramaan and connects to value added service such as e-Sign. It is being integrated with indigenous Certifying Authority implemented. A security evaluation methodology is evolved which aids in assuring the security of the Blockchain stack across multiple layers. Guidelines are derived for optimal settings for Raft and SmartBFT consensus algorithms based on Hyperledger Fabric

which are helpful for efficient deployment of Blockchain applications.

9.1.6.2 SDN based Middleware for 5G Environment

As a part of “Middleware, Applications & Platform for 5G Environment” activity, application exploration over in-house C-DAC PARAM Shavak based SDN experimental sandbox environment, along with opensource 5G testbed simulation setup is being carried-out. An open telemetry services and visualization dashboard is being leveraged for application traffic analysis. C-DAC healthcare application Mercury™ Nimbus Neo Suite and Voice Enabled Doctor Desk (VEDD) were instrumented accordingly.

Evaluations at CEWiT (Center of Excellence in Wireless Technology) at IIT Chennai including API integration towards 5G primitives are ongoing. The solutions and 5G experiments were showcased at C-DAC stall under MeitY pavilion, and was presented at DoT-TSDSI international conference at India Mobile Congress (IMC) held in October 2022. Interactions with MoHFW, DGHS and NIHFH under 5G healthcare usecase is in progress. Collaborative Live Video Analytics for Large Camera Deployments using 5G and Disaster Management applications Fire is also being assessed over 5G simulation setup.

Cyber Threat Management System (CTMS)

This framework has been developed for large-scale attack data capturing, collection and analysis which is being leveraged by the National Threat Situational Awareness Program (TSAP) centre and is used for generation of cyber threat intelligence. The threat capturing sensors are deployed at different organizations of various sectors. CTMS is currently functional at national threat situational awareness program (TSAP) centre at CERT-In, NCCC Data Centre, STPI Noida and used for generation of cyber threat intelligence from captured and collected attack data. The threat capturing sensors are deployed at 140 different organizations of various sectors. The system has been enhanced with capabilities of detecting newer vulnerabilities and attacks datasets.

Cyber Forensics Solutions

C-DAC has developed various Cyber Forensics solutions including Cyber Check (forensic data recovery and analysis tool), Advik CDR Analyzer (A Call Data Record/ IPDR Analysis Tool), MobileCheck (Mobile phone forensic solution), Win-LiFT (Windows Live Forensics

Tool Suite), Web Investigator (Internet Forensics Tool for Windows Computers), Photo Examiner (Windows based cyber forensic application), NESA (Network Session Analyser), Truelmager (high speed, lightweight, portable disk imaging hardware solution), TrueTraveller (Complete forensic field kit), eGlancer (Forensics Kiosk), and Bin-V (Binary Vishleshak/Analyser).

9.1.6.3 Information Security Education and Awareness (ISEA)

The Information Security Education and Awareness (ISEA) Project Phase-II was approved with the objectives of capacity building in the area of information security, training of Government personnel, and creation of mass information security awareness for various user segments. Under the project so far, a total of 85,847 candidates have been trained/are undergoing training in various formal/non-formal courses in the area of Information Security through 52 institutions. Besides this, 25,752 Government Officials have been trained in various short-term courses through direct/e-learning/ VILT mode.

During the year, 87 Awareness workshops (Online / Offline) by covering 42,998 participants, and 7 Quizzes were organized covering 67,654. ISEA collaborated with Union Bank of India & released customer Cyber Safety Awareness books called ‘Union Shield’ in 6 Indian languages and reached more than one crore customers across in India. ISEA has participated in and showcased its activities in NERC-2022 (North East Research Conclave) at IIT Guwahati and Digital India Week-2022 at Gandhinagar.

9.1.7 Software Technologies, including FOSS

9.1.7.1 Platforms and Frameworks

e-Pramaan 2.0: Authentication enhanced

e-Pramaan 2.0 is the enhanced version of e-Pramaan, a National Single Sign On and e-authentication service that allows users to access various services in a safe & secure manner. The objective of e-Pramaan 2.0 is to provide additional authentication features, User consent management system; robust security through varied fraud management techniques and develop adaptive authentication solution.



Features of e-Pramaan 2.0

One of the major components of e-Pramaan is Aadhaar Ecosystem. C-DAC is ASA as well as AUA/KUA of UIDAI to provide Aadhaar services such as authentication and e-KYC. The services can be availed by sub-AUAs or AUAs. C-DAC also provides solution of AUA. A total of 332 departments have been integrated and 28.43 crore transactions have been completed as part of this initiative.

National Single Sign on (MeriPehchaan)

MeriPehchaan is a platform that authenticates citizens easily and securely. It aims at eliminating the need to repeatedly prove user identity to different applications and hold different credentials for each application. It is an extensive collaboration of the three mainstream SSO platforms e-Pramaan, Jan Parichay and DigiLocker. MeriPehchaan enables standardized registration which means users need to provide information once for accessing different services. MeriPehchaan authenticates the user based on multiple authentication parameters like username, mobile number, Aadhaar, PAN, etc. National Single Sign On was launched on July 4, 2022 by the Honorable Prime Minister, Shri Narendra Modi in the Digital India Week held at Gandhinagar, Gujarat.

Mobile Seva

As part of the government's m-Governance initiative, Mobile Seva centralized infrastructure platform was created by C-DAC for enabling Government departments to offer public services through mobile devices. During the year generic mobile applications including Geo-fence-based Attendance applications, Complaint Management, Secure Chat, Smart Notification, and Feedback, etc. also compliance with Distributor-Ledger Technology (DLT) blockchain-based framework was implemented for

commercial communication by TRAI for SMS services. 152 departments/agencies were integrated during the year and A total of 4343 accounts of departments/agencies have been integrated under this platform with more than 4834 Crores transactions. A total of 706 pull services are integrated into the platform.

Aadhaar Data Vault (ADV) as a service

While using Aadhaar services UIDAI, if any service/application requires storing an Aadhaar number in their application, the same should be stored in encrypted format in a separate system 'Aadhaar Data Vault (ADV)'. In order to facilitate the same, this project was initiated to provide nationwide secure storage of Aadhaar numbers in the Aadhaar Data Vault. ADV service is facilitating secure Aadhaar number storage and helps the departments to de-link Aadhaar numbers stored in their databases and to determine duplicate records.

Achievements of this service include Infrastructure enhancement with redundant modern HSM with high throughput and MPLS connectivity with UIDAI, ADV as a service is available in the DC-DR setup and the vault has crossed 60 crore transactions in 2 months' time and also handled 2.6 crore transactions in a day without any hassle.

National mSeva AppStore

mSeva AppStore is India's first indigenously developed AppStore with a very wide reach amongst the people and available for all developers. Users can download applications from mSeva AppStore for accessing various government/public services anytime from anywhere. Its AppStore has 1070+ apps hosted on the platform.

e-Hastakshar – C-DAC's eSign Service

C-DAC's eSign service facilitates instant signing of documents online by citizens in a legally acceptable form using Aadhaar. C-DAC utilizes service of Unique Identification Authority of India (UIDAI) for on-line authentication and Aadhaar eKYC service. C-DAC's eSign service has been integrated by various ministries, central government and state government agencies in their applications. e-Hastakshar was presented in DIW@July 2022, PKIA@Sep 2022 and Cyber Security R&D Roadshow@Sep 2022. More than 7.45 Cr. e-Sign Digital Signatures have been issued by C-DAC since inception till August 2022 and more than 140 agencies are leveraging eSign 2.1 Production service.

9.1.7.2 Free and Open-Source Software and Collaborative Portal

BOSS Enterprise Management Solution

C-DAC has developed and deployed the BOSS Enterprise management solution for Tamil Nadu School Education Department for 6030 Schools and 1,20,000 Clients Machines. The objective is to provide a customized BOSS GNU/Linux OS for the thin clients, and school servers and also to develop an Enterprise Management Solution for the School project.

Secure BOSS OS

C-DAC customized Secure BOSS OS for Indian Army (version 2) and Strategic Forces Command (SFC) to be deployed pan India on their respective internet-facing machines of around 9000+ Machines. C-DAC has developed the Secured BOSS and deployed in Integrated Defense Services (IDS), Indian Coast Guard (ICG) and other Strategic Sectors.

Jammu & Kashmir Public Works Department Online Management System (JKPWDOMS)

In order to streamline and speed up the working of the Public Works (R&B) Dept, Government of Jammu and Kashmir, the department has computerized various processes by deploying an online web Portal called "JKPW-Online Management, Monitoring & Accounting System". The initiative has upgraded the present system of manual working to online making the department more vibrant and paving the way towards a scientific and efficient management system in the department.

Vikaspedia - Collaborative Knowledge Sharing Portal

Vikaspedia is a multilingual, multi-sectoral collaborative knowledge sharing platform developed by C-DAC and is accessible in all 22 scheduled languages of the country, besides English. Vikaspedia platform is IDN enabled with .Bharat domains for all 22 languages that it supports. The Vikaspedia collaborative knowledge sharing framework has been made available for use by institutions as a product/service for their knowledge management initiatives. During the year, 28 webinars were organized on digital content access and sharing in Indian languages for about 2100 first level services providers from across the country in various languages.

9.1.7.3 Standardization Activities

Knowledge & Resource Centre for Accessibility inICT

As a part of "Knowledge & Resource Centre for Accessibility in ICT (KAI)" initiative, C-DAC has closely worked with STQC and BIS to formulate the standard "IS 17802 (Part-1) : 2021- Accessibility for ICT Products and Services Part 1 Requirements" and "IS-17802 (Part-2) : 2022 - Accessibility for ICT Products and Services Part 2 Determination of Conformance. Gazette notification for Part 1 of Standard (IS 17802) published in December 2021 and Gazette notification for Part 2 of Standard (IS 17802) published in May 2022. Various awareness events, capacity development workshops and train-the-trainer events were conducted.

e-Governance Standards and Guidelines

C-DAC along with STQC is working on development and/or review of ICT Standards/Guidelines/Frameworks for effective and efficient implementation of e-Governance projects as part of the "Digital India Program" initiative by the Government of India. As a part of this activity, a new website for e-Governance Standards has been developed and hosted. "India Digital Ecosystem Architecture (InDEA) 2.0" framework document is under finalization stage. Similarly, the guidelines on 'Anonymization of Data (AoD)' and 'Mobile Security Guidelines (MSG)' are being reviewed. Additionally, two guidelines for 'Zero Trust Architecture (ZTA)' and 'Internet of Things (IoT) security', are in the process of finalization.

Education and Training

C-DAC's Education and Training has been developing the skilled resources as part of Skill India initiative through its Post Graduate Diploma as well as Post Graduate Degree awarding programmes for its internal human resources needs of Research and Development activities as well as IT industry. These skill enhancement ICT training courses are imparted by C-DAC training centres as well as Authorised Training Centres across India.

C-DAC's education and training division is involved in the following activities:

- Post Graduate Diploma courses in ICT
- Education and Training Technologies
- Comprehensive Recruitment System

- IT & Skill Development programmes for Capacity Building
- International Training & Solutions
- Corporate Training for Corporate, PSU and Government Organization

PMGDISHA

Pradhan Mantri Gramin Digital Saksharta Abhiyaan (PMGDISHA) is a central government initiative for digital literacy. C-DAC centers having their presence across India are participating as assessment & certifying agencies. C-DAC centers conduct the online remotely proctored examination in the PMGDISHA scheme and issue certificates to the successful candidates. C-DAC centers have successfully examined more than one crore citizens to date (Aug'22) since beginning of the project.

Future Skills PRIME

Future Skills PRIME is a Programme for Re-Skilling/Up-Skilling of IT Manpower for Employability. The project is approved by MeitY under the Champion Sector Service Scheme (CSSS). C-DAC being Programme Management Unit, aims to re-skill/up-skill 4.12 Lakh IT Professionals in ten(10) emerging technologies including Printing/Additive Manufacturing, Blockchain, Cyber Security, Internet of Things, Artificial Intelligence, Robotics Process Automation, Social & Mobile, Big Data Analytics, Cloud Computing and Augmented Reality/Virtual Reality. 9.07 Lakh candidates have signed up on the FutureSkills PRIME portal; around 4.17 lakh candidates have enrolled for Foundation/Deep-Skilling/Bridge and non-aligned courses out of which, around 1.41 lakh candidates have completed the courses.

Up-skilling program in “IoT Technologies”

C-DAC is working on a project in collaboration with NIELIT and IEEE India. The main objective of the project is to empower SC/ST youth by offering training programs in the emerging field of Internet of things (IoT). 2145 SC/ST beneficiary candidates have been on-boarded to take-up IoT training courses through IEEE's Blended Learning Program since April 22. Also, the team has conducted in-person 5 day hands-on workshop trainings at Sister Nivedita University, Kolkata; University college of Engineering Kakinada, JNTUK; and Dayanand College of Engineering, Bengaluru. 5000 SC/ST beneficiaries shall be trained in the field of IoT technologies at PAN India level till March 2023.

9.1.8.1 Solutions for Online Examination

Process Automation for Competitive Exams

C-DAC has designed and developed a Process Automaton for Competitive Exams (PACE). PACE focuses on competitive exams like GATE, and JAM. PACE has been used for GATE (past 10 years), JAM (past 9 years) and NBE's DNB/FNB seat counselling (4 years). The system handles more than 10 lakh applicants every year.

Comprehensive Recruitment Solution for Indian Air Force

C-DAC has designed and developed Comprehensive Recruitment and Online Examination system for the selection of candidates in the Indian Air Force and Indian Coast Guard. The system involves the development of Website and complete automation of activities from registration till result processing.

Agnipath Scheme and IAF's Agniveer exam (01/2022) conduction by C-DAC

The Agnipath Scheme was launched by Hon'ble Defence Minister Shri Rajnath Singh on June 14, 2022. C-DAC developed and released a new website for Indian Air Force (Agniveer Vayu) on June 24, 2022. The Agniveer Vayu exam for recruitment of AGNIVEER in Indian Air Force was conducted successfully from July 24 - July 31, 2022 across 250 centers spanning in 72+ cities.

IAF's AFCAT exam (02/2022) conduction by C-DAC

C-DAC has conducted AFCAT (Air Force Common Admission Test) exam of Indian Air Force successfully from 26-28th Aug 2022 for selection of candidates in Flying Branch, Ground Duty Officers (Technical & Non-Technical). The exam was conducted at 192 centres across 99 cities.

Online Registration of ICG-Sailors (Navik&Yantrik)

C-DAC has successfully conducted registration of ICG-Sailors from September 8-24, 2022 inviting male candidates to apply for the post of Navik (General Duty), Navik (Domestic Branch), and Yantrik in the Indian Coast Guard. Eligible candidates have applied online through the portal developed by C-DAC. C-DAC has conducted Coast Guard Enrolled Personnel Test (CGEPT) for Navik and Yantrik categories of Indian Coast Guard across 75 cities.

Online Registration of ICG-Officers (Assistant Commandant)

C-DAC has successfully conducted registration of ICG-Officers from 17th Aug – 07th Sep for vacancies comprising of General Duty (GD), Commercial Pilot License (SSA), and Technical and Law Entry.

North-East Initiatives**Drug and Vaccine Distribution Management System (DVDMs):**

DVDMs also called e-Aushadhi is a software platform to automate various activities of medical health. It comprises of drugs and vaccine supply chain management that deals with purchase order and distribution of various drugs etc. The main objective is to implement a transparent system for procurement, storage and distribution of quality drugs, required for the hospitals at reasonable competitive price. DVDMs has been implemented across India including 5 states in North Eastern Region (Meghalaya, Manipur, Arunachal Pradesh, Mizoram and Nagaland) which is developed and maintained by C-DAC.

Human Resource Management System (eHRMS):

eHRMS is a web based Human Resource Management System to manage the HR related processes online and organized neatly with features like Employee Management, Leave Management, Payroll Management etc. eHRMS is a state-of-the-art modular, integrated, scalable, web-based system for Department of Health and Family Welfare, Govt. of Meghalaya.

Cyber Security Audits:

- C-DAC conducts Vulnerability and Penetration Testing at NERLDC, Shillong & Guwahati twice in a year. The scope of the VAPT includes:
- VAPT of Networking Equipment Infrastructure at NERLDC, Shillong office
- VAPT of Networking Equipment Infrastructure at Back-up NERLDC, Guwahati

VAPT of Web Applications of NERLDC**ICT Solutions for India's Northeast Heritage**

The main objective of the project is to provide state-of-the-art ICT solutions for the digitization, preservation, protection, dissemination and promotion of the NE

heritage. There are around 30+ museums in the NE states. It is critically important to digitize, document, preserve, protect and promote NE heritage that is available in museums, monuments and tourist destinations. C-DAC is responsible for developing an online northeastern crafts portal which is made to preserve the heritage of handicrafts and handloom sector of North East of India. It showcases the artisans, weavers & products of NE states of India.

9.1.10 International Initiatives

Collaborated with The Open Stack Foundation for authorized training, Consulting, and Integration partner in Asia Pacific Region in Cloud Computing

With support from the Ministry of External Affairs (MEA), C-DAC extends its expertise in ICT to collaborating nations and nurtures its ICT centers. During the year, the following activities were carried out as part of this initiative:



Hon'ble Defence Minister of India, Shri Rajnath Singh inaugurated Cyber Security Training Centre (CSTC) setup by C-DAC at National Defence University (NDU) in Ulaanbaatar, Mongolia on September 6, 2022. He was joined by his Mongolian counterpart Lt Gen. Gursediin Saikhanbayar in the inauguration ceremony.

C-DAC ATC (Authorized Training Centre) has formally been started at CESDT - Lao PDR from September 01, 2020 for 2 years till Aug 31, 2022 as a part of "Setting up of Centre of Excellence in Software Development and Training (CESDT) in Cambodia, Lao PDR, Myanmar & Vietnam and appropriate accreditation to these training courses by C-DAC" initiative.

Conducted training in Big Data Technologies, Python Programming & Ethical Hacking and conducted HPC Workshop in India & Namibia as a part of, “Setting up of India – Namibia Centre of Excellence in ICT & HPC at NUST in Windhoek” initiative.

As a part of “India – Argentina Centre for Excellence in IT (IA-CEIT) at University of Hurlingham in Buenos Aires”, delivery, installation & commissioning of IT Infrastructure has been completed.

C-DAC & MEA have signed the Agreement for setting up of India – Solomon Islands Centre of Excellence in IT (IS-CEIT) at Honiara, Solomon Islands for which the procurement of IT Infrastructure & Courseware had been completed.

As a part of extension of India-Myanmar Centre for Enhancement of IT Skills as Authorized Training Centre of C-DAC, Faculty Development programmes on “Artificial Intelligence” & “Advanced Artificial Intelligence” were conducted.

C-DAC is conducting M.Tech. Programme in Information System & Network Security and in Wireless Computing under “ICT Resource Centre at Nelson Mandela African Institution of Science & Technology (NMAIST)” in Arusha, Tanzania initiative.

Upgradation of PARAM BILIM at India – Kazakhstan Centre of Excellence in ICT at ENU in Nur-Sultan is being carried out.

Collaborated with Moscow State University for development of approaches to the dynamic and precise management of monitoring systems for the operational control of the structure and intensity of data streams collected on highly scalable supercomputers.

Collaborated with Efficient Power Corporation (EPC) Ltd, Plano, Dallas, USA in the area of GaN wide Band Gap device-based converters.

9.2 Society for Applied Microwave Electronics Engineering and Research (SAMEER)

Society for Applied Microwave Electronics Engineering and Research (SAMEER) is an autonomous R&D institution under the Ministry of Electronics and Information Technology, Govt. of India. SAMEER is an offshoot of the Microwave Engineering Group of Tata Institute of Fundamental Research (TIFR), Mumbai.

SAMEER was formed in 1984 as an R&D Laboratory of the then Department of Electronics, Government of India and moved to its present location at Indian Institute of Technology, Mumbai in 1988. SAMEER has five centres located at Mumbai, Chennai, Kolkata, Vishakhapatnam, and Guwahati. The headquarters of SAMEER is located at IIT campus, Powai, Mumbai. SAMEER is engaged in active research in the broad area of microwaves and undertakes various state-of-the-art and challenging projects from HF to lightwave with the aim of remaining at the forefront of research in the various application areas of microwaves including 5G/ 6G applications, quantum communication, medical systems, linear accelerator technology, atmospheric radars, microwave heating and drying, photonics, microwave communication and other such applications. SAMEER also designs and develops passive and active components and subsystems such as amplifiers, antennas, power dividers, digital receivers, transceivers.

SAMEER Mumbai is the headquarters of the organisation and a premier centre for research and development in microwaves. The Centre, with its laboratories within IIT Bombay, Powai and at Navi Mumbai, executes sponsored and core design and development projects on such diverse topics as Linear accelerator technology and systems for medical application, quantum communication, atmospheric instrumentation, high power microwave systems, radar technology for strategic and non-strategic applications and optoelectronics. The Centre is pursuing projects of national importance such as the development of “Indigenous MRI scanner” and the indigenous development of NAVIC receiver for the regional navigation satellite system being developed by India. The Centre also offers EMI/EMC test, evaluation and design consultancy services to the industry as per various industrial and military standards at its Navi Mumbai Campus. The Centre also provides various calibration services pertaining to EMI/EMC, Electrical Safety and Environmental tests at Navi Mumbai Campus.

SAMEER Chennai Centre has become synonymous with EMI/EMC testing within India. Equipped with a state-of-the art infrastructure and complemented by a team of experienced and dedicated engineers, the Centre offers comprehensive testing, design consultancy, calibration, and training to its customers, including the Government and private sector industry. The Centre has its laboratories

at Taramani and Perungudi Campus in Chennai. The Centre has a strong communication team and numerous advanced communication systems have been developed by this Centre. The Centre also has a strong presence in the development of antenna technology and endeavours 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 based on the 5G/ 6G platform. The Centre undertakes thermal design consultancy and thermal performance testing and evaluation of Electronic System from module level to shelter level. The Centre has addressed thermal design and analysis consultancy tasks for space, strategic, consumer and medical electronics systems working in various operating environments. The Centre has also initiated research with the aim of realizing System on Package (SOP) technology at its Perungudi Campus.

SAMEER Kolkata Centre, with its laboratories at Sector V and Sector III within Salt Lake is pursuing active research and development in the field of antennas, microwave, and millimeter wave technology. The centre executes sponsored as well as core projects in the field of advanced antenna and millimeter wave circuits and systems. The Centre has embarked on the development of Intelligent Reflecting Surfaces (IRS) for 6G communication. Some core developments are also being executed on anticipated requirements and some of the new areas identified. EMI/EMC Design and consultancy services are being provided to the industry. Test and measurement services are being offered to the private industries and Government agencies in the areas of EMI/EMC, antennas, radome and RCS. The Centre is equipped with a state-of-the-art Compact Antenna Test Range (CATR) for the radiation performance assessment of antennas and an anechoic chamber for radiated emission/susceptibility evaluation of electrical/electronic equipment as per various international standards.

Electromagnetic Environmental Effects (E3) Laboratory has been set up at Visakhapatnam, Andhra Pradesh for pursuing activities of national importance at this centre. The Centre addresses various important issues such as critical Infrastructure protection against EMP to qualify defense electronics 'sector of the country and will ensure satisfactory performance of strategic

hardware. The evaluation and design services provided by this centre, which are currently available only at limited locations overseas, will not only ensure safety against import security threats but will also save foreign exchange. Unique facilities at this centre shall enable research activities in specialized domains of High Power Electromagnetics with specialized test facilities established such as, Electromagnetic Pulse (EMP), Pulsed Current Injection (PCI) and Ultra-Wide Band (UWB) facility. SAMEER Visakhapatnam is first and among very few centres in the country to provide the full range of EMI/EMC test and measurements as per MIL STD 461 G covering radiated field strengths of 200 V/m and up to 40 GHz. It also houses a mobile UWB facility for qualifying equipment for Intentional EMI (IEMI). SAMEER Visakhapatnam also offers EM simulation services in the field of E3 covering Antennas, EMI/EMC, HPEM, PCB, Cross Talk and Signal and Power Integrity using state of the art 3D EM modeling tools with advanced hardware configurations

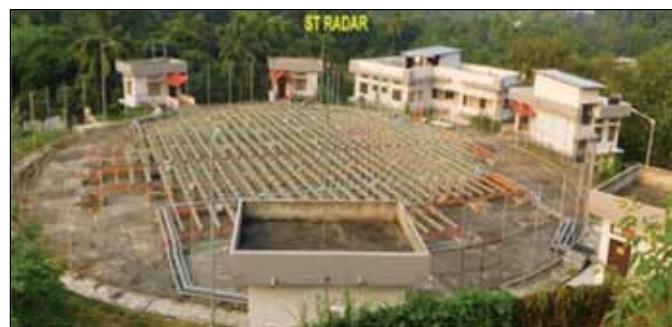
Centre for High Power Microwave Tube and Component Technology has been established within IIT Guwahati Campus, Assam. The centre is working in the area of high power microwave tube and component technology. This centre is dedicated for development of conventional high power microwave tubes/components as well as futuristic high power mm wave and THz sources. It will also develop manpower working in the area of high power microwave tubes/components by imparting proper training.

9.2.2 R&D activities during the year 2022-23

Societal Applications

Atmospheric Systems

Stratosphere Troposphere (ST) Radar at Gauhati University



ST Radar installed at Gauhati University

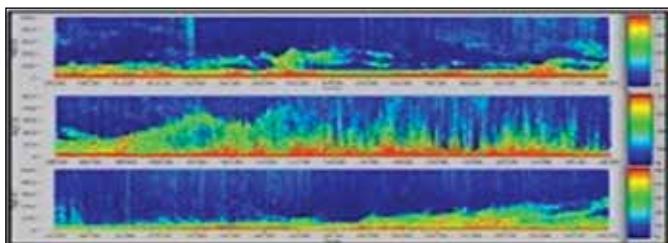
The data processing software of ST Radar was improved under a project funded by MeitY. The ST Radar designed, developed and installed earlier by SAMEER at Gauhati University, Assam under a project funded by MeitY was handed over to Gauhati University for day-to-day operations on 21st June 2022.

Phased Array Doppler SODAR



Sodar system installed at SAMEER Mumbai terrace

The Phased Array Doppler SODAR (Sound Detection and Ranging) is a ground based remote sensing instrument to measure the wind speed, wind direction and turbulence of the lower part of the atmosphere, especially the boundary layer. It is an acoustic radar, where sound waves are used instead of electromagnetic waves for probing the atmosphere. One such SODAR is being developed by SAMEER and will be deployed at BARC, MUMBAI shortly. SODAR provides a better alternative for wind measurements since it gives a continuous unattended measurement of winds with better range resolution. The Doppler SODAR can be used for various applications like atmospheric boundary layer studies, weather and climate modelling, assessment of environmental impacts due to nuclear and thermal plants, atmospheric Dispersion studies, wind energy site assessment, wind shear studies etc. The data output parameters derived are wind speed and direction, echogram, wind rose and time height plot.



Echogram Display

Dual Band MMW Radiometer

This design and development project is sponsored by MeitY, Govt. of India. The objective is the indigenous development of the Radiometer for the NE Region of India for Climate Modeling Studies for weather changes. The radiometer should operate at K/Ka-band (22 - 31 GHz) for atmospheric humidity profiling and at V-band (50 - 60 GHz) for temperature profiling. A wideband frequency synthesizer module has been designed and developed that generates a frequency up to Ka-band. With reference to a 100 MHz crystal oscillator, a stable signal with a frequency starting from 62.5 MHz up to 32 GHz can be synthesized using this module. Phase noise of -96 dBc/Hz at 100 kHz offset has been achieved at the highest output frequency of 32 GHz. Optimization of the output power level is in progress. A coaxial to waveguide adopter has also been designed and developed for interconnectivity.



Photograph of the Ka-band synthesizer module
Communication Systems

SAMEER Contribution for 5G Solutions

Till now, India did not have a testing facility to test and validate the 5G products and applications developed by start-ups and companies before deploying them in the field. Hitherto, Indian start-ups had to go abroad to get their products tested. With a fund of Rs. 224 Crores, from Govt. of India, 8 institutes collaborated to develop a complete end-to-end 5G test bed facility, to enable Indian Telecom-Eco system.

As part of this great initiative, SAMEER has been instrumental in developing the critical deployable hardware for both sub 6 GHz and mmwave 5G solutions.

SAMEER has built fully functional MIMO and massive

MIMO antennas for 5G [first time development in India] @ sub 6 GHz bands.

SAMEER has built fully functional mmWave phased arrays for 5G @ 26/28 GHz.

With these developments, India has joined the league of very few nations who can build complete 5G solutions for ICT applications.

The IP thus generated is being transferred to Indian industry to build fully indigenous solutions for the nation.

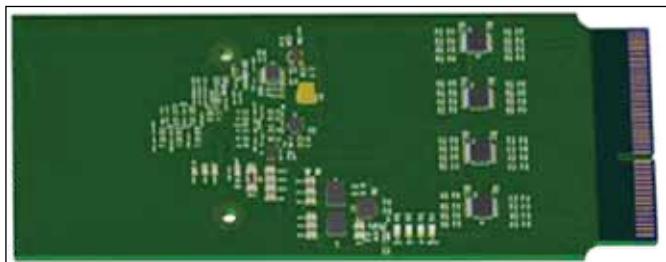
Large amount of Human Resource Capacity is built for 5G in the country.

Number of publications are resulted under this program, Number of workshops, symposia, and conferences were arranged to decimate the knowledge to Indian industry and young researchers.

NAVIC

The Ministry of Electronics and Information Technology (MeitY), Govt. of India has funded the development of the NAVIC receiver. SAMEER Mumbai (nodal organization) in collaboration with SAMEER Kolkata and other organisations is executing the project. AJIT Correlator (Coprocessor) SDR implementation has implication in symbol synchronisation and dependent routines. Using offline model, experiments were carried out with IF and other front end which had different IF and sampling frequency combinations. Corresponding algorithm development and modification have been done in offline model. Validation has been done with the reference model for each of RF front IF 2-bit data captures. Position accuracy achieved was +/- 9 meter with stored data in 2D positioning.

Multi-Gigabit (MGBiT) wireless system at 60GHz for 5G and Beyond



PCB designed for multi-gigabit operation

Design and development of a 60 GHz multi-beamforming system with integrated RF circuits is funded by MeitY and

proposed for high speed data transmission. The gigabit design enables the development of new technology in antenna systems, high-frequency RF circuits, and mixed-signal layouts operating at the V-band spectrum. This system will provide back-haul support for 5G and point-to-point communication and is an alternative solution to high-cost copper and fiber networks with high speed and increased throughput. The 4x16 element antenna array provides a sharp pencil beam scannable in azimuth angles from -60 deg to +60 deg.

Medical applications



Indigenous Magnetic Resonance Imaging system

Image obtained from body Birdcage (i.e Body bird cage for transmit and surface coil receive)

Image obtained from body Surface Coil (i.e Body Coil used for transmit and Surface Coil for receive)

The project entitled “Indigenous Magnetic Resonance Imaging (IMRI)— A National Mission (Swadeshi Chumbakiya Anu-naadChitrani – Ek Rashtriya Abhiyaan) (SCAN-ERA)” was initiated at SAMEER with an objective to “Design, develop and test an indigenous 1.5 Tesla MRI system for medical imaging.” EOI for IMRI project was floated in leading newspapers. The EOI received an overwhelming response from the industries. Two pre-bid meetings were conducted where in the system was demonstrated to these industries, after which the industries submitted the bid. The MoU and NDA will soon be sent to shortlisted industries. Some new sequences have been integrated and images obtained with these. The magnet development is in its final stage. The Control and monitoring software has been integrated and tested.

Medical Linear Accelerator (LINAC) for cancer Therapy

The medical LINAC program in SAMEER for Cancer radiation therapy/ treatment is a matured activity with the constant support of MeitY. SAMEER had earlier developed a 4 MeV linear accelerator (LINAC) system for use in radiotherapy in the treatment of cancer. These machines have been deployed in hospitals and have

been used to treat many poor cancer patients. Over the years the in-house medical LINAC program has been steered and guided by eminent Oncologists. To meet the requirement of almost 95% of cancer cases prevalent in our country, the steering committee recommended to upgrade the energy of LINAC from 4MeV to 6 MeV.

There are very few companies in the world producing these 6MeV medical LINACs and SAMEER has joined the league by developing 6 MeV medical LINAC machines. SAMEER medical LINAC has been type approved by the Atomic Energy Regulatory Board (AERB) for use in hospitals to treat cancer patients.

As part of this development, the Cancer Institute, Adyar, Chennai, Tamilnadu, requested for the upgraded SAMEER's 6MeV medical LINAC to be installed and commissioned in their radiation bunker. This cancer institute is a premier hospital and public charitable voluntary institute dedicated exclusively to the care of cancer research and treatment for last 60 years. The proposed SAMEER 6MeV machine will be used to treat on an average of 35 - 40 patients daily in this institute. This machine will be used to treat the cancer patients along with LINAC machines commissioned by MNCs.

The 6 MeV medical LINAC development has been part of MeitY's programme to promote science and technology for societal applications.



6MeV being installed at ADAYAR
Cancer Institute, Chennai, Tamilnadu.

Development of High Energy Linac for Medical and other Applications



Linac tubes for High energy Linac

This unique installation will have two linacs in series to deliver about 30 MeV energy with beam power up to 5-10 kW. The first linac tubes has been baked and pinched-off. RF outgassing of first linac tube is being carried out at 3.1MW peak power in Powai radiation facility. The second short linac tube is also brazed and frequency tuning is over. The frequency of both the linacs is within 100 kHz. As the beam power is high, special local shielding was designed to ensure that no photon or neutron leakages are seen.

RF AND MICROWAVE SYSTEMS

Smart Warehouses with Application of Frontier EM and Electronics based technology

The project entitled 'Smart Warehouses with Application of Frontier EM and Electronics based technology' was initiated with the objective "to develop technologies and gadgets required for the safe storage of grains in warehouses". The project was completed and commissioned at FCI Raipur. The Technology developed under the Smart Warehouses using EM and Electronics based technology Food Processing project is suitable for multiple grains and has a non-destructive operation with a user friendly control system, RFID for tagging and tracking, versatile data management for efficient warehouse management and alarms. The system consists of a loading and unloading system with online measurement of moisture and weighing, a standalone precise and highly accurate online moisture meter and a RF dryer system. An EOI document has been created for the technology transfer of the above modules.

Design and Development of a Microwave Based Compact Cost effective Brix Meter for Sugar Industry



Brix sensor with subsystems



BRIX sensor installation at site

In a sugar industry, accurate measurement of syrup concentration (Brix) at all times during the sugar boiling process is most desirable to produce high quality sugar meeting the ICUMSA standard. The Brix measurement plays a very important role in the sugar production process. The main objective of this project is "Non-destructive instant in-situ Brix measurement of the sugar syrup/massecuite/molasses for sugar industry during the crystallization process using microwave theory". All the subsystems have been developed, integrated, tested and installed at site (Sugar factory).

Development of 'Through-Wall Imaging' (TWI) Radar for Homeland security



The fabricated antenna for Through wall imaging radar



Antennas mounted on top of the TWI unit

Through-the-wall radars image the targets behind the wall by transmitting short pulses and processing the

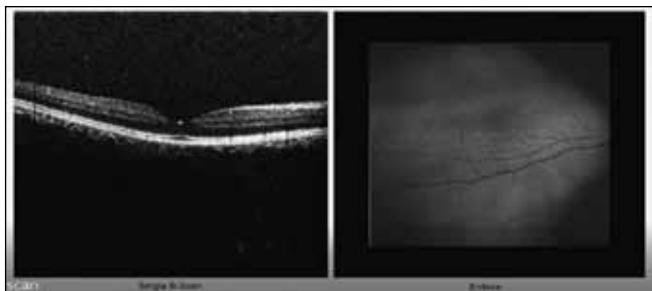
signal returns from the wall and targets. The TWI Radar technology is particularly useful in behind-the-wall target detection, surveillance and reconnaissance, law enforcement, and various earthquake and avalanche rescue missions. SAMEER is developing one such system, which is funded by Ministry of Electronics and Information Technology (MeitY). System Design has been completed and the design and development of some sub-systems has been completed. Image generation Algorithm simulation also has been completed. The main challenge in antenna design is to design an effective and efficient compact antenna with high sensitivity, low loss and stable radiation pattern over the whole frequency band of 2-4 GHz for narrow pulse operation. An ultra-short pulse generator using Step Recovery Diode has been developed and integrated with Transmit sub-system. Tx-Rx subsystem of the radar has been developed.

Development of dielectric heating based processing technologies for solid-wood, bamboo and their composites



Moisture measurement System Layout

The project was initiated with an objective " To Design and Develop State of the art Vacuum assisted Radio Frequency drying system for wood curing, Microwave based online moisture measurement system for wood and forestry products and Microwave based Bamboo processing System". Design, development and testing of a transceiver at 5.81 Ghz has been completed along with the development of Data Acquisition system, HMI display and thermal printer. Testing, calibration and demonstration of three species of wood was done at IWST, Bangalore. Fabrication, testing, integration and calibration of microwave based moisture meter system for wood is completed. Photonics Enhancement to High Speed Compact Spectral Domain Optical Coherence Tomography

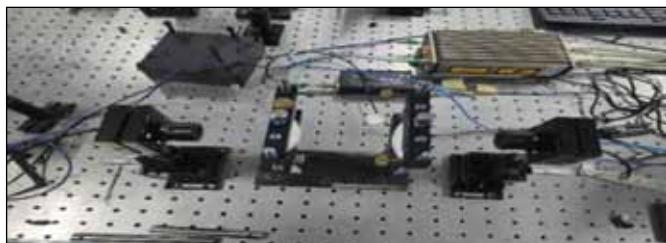


B-Scan Image (L) and Enface image (R) of human eye captured through ROSHANI

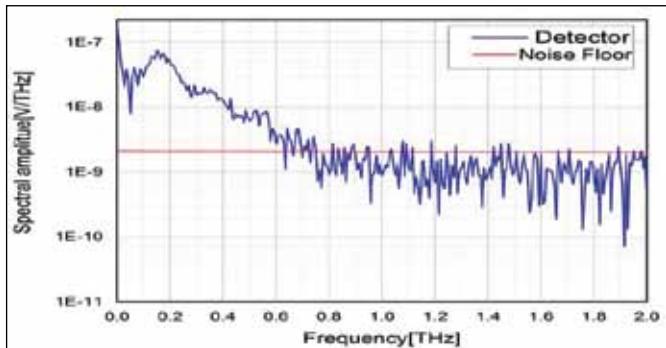
SAMEER has added CMOS based fundus camera into SDOCT prototype ROSHANI developed under a DST funded project to enable better identification of the area of the eye under examination. The display window is now able to show fundus/enface image right next to the B-scan image of the eye.

ROSHANI was taken to the premises of one Pharma Company in Pune and at ICAR, Baramati and was able to successfully scan some of the pharmaceutical products and agro samples, providing high-resolution images. ROSHANI has successfully passed the EMI/EMC compliance tests IEC 61000-3-2,3-3,4-3,4-4-4-6,4-8 and CISPR/11/22 for Conducted Emission.

Design and Development of Terahertz spectroscopy-based diagnostics platform for materials

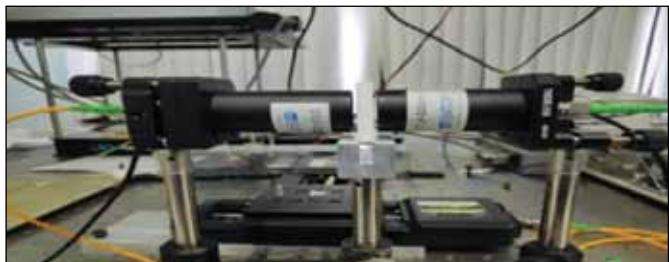


THz Setup for diagnostics of materials



THz radiation generated and detected

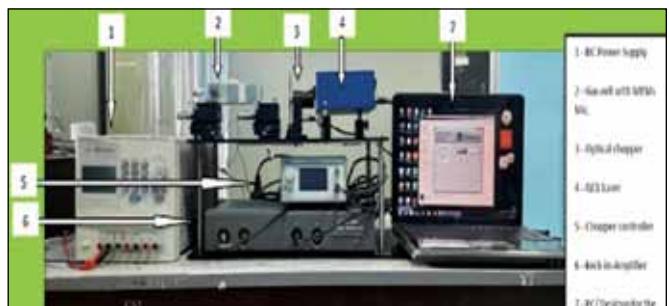
The development of benchtop for Terahertz time domain spectroscopy (TDS) setup has been initiated under a core project. THz radiation upto 700 GHz was generated and detected with a teflon lens designed and fabricated in-house. Pulsed THz Spectroscopy Setup for thickness measurement and material analysis applications



Thickness monitoring setup using TDS system

Non-contact dielectric material thickness measurement was demonstrated in the transmission mode using THz TDS system.

Design and development of MEMS based detectors and their real time testing as IR laser-based sensor system for environmental monitoring



Experimental setup for trace Nitric Oxide detection by Photoacoustic technique

The target gas chosen in this project is Nitric Oxide, which has highest absorption at 5.2 m in the mid-infrared region of the electromagnetic spectrum of light. A light beam of this wavelength from a Quantum Cascade Laser (QCL) is made incident on the gas sample enclosed in a gas cell, which has a volume of less than 20 cc with the active volume of light-gas interaction being 1.7 cc. This laser beam from QCL is modulated using an optical chopper at a chopping frequency of 2.2 KHz. Thus, the light beam entering the gas cell is pulsed at a frequency of 2.2 KHz. The average power on the light beam in gas cell is nearly 40 mW and the laser was

stabilized at a wavelength of 5379 nm. The gas cell is all vacuum sealed and the interference from external noise is strongly eliminated. When the pulsed light beam is incident on the gas in presence of the target gas i.e. nitric oxide, there is an acoustic pressure generated with the frequency similar to the pulsing frequency of laser beam and also its harmonics. This acoustic signal is detected using a MEMs microphone with an analog output signal, which is fed to a Lock-in-Amplifier (LIA). This microphone has a sensitivity of nearly 6 mV/Pa. Thus, with the above experimental parameters a photoacoustic signal of 20 V amplitude was observed in the lock-in amplifier, when a gas mixture of 5000 ppm Nitric oxide in pure nitrogen was fed to the gas cell. The observed SNR is 26 dB and the minimum detectable concentration of 250 ppm is achieved. A LabVIEW based GUI has been developed for remote controlling the operation of all the devices for real time experiment. The gas exchange is also automated using solenoid valves at the inlet and outlet of the gas cell, which are being operated using an arduino based electronic circuit. The entire set-up is automated and completes one sample detection in less than 2 minutes. The process is remotely controlled by a LabVIEW based interface.

Fabrication and Characterization of a compact prototype positive ion detector as a non-invasive device for early detection of respiratory disease.

There is a growing interest to experimentally evaluate the track structure induced by ionizing particles in order to characterize the radiobiological quality of ionizing radiation for applications in radiotherapy and radiation protection. To do so, a novel positive ion detector based on the multilayer printed circuit board (PCB) technology has been developed, which works under the principle of ion induced impact ionization. Based on this, an upgraded 3D positive ion detector was fabricated in order to improve its efficiency and use it for various applications. A collaborative project was sanctioned by Department of Science and Technology to Dept. of Medical Physics, Bharathiar University, Coimbatore with SAMEER, Mumbai as engineering collaborator for early diagnosis of pulmonary diseases. One such application is early detection of cancer through analysis of exhaled breath for its volatile organic compounds content.

Indian Defence Indigenisation

Antenna

Conformal L-band IFF/ TACAN Antenna



L-band IFF/TACAN Antenna

A miniaturized antenna configuration was designed for L-band IFF/TACAN application. Shared aperture concept was used for the design and implementation of the antenna. The overall geometry was optimized for enabling the antenna installation conformal to the aircraft structure. The antenna being conformal in nature, generates less RCS when installed on aircraft. Hence, this antenna is preferred in aircrafts for stealth mode of operations.

Wideband Circularly Polarised Antenna for ECM applications



Wideband circularly polarized bi-directional antenna for ECM applications

Wideband, circularly polarised, bi-directional antenna was designed for ECM application. Novel miniaturization

techniques have been incorporated to reduce the overall footprint of the antenna. The radiating element is encapsulated in a teflon cavity for obtaining superior axial ratio performance. A miniaturized BALUN configuration is used for feeding the radiating element which in turn helps to reduce the overall antenna height. This wideband circularly polarized antenna offers stable impedance and axial ratio performance over the operating band. The antenna operates in the frequency band of 1-6 GHz, with an overall dimension of 98mm (diameter) and 13mm (height).

RF/Microwave Systems

Conformal Jamming Systems for Radio Control Improvised Explosive Devices (RCIED)



Jamming system unit with antenna



Jamming antenna on a vehicle body

Design and development of conformal jamming system for RCIED is a MeitY funded project. The proposed jamming system is intended to protect the VVIP convoy from the threats of remotely operated devices. An intelligent jamming signal is continuously

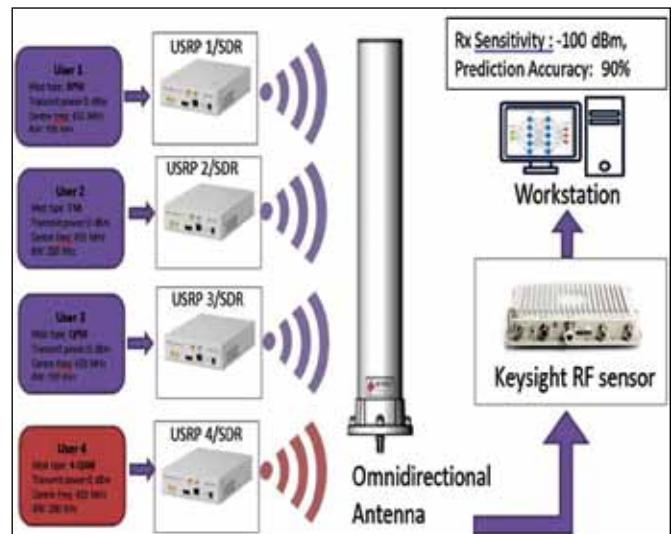
transmitted from the system on specific bands to block communication over a few hundred meters. The novelty here is the conformal antennas on the vehicle body, which are invisible and become part of the vehicle body. The system has distributed hardware specific to individual antennas distributed around the vehicle body. The combined pattern from all the antennas provides an omnidirectional pattern around the jammer vehicle. Low power from independent antennas combines to give a wide-coverage jamming signal. The antennas placed on the body of the vehicle, share common aperture and take less space to cover all cellular bands.

NextGen Systems

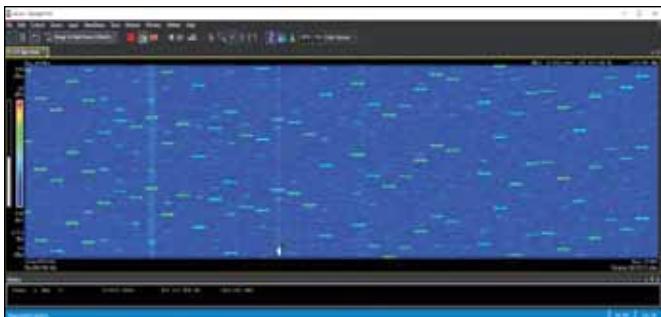
Quantum Technology

This project has been funded by MeitY. Design, fabrication and testing of 2.4 GHz patch antenna for short distance wireless communication has been done. Low cost commercially available Arduino and RF modules were programmed using python to setup wireless communication link for data transmission. A python code has been developed to generate quantum keys based on BB84, B92 and BBM92 protocols. These simulated keys were used to encrypt and decrypt the messages at two ends of a wireless public channel. The link is proposed to be used for demonstration of quantum communication involving entangled photons.

Analysis of Deep Learning Techniques for Electronic warfare 5G applications



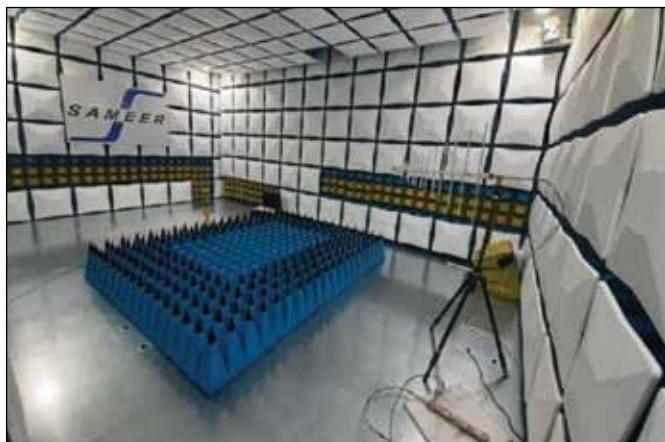
Validation Scenario for Deep Learning Techniques for Electronic warfare 5G applications



Frequency Hopping signal generation for Deep Learning model validation

This project is aimed at analyzing AI/ Learning techniques and at evolving an efficient model for anomaly detection, as applicable to the present day Electronic Warfare scenario and to augment the futuristic 5G scenario of conglomeration of communication technologies. The output of this AI/Learning model will then be fed to the other weapon systems for threat detection and management. A Reinforcement learning model to distinguish different types of signal anomalies (Long duration signal, Short duration signal, Single instance, FH signal, Burst signal) using the discounted reward logic methodology was implemented. In order to simulate the model validation scenario, a hardware setup with 4 USRPs (BPSK, QPSK, 8-QAM and FSK) as transmitters in which 3 are normal users and one anomaly user is implemented.

Services



Establishment of MIL-STD EMC test lab 3 meter Shielded Anechoic Chamber (SAC) for MIL-STD EMC testing SAMEER-CEM, Chennai is establishing a world class MIL standard EMC test laboratory to provide EMI/EMC test services to the Indian strategic electronics hardware industry. The project is funded by MeitY, Govt. of India.

Presently, the installation and third party evaluation of 3 meter Shielded Anechoic Chamber (SAC), Radiated Immunity test system and Conducted Susceptibility (CS) Lab has been completed and the facilities are operational for testing and evaluation. Construction of RCC shelter to house 5 meter chamber has been completed and the 5m shielded anechoic chamber will be installed shortly.



RCC shelter for 5m shielded anechoic chamber for EMC testing Antenna Factor measurement using Continuous Noise Emitter (CNE) based on SAE ARP958D standard Radiated emissions is one of the EMC tests criteria which needs to be complied as per the applicable standard. The emissions are measured using calibrated antennas and an EMI receiver. Antenna Factor is a conversion factor of the antenna under test, which is measured as the ratio of induced voltage to the incident electric field and vice-versa. A pair of similar antennas are required for the measurement to compute the Antenna Factor. The work carried out replaces the requirement of RF signal generator with a portable continuous noise emitter source. The measurement is carried out with the CNE and compared with the traditional procedure; it is observed that the deviation is not more than 1.8 dB.

HEMP filter



Single-phase Power Line Point-of-Entry (POE) protection HEMP filter

Design, development of single-phase Power Line Point-of-Entry (POE) protection HEMP filter as per MIL STD 188-125-1&2 has been carried out. HEMP filters are used to protect the critical defence infrastructure from Electromagnetic Pulse (EMP) attacks which can have devastating effects. The prototype model of the filter is designed and developed to test its acceptance as per standard for EMP events. The residual current measured was less than 2.5A.

Testing and calibration



EMI/EMC Testing of Vande Bharat Express

SAMEER carried out RFI testing of prestigious semi-high speed Vande Bharat Express at Chandigarh in August 2022. These tests were carried out in accordance with BS EN 50121-3-1 – 2017 and BS EN 50121-2-2017 standards. Pacemaker interference test for Vande Bharat Express was also carried out at Kota during August 2022. This test was carried out as per BS EN50500:2008+A1 :2015 standard. RFI testing of on-board MEMU at Chandan, Bihar was carried out in May 2022 for M/s BHEL. These tests were carried out in accordance with BS EN 50121-3-1 – 2017 and BS EN 50121-2-2017 standards.



EMI/EMC testing of Electrical Heavy Weight Torpedo (EHWT)

SAMEER carried out the preliminary EMI/EMC tests on individual subsystems and complete Electrical Heavy Weight Torpedo (EHWT) at M/s NSTL EHWT laboratory. Indegiones drones developed for defence Strategic Applications by BARC(V) were evaluated in flying condition

for EMP Qualification as per MIL STD 461E.



Study of Conducted and Radiated noise from BLDC Thruster pertaining to deep water manned submersible (6000m), MATSYA6000 for National Institute of Ocean Technology (NIOT), Chennai SAMEER also provided EMI/EMC test and measurement services to the industry and more than 100 assignments were carried out, both onsite at customer's premises as well as in its well equipped laboratories at Mumbai, Chennai, Kolkata and Visakhapatnam. More than 50 calibration assignments were also carried out. SAMEER also offered design assistance to more than 5 manufacturers in order to achieve compliance for their products as per various prescribed international standards.

Electrical safety and environmental testing services were also offered to the industry.

Compact Antenna Test Range

SAMEER Kolkata offers its compact antenna test range for antenna pattern measurement.

ILC Programme

SAMEER, Chennai organised and participated in Inter Laboratory Comparison (ILC), a mandatory requirement of International Standard ISO/IEC 17025:2017 as part of Quality Assurance for NABL Accreditation of EMC Testing services. ILC measurements have been successfully completed in 7 NABL Accredited EMC Labs at different geographical location across India.

Prominent Visitors



Shri. V. Muraleedharan, Ministry of State for External affairs and Parliamentary Affairs at SAMEER CE3, Visakhapatnam

Shri. V. Muraleedharan, Ministry of State for External affairs and Parliamentary Affairs has visited SAMEER CE3, Visakhapatnam on 25th August 2022 and appreciated the Research and Development activities being carried out at the centre.

9.3 Centre for Materials for Electronics Technology (C-MET)

Centre for Materials for Electronics Technology (C-MET) has been set up as a registered scientific society in March 1990 under Ministry of Electronics and Information Technology (MeitY), engaged in R&D of electronic materials having unique concept for development of viable technologies in the area of materials mainly for electronics with the objectives of;

- To establish the technology up to pilot-plant scale for a range of electronic materials and transfer the same to industry for commercialization.
- To establish relevant advanced analytical facilities.
- To undertake applied research activities in its operation.

9.3.1 Core competence at C-MET laboratories

C-MET's R&D activities have been implemented in three laboratories i.e., Pune, Hyderabad, and Thrissur. In the campus of Pune laboratory, C-MET headquarter is functioning which monitor the administrative activity and central technical coordination. 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.

(a) Pune laboratory

Pune laboratory is mainly focusing on cutting edge R&D research on materials for electronic packaging, Additive manufacturing, renewable energy, energy storage, sensors and nanomaterials/composites. National Centre for Quantum Materials technology is established. These key areas of research have been thrived out into various inter-disciplinary applications.



4-wheeler with Li-Ion Battery

(b) Hyderabad laboratory

C-MET, Hyderabad has evolved as a unique facility in the country for the development of ultra-pure materials, compound semiconductors, refractory metals, alloys, etc. In order to promote resource efficiency and circular economy, a Centre of Excellence on E-waste (CoE) management is established with pilot plant recycling facilities. A state-of-the-art NABL accredited Restriction of Hazardous Substances (RoHS) test facility is also established to support EEE industries.



Recovered 4N pure Si from end-of-life Si solar cell

(c) Thrissur laboratory

Major thrust area of C-MET Thrissur includes microwave material (including microwave dielectrics and substrates), energy materials (Carbon aerogel and Graphene based super capacitors), Sensors and Actuators (Thermal sensors, Piezo ceramics and Piezo actuators) and Nanomaterial (nano structured oxides, thin films, thick films and materials for Plasmonic application), Biosensors (wearable and stretchable electronics, Biomedical sensors, Artificial skin/prosthetics), Graphene, MXene and other 2D materials for electronics applications. India Innovation Centre for Graphene (IICG) is established.



Plasmonic based portable Biosensor with disposable chip

9.3.2 Products developed for strategic sector

(a) Carbide derived carbon for strategic applications

Carbide derived carbon (CDC) is a high surface area material with a combination of micro, meso and macro pores. The tunable pore size makes it an ideal material as the carbon source in supercapacitor applications. CDC is prepared by dry chlorine etching of metal chlorides. CMET Hyderabad has developed a process methodology for dry chlorine etching of silicon carbide with high conversion rate and low residual chlorine content. The materials are being tested and evaluated for super capacitor application at VSSC.



Dry chlorine etching facility

(b) Hafnium sponge for strategic applications

Hafnium Plant at C-MET Hyderabad is a unique facility built to supply the total hafnium sponge requirement for Indian space applications. The plant has supplied more than 280 kg of space grade Hafnium to Vikram Sarabhai Space Centre (VSSC) /Indian Space Research Organization (ISRO) so far. C-MET is in discussions with ISRO for the supply of 1.75 tons of this metal under 5 years contract and aspires to meet the requirements of Department of Atomic Energy in future. C-MET is also working on spin off products like high dielectric gate oxide material for silicon based MOSFETs due to its high dielectric constant (k), thermal stability, large heat of formation and large band gap.



(a)

(b)

Hafnium Sponge (a) before and (b) after shredding

(c) 7N pure Germanium for detector applications

Induction zone refining system designed, fabricated for the purification of scrap Germanium converted to 7N pure Germanium for detector applications. Zone refined samples analyzed by GDMS at NRC Canada and confirms 7N Ge with respect to metallic impurities. 5 kg of 7N pure Germanium prepared by induction zone refining was supplied to SSPL, DRDO.



7N pure Germanium to SSPL, DRDO

9.3.3 Technology transferred to industries

Technology for the “3D analysis system for wearable device for the prediction of tumor parameters” has been transferred to M/s. Murata Business Engineering (India) Pvt. Ltd., Hyderabad on 06.12.2021.

Technology for the “NTC fast response thermal sensors” has been transferred to M/s Thermosen Technologies Pvt. Ltd., Bangalore on 31.05.2022

9.3.4 Technologies ready for transfer

The following technologies are ready for transfer. The glimpses of these technologies are given below.

(a) Tri-band composite NavIC Antenna

Navigation with Indian Constellation (NavIC) is an indigenous satellite navigation system, which facilitates accurate real time positioning and timing services over India as well as the region extending up to 1500 km from its boundary. Considerable efforts have been done by Ministry of Electronics and Information Technology (MeitY) for the development of NavIC modules locally which has tremendous application potential ranging from agriculture to road transport to homeland security. Utilizing the in-house knowledge base, C-MET has developed miniaturized planar antennas on high

dielectric copper cladded substrates for Tri-band (L5, L1 and S) NavIC receiver applications.

Technology Readiness Level is 4



Tri-band NavIC antenna (L1, L5 &S)

(b) 7N Zinc for detector applications

C-MET Hyderabad has developed process technology for the purification of 3N Zinc to ultrahigh pure 7N Zinc by zone refining at 1 Kg batch size. Also developed the process technology for conversion of zone refined ingot to granules of <3 mm diameter for detector applications. Zone refined samples analyzed by HR-ICPOES at CSIR-NGRI confirms 7N purity w.r.t. metallic impurities.

Technology Readiness Level is 4.



7N pure Zinc

(c) Purification of scrap Germanium to 7N Germanium

C-MET Hyderabad has developed process technology for the purification of scrap Germanium to ultrahigh pure 7N Germanium by induction zone refining at 1 Kg batch size. Indigenous induction zone refining system has been designed and fabricated. Zone refined samples analysed by GDMS at NRC Canada confirms 7N purity w.r.t. metallic impurities.

Technology Readiness Level is 4.



7N Germanium ingots

(d) Li-Ion Battery Recycling: Hydrometallurgical route

C-MET developed a complete technology package for the selective recovery of Li, Co, Mn and Ni values from assorted types of discarded lithium-ion batteries. The technology ensures high recovery (~98%) of Li, Co, Mn and Ni values in the form of their corresponding oxides as Li₂CO₃, Co₃O₄, MnO₂, and NiO respectively, with purity equal to or higher than 99 %. The process methodology is tailor-made in such a way that it suits to assorted type of lithium-ion batteries. The method has high extraction efficiency with less solvent. Further, the method requires comparatively lesser extraction time to extract metals. All the processing equipments are indigenously designed and fabricated. The technology is fast, cost effective and easily scalable.

Technology Readiness Level is 5.

(e) Li-Ion Battery Recycling: Pyrometallurgical route

The major drawback of using pyrometallurgical route in recycling of Li-Ion battery (LIB) is difficulty in extraction of valuable metal contents as all metal contents smelt to form a mixed metal alloy and very low recovery of the Li due to evaporation and infusion of Li content into slag. C-MET has developed a novel methodology for the extraction of valuable cobalt-nickel alloy from discarded LIBs using pyrometallurgical route. Smelting of LIBs black mass is carried out in an energy efficient manner and reduces the total processing cost compared to other smelting routes. The technology

is indigenous, cost-effective, environment friendly and easily scalable.

Technology Readiness Level is 4



Co-Ni alloy

9.3.5 Centre of Excellences

Two Centre of Excellence (CoEs) were initiated during 2021-22 in C-MET. One from C-MET Pune and the other from C-MET, Thrissur. The aims and objectives are as follows:

(A) National Centre for Quantum Materials Technology, Pune

- Establishment of Quantum Material Technology (QMT) R&D and Commercialization Ecosystem.
- Establishment of R&D infrastructure at CMET, Pune to deliver results up to Technology Readiness Level (TRL) 6.
- Development of Quantum Material (QM) products and manufacturing processes & machines based on the Indian supply chain, for the global market.
- Development of quantum technology components for different applications based on quantum materials developed by the centre up to TRL 6 through grand challenges and collaborations (National & International collaborations to be developed and executed during the project).
- Annual Techno-commercial Road mapping for marketable products.
- Business Development Office: Establishment of Start-ups for commercialization and achievement of self-sustenance.

(B) Centre of Excellence (CoE) in Intelligent Internet of Things (IIoT) Sensors, Thrissur

- To establish a Centre of Excellence (CoE) in Kochi, adjacent to Electronics incubator fa-

cilities of Maker Village by utilizing the complimentary sensor research, development, and applications expertise at Centre for Materials for Electronics Technology (C-MET), Thrissur, and Indian Institute of Information Technology and Management Kerala (IIITM-K), Trivandrum.

- To develop application domains of CoE with the support of industry partners, including start-ups at Maker Village, as well as that in the Kerala Start up Mission ecosystem.



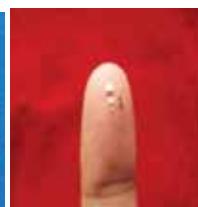
Heat Sensor using Thermistor



Fire alarm using Thermistor



Smart digital thermometer



NTC Chip Thermistor for battery charging monitoring

9.3.6 Research performance indicator

- (a) 40 Research publications in national and international peer-reviewed journals
- (b) 2 Patents applications filed
- (c) 38 Presentations in conferences and symposia
- (d) 11 Awards and honours
- (e) 43 Invites talks
- (f) 1 Technology transferred

9.3.7 Future area of research

The following activities are planned to explore the cutting-edge technologies in advanced electronic materials.

Development of multilaterals 3-D printing machine and inks, microwave devices for strategic and commercial applications.

- Development of metal, ceramic and semiconductor based FFF filaments for 3D printing of electronic components.
- Development of conductive inks for RFID tag antenna and flexible applications.
- High energy storage devices by researching on active materials for batteries for e-vehicle applications (supercapacitors, lithium-ion battery).
- Development of 3-D printing inks and microwave devices for strategic and commercial applications.
- Development of 3-D printing machine and materials for fabrication of LTCC packages and circuits.
- LTCC based liquid cooling devices for high performance computing.
- Development of Perovskite and thin film Solar Cells.
- Development of Li-S battery, Na-Ion battery and solid-state battery.
- Development of Organic battery and polymer electrolyte.
- Indigenous sensors for internet of things (IoT) and smart cities applications.
- Microwave substrates, terahertz, and millimeter wave materials.
- Cost effective and environmentally friendly recycling technologies and RoHS testing.
- Silicon carbide electronic device grade substrates for strategic and commercial applications.
- NTC materials for low temperature applications for airport weather monitoring system (-90°C to +50°C).
- EMI-shielding materials, nano powders of aluminum, iron, boron, Boron nitride, boron carbide, aluminum nitride for strategic applications.
- Graphene based electrical, optical, and acoustic attenuators for medical, consumer and strategic applications.
- Cost-effective plasmonic materials based portable biosensors and gas sensors.
- Plasmonic for photostable nanoparticles in medical applications such as Plasmonic devices for cancer detection.
- Stretchable electronic devices.
- MXene based 2D materials for electronics applications.

Development of lithium-ion capacitor/ hybrid supercapacitor

Development of DRA for millimeter wave applications.

Wearable/flexible sensors.

Quantum materials and technology.

9.4 ERNET India

9.4.1 VSAT Network

ERNET India has a VSAT network operating in C-band on GSAT satellite which provides Internet & Intranet access to education and research institutions located all over the country. The Master Earth Station (MES) is located at Bengaluru and is functioning as the Network Operations Centre (NOC). The network provides three types of VSAT links, viz., DVB-S2 ACM/MF-TDMA based Broadband VSATs; Normal SCPC VSATs and High Capacity SCPC VSATs. Presently, the network has 111MHz transponder bandwidth on GSAT satellite and this bandwidth is successfully used in providing connectivity services to remotely located educational institutes in North-East States, Andaman & Nicobar Islands and Lakshadweep Islands. The following are major projects under VSAT Network:

High Capacity SCPC VSAT links for NKN

ERNET India has established two High Capacity SCPC VSAT links for NKN project of MeitY located at (i) NKN Kavaratti, the U. T. of Lakshadweep Islands functional from 1.3.2017; and (ii) NKN Port Blair, the U. T. of A & N Islands functional from 9.1.2018; which were individually providing data rate of 47 Mbps at both locations. From April 2022, the VSAT link at Kavaratti is working with 93Mbps; and VSAT link at Port Blair is being used as backup link of terrestrial connectivity and working with nominal 4Mbps data rate. The National Knowledge Network (NKN) is using these links for providing connectivity to the Knowledge institutions of the respective areas.



Figure: High Capacity SCPC VSAT at Kavaratti, the U.T. of Lakshadweep Island for NKN

High Capacity SCPC VSAT links for LITSS Lakshadweep

ERNET India has established nine High Capacity SCPC-VSAT links for Lakshadweep Information Technology Services Society (LITSS) in 09 Islands of Lakshadweep viz., Agatti, Amini, Andrott, Chetlat, Kadmat, Kalpeni, Kavaratti, Kiltan and Minicoy. Initially, the satellite bandwidth of 25.5 MHz was allotted w.e.f. 31.10.2019, which has been further enhanced from time to time as per the availability of satellite bandwidth. Currently, these 9 links are operating with 50 MHz of satellite bandwidth. All the links are functional and are being used by LITSS, Lakshadweep.

9.4.2 Establishment of Intelligent Educational Infrastructure (SMART) in Eklavya Model Residential Schools (EMRSs)

The Project has been approved by Ministry of Electronics and Information Technology (MeitY) and is jointly funded by MeitY and Ministry of Tribal Affairs (MoTA) for setting up of Intelligent Educational Infrastructure (SMART) in 175 Eklavya Model Residential Schools (EMRSs) spread across the country. The objective of the project is to set up Intelligent Educational Infrastructure (SMART) at Eklavya Model Residential Schools along with facility of Internet connectivity. It will help in the growth and development of the tribal students and to bridge the digital divide by using latest technology. ERNET India is an implementing agency of the project. The ICT infrastructures have been delivered and installed at 48 Nos. of EMRSs.

9.4.3 NE Region: Setting up ICT Infrastructure in Government Schools to familiarize usage of Personalized Adaptive Learning

The project has been approved and funded by Ministry of Electronics and Information Technology (MeitY). The objective of the project is to set up advance Digital ICT lab Infrastructure in 40 Government Schools located in eight (8) North Eastern states of the country along with Internet connectivity, training to 400 teachers and an awareness workshop in each NE state. The project infrastructure has been delivered & installed in all the 40 schools. The 400 teachers/staff have been trained along with conduction of a workshop in all eight states of NE Region.

9.4.4 Setting up Wi-Fi Enabled Campus Network at Patna University, Patna

ERNET India is implementing the project "Setting up Wi-

Fi enabled campus network at Patna University, Patna, Bihar" funded by MeitY. The objective of the project is to setup a model Wi-Fi Enabled Campus Network at Patna University, Patna, Bihar. The model is replicable and can be replicated at all other higher learning institutions/universities/ hospitals across India. This shall enable on campus students, faculty, teachers, staff, guests to have entry to cyber world having intelligent Wi-Fi devices such as tablets, smartphones, laptop to access, retrieve and post information at any time. The network at Patna University is planned to be a controller based high speed wireless network with security & centralized monitoring & management systems. The purchase order for procuring the items for setting up of Wi-Fi Enabled Campus Network at Patna University has been issued on the System Integrator.

9.4.5 Web Hosting Services

ERNET India is providing web hosting services to various academic & research institutions, departments / organizations of Government. ERNET India has set up web hosting infrastructure on cloud to provide dedicated and shared ICT infrastructure to the Government institutions for hosting their websites, etc.

9.4.6 Participation in International Collaboration

ERNET India is a primary member of Asia Pacific Advanced Network (APAN) association from India and participates in its activities. APAN association is the international partnership of the National Research and Education Networks (NRENs) across the region. It provides a forum for user communities to come together with network engineers to help promote and exploit opportunities to enhance research and education in relevant disciplines, like Tele-health, Natural disaster mitigation, Research collaboration, Knowledge discovery, etc.

ERNET India is also primary member of Asia Pacific Network Information Centre (APNIC) and actively participated in its annual conferences and seminars. APNIC is a Regional Internet Registry (RIR) for the Asia Pacific region for providing Internet number resources to its members. It is one of the world's five RIRs and is part of the Number Resource Organization (NRO). APNIC provides numbers resource allocation and registration services that support the Global operation of the Internet. APNIC manages Internet number resources according to policies developed through an open process of consultation and consensus.

9.4.7 R&D Activities:

Optical Wireless Access Network for Rural and Urban Communication:

ERNET India jointly with IIIT Delhi is executing MeitY funded project on Optical Wireless Access network for rural and urban communications. As part of the objective, ERNET is developing LiFi-WiFi co-existence strategies for indoor broadband access and demonstrate in an auditorium scenario. Also carrying out real-field deployment of LiFi communication system in outdoor environment and demonstrate up to 10 Mbps using solar panel as a receiver for rural scenario.



Fig. Indoor Hybrid LiFi-WiFi testbed setup

The Hybrid LiFi-WiFi testbed was setup and experiments of standalone WiFi and standalone LiFi was performed. The Handover algorithm based on RSSI has been developed in MATLAB for simulation study, has been later integrated into physical testbed. The algorithm is now being evaluated over testbed for evaluating the performance of Hybrid LiFi-WiFi for increased coverage and better performance. The validation of algorithm is being carried out using different metrics. The outdoor LiFi communication system is evaluated in a lab environment, where a custom LED panel was designed and integrated for collimating light at 10mts distance onto solar panel. Currently, the performance trials for 10 mts distance are being carried out.



Fig. LiFi Outdoor Deployment Architecture (lab setup)

Designing Reliable and Low-latency Networks for Tactile Cyber-Physical Systems

ERNET India jointly with IISc Bangalore is executing a MeitY funded project on “Designing Reliable and Low-latency Networks for Tactile Cyber-Physical Systems”. The objective of this project is to design and implement Tactile Cyber-Physical System that addresses the challenges of achieving real-time interaction between physical and virtual worlds in prominent applications like remote surgery and virtual reality that require ultra-reliable low latency communications (URLLC).

ERNET India jointly with IISc is setting up IEEE 802.1 TSN testbed to study latency/jitter etc., combining TSN and DetNet technologies, and development of efficient Operations, Administration and Maintenance (OAM) methods for real-time network performance monitoring. The MPLS strategies for path discovery and resource allocation proposed under IETF DetNet WG were evaluated in simulation environment. The in-situ OAM implementation were carried out in Linux environment for monitoring the network parameters and the same is being ported onto P4 enabled devices (RPi) for integration into the TSN network. Finally, the developed TSN and DetNet strategies will be evaluated on physical testbed over WAN and demonstrate over typical tactile applications like distance education using virtual reality.

IoT enabled Water Management for Ramanathapuram District

ERNET India is executing IoT based Smart Water Management solution development with funding support from “Water Security and Climate Adaptation in Rural India” (WASCA) / TN State Rural Department. As part of this project (WASCA Phase-1), the water quality-based system in overhead tanks will be deployed in rural villages in Ramanathapuram and additional villages will be taken up in phase-2.

Proposed system architecture of IoT enabled Water Management

The study and activities in identification of IoT sensors, devices, deployment strategies, field visit to identified villages in Ramanathapuram District are completed. Finally, the IoT system for water quality and flow monitoring will be deployed at the rural villages in Ramanathapuram district.

9.4.8 Skills & Capacity Building:

Information Security Education Awareness ISEA – Phase II:

ERNET India is one of the implementing agencies for Government officials training under the project Information Security Education & Awareness (ISEA) Phase II, funded by MeitY for the duration of 2015-2022. Under this project, ERNET India has organized 18 training programs (both direct and online mode) in which 561 Government officials have been trained from Tamilnadu, Karnataka, Kerala, Telengana, Andhra, Goa, Uttar Pradesh, West Bengal regions. The training programs covered topics on Information and Network Security, Smart Grid Security, and IoT Security with relevant hands-on sessions. Additional training programs in Tamilnadu and Karnataka are planned to be organized by Dec 2022.

9.4.9 Domain Registration:

ERNET India is an exclusive domain registrar for education and research domains; registering the domains under ac.in, edu.in & res.in from 2005. The domain registration, renewal & modification process is fully automated with online payment facility for registering and renewing domain names on just a click. The automated website is GIGW compliant and runs on dual stack IPv4 and IPv6. ERNET has also started providing DNS services to its domain users. In automated system customer can modify online their DNS entries and other permissible information related to their institution avoiding security breaches. ERNET also registers domain names under विद्या—भारत under Internationalized domain names (IDN). More than 16000 domains are active as on date.

9.4.10 Development/renovation of Government/State Govt. websites accessible for Persons with Disabilities (PwD) as per GIGW /WCAG. 2.0 (A, AA level):

As per RPwD Act 2016 all Indian websites should be accessible to all and specially to Divyangjan. So, under Accessibility India Campaign, one of the targets is to make all Govt./State Govt websites accessible to all. For this Department of Empowerment of Persons with Disabilities (DEPwD) has funded ERNET India to make State Govt. websites accessible as per GIGW and WCAG2.0 (A, AA level). ERNET has been given State Government websites to make them accessible to

Divyangjan using Content Management System (CMS). Significant progress has been made in converting State Government websites Accessible with work on more than 90% of the allocated websites have been completed. Awareness as well as hands-on training on the websites developed by ERNET is given on a regular basis at State capitals so that the initiative of developing and maintaining accessible websites is continued and enhanced. ERNET has setup a captive lab for GIGW Compliance testing, Website Security testing and WCAG testing of the developed websites so as to maintain the quality and functionality of the websites developed under the project apart from getting the websites independently tested and audited by CERT-In Auditors and STQC Certified Labs.

9.4.11 National Cyber Coordination Centre (NCCC) Phase II Stage- 2

ERNET India is also implementing a project for establishment of Data Centres (DC and DR) along with IT infrastructure at remote locations bestowed by CERT-In. The project is envisaged to generate an aggregated view of the malicious activities taking place in cyber space in the country which will facilitate all the stakeholders to take coordinated action whenever need arises.

Strengthening of SC/ST/Women

Work Based Learning programme to Strengthen and Empower SC/ST/Women/EWS Graduate Engineers:

ERNET is one of the implementing agencies for the MeitY funded WBL program, managed by C-DAC Mohali to provide an opportunity to SC/ST/EWS/Women candidates to work in a professional work environment. The programme is envisaged to provide significant skills and exposure in Niche/ Emerging Technologies of IT, Electronics and related areas to Fresh Graduate Engineers of SC, ST, Women and EWS candidates or students in their 7th / 8th semester. ERNET will train 36 candidates between 3 centres in one year, with a total of 180 candidates in the project period of 5 years.

9.5 National Informatics Centre (NIC)

About NIC

Established in the year 1976, National Informatics Centre has emerged as a promoter of digital opportunities for sustainable development. NIC has rich experience in providing ICT & eGovernance support in the last 4

decades. 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 about 741+ District administrations of India. NIC has aligned itself with the mission and vision of Digital India program. Generic, configurable eGovernance products/applications have been developed using cutting edge technologies including mobile, cloud, data analytics, BI and advanced GIS. Various centers of excellence have been created to strengthen the nationwide digital infrastructure and services playing a catalytic role in the country's road to digital transformation in the next decade.

The NIC National Cloud (Meghraj) is presently hosting several critical applications on over 24,300 virtual servers supporting over 1600 e-Governance Users/Applications under Digital India. The details can be seen at **Chapter 2**. NIC's video conferencing service is helping Government officials to connect remotely and effectively with each other.

In the present post pandemic scenario of increasing remote working, work from home culture and demand for more online services, NIC is providing smart eGovernance solutions to cater these requirements. NIC has successfully created a digitally enabled ecosystem for the government in carrying out essential services in post pandemic time. NIC products and Services have also been recognized internationally with many countries showing keen interest in taking NIC's support in IT & eGovernance.

Network Services

NICNET

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 a greater number of districts, with primary link from BSNL and secondary links from RailTel/PGCIL. Most of the Bhawan Links at Delhi are upgraded from 100 Mbps to 1Gbps depending upon the requirement.

Direct peering of NICNET with BSNL, PGCIL and RailTel are completed at Delhi and Hyderabad for saving Internet Bandwidth and faster access of each other's Network and Data Centre. Peering with Google, Microsoft, Facebook, 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 and GST Council Meetings.

High speed Internet services are provided to all National data centers to ensure 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. NIC VSAT network NICNET has been offering Ku-Band satellite-based connectivity for providing data, video conferencing services for delivering e-governance services in geographically difficult locations where terrestrial connectivity is either not available or reliable. For running VSAT services, NIC has leased transponder bandwidth from DoS/ISRO on GSAT-18 satellite.

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.

NKN has a strong backbone connectivity with 31 Points of Presence (PoPs) in various State Capitals and 95 core links connected with meshed and partially meshed topology. Moreover, currently over 18 Petabytes of data is flowing within the NKN backbone every day. Over 61 links of 47 Institutes (premium Institutes, SDC (State Data Centres) & SWAN of many states) have been upgraded to 10 Gbps. NKN has also established a High Capacity SCPC VSAT Connectivity at Kavaratti, Lakshadweep and Port Blair, Andaman & Nicobar Island.

Data Centre & Cloud Services

Data Centre

NIC is providing Data Center Services from National Data Centers at Delhi, Hyderabad, Pune, and Bhubaneswar.

At National Data Centre Delhi, Data Storage Capacity

was augmented with 1.0 PB All Flash Enterprise Class Storage and 1400 TB Unified Storage System. Two Core SAN switches were replaced with higher port density, port speed and performance. Integrated Backup Solution was upgraded with another 1.0 PB Capacity to cater the growth of Backup requirement of application/services hosted in Cloud. Security posture of Data Centre was enhanced by deployment of Network and Web APT/ Sandbox solution to mitigate malicious traffic with zero-day attack, unknown malwares and malicious files/ objects and Advanced Persistent Threats attacks and multi-flow attacks etc.

A state-of-the-art Tier-III National Data Centre has been established at Bhubaneswar with a total capacity of 275 racks and is designed to provide a full spectrum of hosting services. Since its inauguration in 2018, the NDC has started its operations with an Open stack-based cloud. Apart from Open stack, VMWare and Kubernetes container services are also running from Bhubaneswar Data Centre. 408 users have been on-boarded, and 2794 no. of virtual machines have been allocated to host several e-Governance applications/ websites in VMWare environment. In the Open stack environment, more than 1000 VMs have been allocated and 50 no of users have been onboarded.

More than 20 applications are successfully running in the Kubernetes environment. NDC Bhubaneswar has been awarded the certification as ISO certified Organization with ISMS & ITSM Standard (ISO/IEC 27001:2013, ISO 20001:2018) and BCMS 22301:2019. Video Conferencing Services and Managed System Services are also provided from NDC Bhubaneswar. Storage capacity at NDC Bhubaneswar has been upgraded with the addition of 1 PB Object Storage, 1 PB Unified Storage and 1 PB Enterprise storage. Also, storage replication has been configured with the addition of equal amount of storage at LNDC New Delhi to provide DR services to users.

Rack space of NIU Hyderabad was enhanced to over 200 racks with the provisioning of energized space of 100 additional racks. The enhancement of Data Centre Physical Infrastructure with adequate redundancies involved enhancement of power capacity by over 70% to facilitate primary hosting and DR of various critical e-Governance Applications. Required Network, Storage and Cyber Security infrastructure has been established to start setting up project / application hosting. Old

obsolete storage systems have been replaced with new 2 PB enterprise storage system.

ICT Infrastructure and services at NDC Pune were further strengthened with the enhancement of NIC Cloud services. This involved up-gradation of Backup service with the Integrated Backup solution of 500TB usable capacity and 250TB front end capacity licenses.

Cloud Services

NIC launched National Cloud Services in 2014 under Megh Raj Government of India Cloud Initiative. NIC Cloud Services are being provided from multiple locations of National Data Centre. Various new services are now offered on Cloud including Application program Monitoring (APM) Service, Resource Monitoring (RM) Service, Artificial Intelligence (AI) Service, Load Testing Service.

Software as a Service is a delivery model wherein Cloud provides various readymade Services for direct consumption of its users. NIC is presently offering following Software Services over its National Cloud:

WAF as a Service: It provides effective protection mechanism against cyber-attacks at web layer. It blocks an ever-expanding and sophisticated web-based intrusion & attacks listed under Open Web Application Security Project (OWASP). It would also help in tracking emerging attack vectors at application level and helps in restricting the same.

Agile as a Service provides a combination of frameworks, tools and software practices for development and delivery of fast paced user centric software solutions. Practices and frameworks touch upon all the aspects of software development from planning (Scrum) to deployment and monitoring (DevOps).

Resource Monitoring as a Service enables a cloud user to have real-time as well as past visibility of cloud resource usage like VM uptime, CPU & Memory, disk, network, etc. It also enables users to monitor availability applications & websites through remote network ports or URLs.

Data Analytics (DA) as a Service enables users to build infrastructure for examining & analysis of large data sets to underline insights, patterns from retrospective to prospective in helping the decision makers to investigate the future and plan accordingly. Infrastructure hosted in the NIC National Cloud and provides an alternative for data analytics infrastructure.

Application Performance Management (APM) Service is an agent-based solution for managing the performance and user experience of applications in the NIC Cloud. This requires installation of monitoring agent software for collection of performance data from various components of application. The data is analyzed in the APM server for actionable insights through a dashboard.

Load Testing as a Service helps users in validating their application design and server Infrastructure on Cloud for expected concurrent user load wherein the system's response is tested under varying load conditions simulating concurrent virtual users accessing the application under test.

Chatbots as a Service: Conversational AI in form of virtual assistants, chatbots and voice-bots have gained popularity, it gives users new ways to interact with product by building engaging text-based conversational interface i.e., Chatbot, powered by Artificial Intelligence (AI). Chatbots helps to conduct a conversation via auditory or textual methods and are often designed to simulate how a human would behave as a conversational partner. Its use can expedite processes in user organizations with automated answering systems in their applications.

e-Granthalaya as a Service is a Library Management Software useful for automation of in-house activities of libraries for rendering online member services. The software provides built-in Web OPAC interface to publish the library catalogue over Internet. The software is UNICODE Compliant thus, supports data entry in local languages.

To cater the projects envisioned under Digital India program and growing requirements of existing Projects, over 24,300 Virtual Servers were provisioned and allocated to over 1,600 Users/Applications for e-Governance Projects.

NIC has been establishing NIC State Clouds in its Mini-Data Centers in the State Capitals. So far NIC State Clouds have been established in 23 States and these are operational and resources of over 3100 virtual servers have been allocated and over 900 users, 1100 applications of Govt. Departments.

Command and Control Centre

Command & Control Centre (CCC) has been operational at NIC HQ with the objective of providing single window solution for monitoring, troubleshooting and technical

support for applications hosted in NIC Cloud, National and NIC Mini data centers across the country. In last one year demand of services offered by CCC have been increased manifold. CCC has been providing following services:

1. Resource Monitoring Service has been using open-source tools such as "Open NMS", Zabbix and Grafana for service and resource monitoring of ICT infrastructure hosted across NIC Data centers and applications on NIC Cloud on 24x7 basis.

Resource Monitoring Service monitoring features

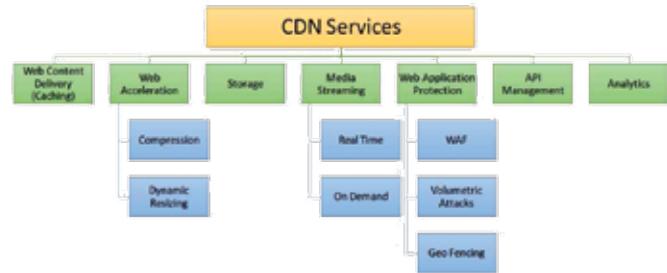
Resource Monitoring services is currently used by the NDCs and other NIC Mini Data Centres for monitoring



Complete Application Flow MAP

2. **Application Performance Management:** On demand APM service to troubleshoot and streamline application performance.
3. **NIC Assurance (Load Testing as a Service):** A self-service model for load testing on the applications hosted on NIC cloud and data centers.
4. **Troubleshooting & Technical support:** Support to applications in resolving various issues ranging from basic OS/software configuration to troubleshooting issues in live applications, software upgrades and patching, resolving security issues (VA), SSL configuration and renewals etc.,
5. **CDN Service:** Many critical websites/applications have been using CDN service including Static AarogyaSethu, MyGov, SCI, Swaas, PM India, PM Cares, National Portal, MHA, MoHFW, ICMR, Min of Ayush, Digi Locker, CVC, ECI Results, Umang, important webcasts etc., More than 15-20 TB per day traffic has been served through CDN.

CDN Services Flow



6. **DC Service:** Operations and management of 52 racks DC hosting the storage, network and SAN related to CCC services and ICT infra of few major projects/services such as Artificial Intelligence, Webcast, Video Conferencing, Near DR of email/messaging etc.

Cyber Security

Cybersecurity incorporates the security standards and procedures followed to ensure protection of sensitive data, personal information, intellectual property etc. Multi layered access mechanisms are implemented on information systems for prevention from security breach and unauthorized access.

To prevent the misuse of the power of social media, Indian Cyber Crime Coordination Centre (I4C) has set up a workflow-based Open-source Information Sharing System (OSISS) through NIC. This initiative aims to provide a secure platform to various stakeholders like Ministries, States, Law Enforcement Agencies (LEAs), Specialized Cyber Space Agencies and senior officers in MHA to feed and share open-source threat data among them for proactive, preventive, and protective actions by individual entities. The information is crawled to OSISS with the help of open-source social media analytic tools and Hydra application. OSSIS has been hosted in NIC cloud and integrated with Single Sign-on (SSO) platform, Parichay of NIC. The platform assists to search from open-source contents and enter the events related to Threat Categories like Cyber Crime, Left Wing Extremism, North-East, J&K Terrorism, National Sentiments Separatist, Trending issues, Radicalization, JMB, etc. Now the system is being rollout in all the States to make it wider utilization.

Network Security

During the year, the Network Security Division (NSD) was constantly engaged in ensuring Cyber Security of NICNET information infrastructure through assessment, planning, deployment, management and administration of state-of-the-art security appliances and solutions. The security span of NSD comprises of National and State Data Centers, over 1000 LANs of Govt. offices and MPLS networks, more than 2 Lac endpoints and a series of networking devices deployed across the country. Multi-layer security was provided to NICNET users with high availability infrastructure and specialized teams were deployed to work on different Layers of security.

Critical Security Controls were maintained for effective cyber defense and change control management. Distributed Denial of Service (DDoS) attacks towards NIC infrastructure were prevented using Anti-DDoS Appliances deployed at gateway level in National Data Centers (NDCs). Network Firewalls are being used to provide the requisite security to the digital assets in NIC's National and State Data Centers. Network Intrusion Prevention Systems (NIPS) were maintained in monitoring and blocking mode for performing deep packet analysis. Up-to-date signatures were applied on regular basis in all IPS Sensors deployed in NICNET across country. Geo-fencing of applications was also facilitated wherever it was needed.

As a part of enhancing endpoint security, Host Intrusion Prevention System (HIPS) solution was deployed in server systems in National Data Centers. Next Generation Antivirus solutions with AI & ML, Endpoint Detection & Response (EDR) and Sandboxing for malware analysis were deployed in client and server systems in NICNET. Necessary support was provided to server owners to fix the vulnerabilities and improve the VA score so that the applications can be securely deployed. Audit of Network and Security devices was conducted at National Data Centers, State Data Centers and various State & Bhawan networks.

The 24x7 Security Monitoring Centre was constantly engaged in identifying suspicious activities towards NICNET based on real time log correlation using SIEM solution. More than 50,000 attacks were handled based on the correlation of security alerts from various security solutions deployed in NICNET. Cyber-attack incident reports for major security issues were regularly shared with the respective application / asset owners along with suggestions for further necessary fine tuning. Separate attack trend reports of strategic sectors were also prepared and shared with the concerned agencies.

Several awareness programs and capacity building programs were conducted on Cyber Security. The month of October was celebrated as Cyber Security Awareness Month with the theme 'Do Your Part; #BeCyberSmart', reminding individuals and organizations about their role in protecting cyberspace.

NIC-CERT

NIC-CERT focuses on handling security incidents, gather security intelligence, and identify security gaps in

ICT Infrastructure, and works with the stakeholders for mitigating the security issues. Some of the key activities carried out by NIC-CERT are its setup central log management platform and integrated logs from over 600+ websites, applications, network, and security devices. It has developed Machine Learning models for detecting advanced security attacks and training of the models are underway. NIC-CERT setup a central portal for facilitating the free SSL Certificate generation through Let's Encrypt CA. More than 2700+ SSL Certificates were issued through this portal. It has configured and sent automatic SSL Certificate expiry alerts, SSL Vulnerabilities, and misconfiguration alerts. It has published more than 300+ Security Advisories covering various hardware, software, and other critical technology stacks. It has sinkholes and blocked more than 1 billion c2 and other malicious traffic hits. NIC-CERT handled more than 660+ Security Vulnerabilities affecting Govt Applications, Websites, and related ICT Infrastructure.

Portal has handled 48 website defacement incidents, 300+ Phishing incidents & 2700+ C2 communication incidents. Also, shared daily security status reports to the Ministry/Bhawan's IT Team. It has shared monthly summary security status reports with the CISO's of various Govt Ministries and Departments. It has undertaken training and capacity building sessions for NIC Officials, CISOs & Other Govt officials. It has delivered cyber security trainings and lectures in various conferences, workshops organized by CDAC, MeitY, NeGD, IB etc. It has shared with CERT-In, the Threat intel identified during investigation of security incidents. NIC-CERT undertook R&D activities to build a Cyber security Platform in a project sponsored by NSCS. It has carried out pro-active red team activities to identify more than 600+ security issues affecting various ICT components managed by NIC.

Application Security

NIC is formulating and updating the Security Policies for NICNET as and when required. 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 threats, 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 Application Security group also undertakes Incident Handling and Malware Analysis, Sanitization of security controls based on analysis results, issuing advisories to NICNET users, and is also aiming for provisioning of WAF as a Service Solution (WaaS) protection for NICNET hosted websites.

VPN

Virtual Private Network is a secure method of connecting and mobile users to their private and corporate networks over Internet. NIC's VPN service is used by Government officials, Central and State Government departments, PSUs, and Autonomous bodies under Central and State Governments to a) access e-governance applications and b) update their web sites and remotely manage the servers hosted in NIC's Data Centers. NIC is also offering new remote access technologies like WebVPN. This customized product is completely Indian and in addition to being lightweight and scalable (requires only a Web Browser) is also secure (through two factor authentication). NICNET has been extended through site-to-site VPN with other independent networks like Indian Missions Abroad.

VPN services are secured using best of security practices and routine detailed log analysis. NIC's VPN services played a key role in e-file movement by enabling Work-From Home for all Government offices during COVID pandemic in 2021, apart from remote maintenance of key e-governance application servers. On an average, 45000 VPN connections are made on every working day. The upgraded VPN service entails an enhanced security in authentication mechanism and client software. Very soon this service will be extended in a Disaster Recovery mode.

Web, Messaging and Support Services

Domain Name Registration

NIC is an exclusive domain registrar for Gov.in . The allocation of Domain Name under Gov.in is made in compliance to the registration guidelines (https://registry.gov.in/pdffdocs/Gov.In_Guidelines.pdf) released by MeitY.

A domain name apart from English could also be registered in 18 other official languages and contributes

to make the website completely in regional language starting from IDN name to webpage content.

Domain name registration could be done online by login into registry portal (<https://registry.gov.in/>)

Different online services with e-Sign feature provided through the portal make the process easy & quick and cut the overhead time and make the Services completely online - like domain registration, renewal cancellation, management, transfer of domain, Permission for creating 4th level domain, Sub domain management (registration, updation, deletion etc).

As of now, there are 4,951 of total Active Domain (3rd level), 1,41,651 of Total Active domain at 4th level (Registered under 3rd level Domain Hosted in NIC).



Email

Email forms the backbone for all eGovernance initiatives in the Government. As part of the mandate under the Digital India program, Government of India is providing a secure e-mail service to its officials for secure communication. NIC as the implementation agency, is providing secured email service with 24x7x365 support to the Government, both at the Centre and State. All services under e-mail are offered for free of cost to all officials under Ministries, Departments, Statutory Bodies, Autonomous Bodies, States and UTs.

Email service is based on five primary pillars: Security, Performance, Redundancy, Service Continuity and Rich feature Set. The current service is the largest service of its kind offered by any Government globally. The importance of E-mail was even more evident during the ongoing pandemic. E-mail as a core service of the Government has ensured that communication within the Government is not impacted by COVID-19 and operates seamlessly. The E-mail and messaging services, with the primary domain of @gov.in, supports more than

1,600 virtual domains like @meity.in, @nic.in, @mea.gov.in, @mha.gov.in etc. with around 3.38 million users and manages over 4.5 crores daily E-mail transactions blocking approximately 1.2 Crore malicious attacks per day.

The service provides plethora of features to the users, some of the prominent features are: Supports 11 Languages (currently with Hindi, English, Tamil and Odia), Internationalized domain name (IDN)- with user ID as, assigning multiple templates per user as per roles of the officer, Video Conferencing Integration, Mail encryption, briefcase, undo, send etc. and Kavach providing Geo Fencing and Device Mapping. NIC also provides an email distribution list for bulk email for official purposes. This service has been a lifeline for all communication during the pandemic.

SMS

NIC SMS Gateway which, transacts 6 to 7 crore SMS per day for more than 3250 integrated e-Gov applications has truly emerged as an effective service delivery and citizen engagement platform. The gateway is TRAI complaint and on an average on-boards average 25 new applications per month. The gateway deployed in active-active DR; has all industry standard features and capable of both horizontal and vertical scaling to meet government departments expectations. Major projects integrated are UIDAI, MoRTH, Health, EPFO, BIJLEE, GSTN, Mid-Day Meal, DOP, MNREGA, PMO applications, AarogyaSetu, Bharat Ke Veer, CoWIN, Judiciary and commissions to name the few. NIC SMS gateway delivers more than 90% of SMS in general and 95% of OTP SMS, which is at par with industry standards. The gateway is integrated with all major TSPs with consistent bandwidth of 20000 TPS.

Services offered include PUSH SMS (application sending SMS to subscribers), PULL SMS (subscriber sending SMS to application), Reporting Dashboard, Voice message through OBD, Miss-Call and short code integration. Currently 16 short codes are integrated. Major short codes are 1921 (MyGov), 15544 (Mid-day-meal), 1947 (UIDAI). In year 2022, till the writing of this report, 2310 crore SMS were transacted.

Major SMS campaign include 22 crore SMS for Ministry of Labour, 20 crore SMS for VAHAN project, 10 crore SMS for NCF survey and 11 lakh for PPC 2022. Similarly, OBD campaign done for 49 crore seconds. NIC SMS

Gateway will be used during proposed MCD Election in Delhi for both Push and Pull SMS services.

Single Sign On - Parichay

Parichay is a multi-lingual single sign-on platform designed to integrate Government applications under a single authentication framework. It provides a centralized session and user authentication service in which one set of login credentials can be used to access multiple Government applications. Once the user logs into Parichay, all the services that the user is authorized to access and that comply with Parichay's. This platform enhances the security posture of all Government applications as it provides a secure sessions-based access and provides two factor authentications with geofencing. It has over 1600+ applications integrated and has a citizen-centric platform named "Jan-Parichay". JanParichay (Meri Pehchaan) was launched by Hon'ble PM on 4th July 2022 at Gandhinagar, Gujarat on the occasion, of Digital India Mahotsav. It has integrated more than 900 applications and 1700+ services so far. Citizens can self-board on any citizen service using attributes like Aadhaar, Mobile number, email address, Driving License, PAN etc. The platform offers both a central and federated architecture with seamless citizen/user movement. Some of the extensive features of Jan Parichay are Password Less Authentication using mobile and email, Per-Service Multi-factor Authentication using Parichay authenticator, Authentication auditing using Analytics, Single/Multiple logins per service configuration, Per Service Global Authorization using Verification parameter, Signup using Social Account Logins, and various other intuitive functionalities.

It has in-depth analytics for security with Parichay Analytics as a service which offers independent user and admin dashboards for detailed insights from data to prepare for & prevent future cyberattacks. The platform also provides pluggable Auth store which provisions for users having an account on any other application to be seamlessly migrated/ accessed by using pluggable authentication store irrespective of the type of database and backend application. The platform is also available on mobile using QR Code or MPIN generated through Parichay/ Jan Parichay web application.

Government Instant Messaging System (GIMS)

SANDES (The instant messaging system) Sandes is an open source based, secure, cloud enabled, and indigenous platform developed by NIC for instant and

end to end encrypted messaging for G2G, G2C and C2G communication. The Mobile App, the Portal, Sandes Web, and the Gateway are the four major components of the System. The Mobile App can be configured to manage messaging and is integrated with NIC email and Digi-Locker. The Management portal is for the organization and employee onboarding, group management, employee verification, broadcasting messages, dashboard, and analytics. Sandes Web enables a user to send and receive messages from the web browser. The Messaging gateway is the platform for integration with other Government applications. The App is available at Play Store and App Store.

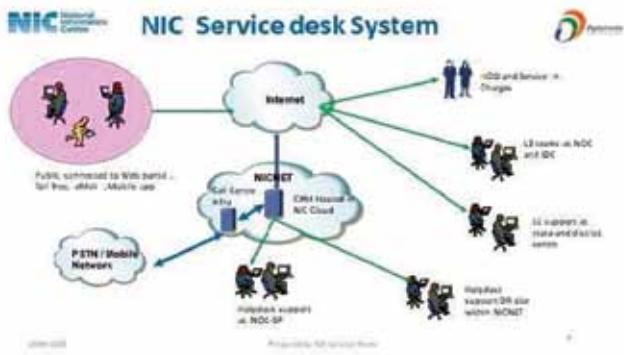
Current Features and Future Roadmap



Sandes is developed with security first principle and is hosted on Government infrastructure. All communication in Sandes is end-to-end (E2EE) encrypted. Sandes offers facility for one to one and group chat, one to one and group audio/ video call, inviting users, sharing media file, auto synchronization of contacts with phone book, message broadcasting and chatbot enabled dashboard. Sandes complies with Social Media Intermediary Guidelines and the Privacy, Data Retention policy designed as per Govt. Requirement.

Service Desk

NIC Service desk is a single-window platform for resolving issues related to various services offered by NIC. Any user of NIC services including the government, statutory bodies or general public can raise a query/call/complaint/suggestion for the issues faced by them. This desk is the Single Point of Contact (SPOC) between various NIC service providers and users for day-to-day activities. NIC Service desk manages incidents, service requests and user communications. The users can raise tickets for any issue related to any NIC services through various channels like web Portal, email or via a toll-free number.



The main objectives of NIC Service Desk are:

- Single point of contact for users to register the complaints with respect to NIC services via Call Centre, Web portal and email.
- Quick routing of issues to the concerned queue/department
- Transparency and accountability to resolve the tickets
- Single repository for issues raised and resolved.
- Timely resolution with provision for escalations.
- Detailed response to users' issues with feedback mechanism.

Communication channel between NIC and its users.

Presently users from all central and State Government departments are using this system.

Description	2021	2022
Organization (Institutes)	1,482	1,687
States Departments	2,963	2,966
Districts	712	712
Central Ministries	69	70

Description	2021	2022
Central Department (Including 58 Delhi Bhawans)	274	274
Total Registered users	4,19,698	30,83,658
Total New Register Users	92,811	1,26,267
Total Core Services	38	467
Total Executives (Resources from NIC/Support)	4,315	5,102
Executives at Call Centre	50	50

To provide 24x7 service there is a call centre where users can contact through toll free no 1800111555 for solutions and also a web portal <https://servicedesk.nic.in> for directly registering complaints/ issues. Any compliant related to any services provided by NIC can be made through this portal.



After the complaint is registered, an auto ticket is generated, and details forwarded to support or services concerned. The support staffs and administrators of all onboarded services can attend the complaints and provide solution. Its complete transparent system which tracks all actions from the point complaint registration till closure. The support staffs and admins communicate with the user through email and web portal <http://support.nic.in>.

Video Conferencing Technologies and Services

Video Conferencing Services

NIC provides state-of-art Videoconferencing services since 1995 to various Departments of Central Government & State Governments including apex offices. Video Conferencing services are secure, scalable, and reliable having the largest coverage in the government sector across the country. NIC offers Studio based Video conferencing facility to the users from 2400+ studios over NICNET which are in State Capitals, Union Territories, Union Ministries, Departments and Districts of states. NIC also provides Desktop based Video

Conferencing facility, which enables users to access VC services from Anywhere, Anytime with Any Device equipped with internet. Videoconferencing services play a vital role for faster implementation and monitoring of various Government existing Projects/Schemes, Public Grievances, Hearings of RTI cases, Tele-education, Tele-medicine, Launching of new projects/schemes, etc. VC services are being extensively used by the honorable President of India, honorable Prime Minister of India, Union Ministers, Governors, Chief Ministers of states, Cabinet Secretary, Chief Secretaries, Chief Information Commissioner, and various levels officials across country.



Interaction of Prime Minister of India with International counterparts

Webcast & Webinar Services

NIC is providing webcast services since last two decades. NIC webcast service covers Events like Union Budget, President and Prime Minister's addresses, Prime Minister's Mann ki Baat, Independence Day and Republic Day celebration (New Delhi), PIB Press conferences, Army and Air force day celebrations, State Assemblies proceedings etc. NIC has its own indigenous webinar solution for training, seminars etc. with large scale of participations.

Geo Spatial Technology and Services

To fulfill the objectives of Digital India and to establish end to end geo-spatial electronics delivery systems as part of National GIS Mission Mode Project, GIS Platform established by NIC 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 & railways, forest layer, settlement locations etc., including many base map services. Map Services are

being provided to various ministries and departments like Ministry of Sanitation and Drinking Water for SBM (Garmin), Drinking water Portal etc. Similar Services are being provided to Department of Land resources, Department of Labor, Vahan/ Sarathi Project, CGHS, HMIS etc.

STATE GIS PORTAL empowered by BharatMaps is a simplified user interface for all the states and union territories of India (URL <https://stategisportal.gov.in/>). Six Centers of Excellence in GIS have been established in Madhya Pradesh, Tamil Nadu, Odisha, Bihar, Andhra Pradesh, and Assam. They are also offering GIS services to various departments. "Geo-Spatial" is a core foundation to improve or enhance Governance Systems and Structure to facilitate location specific planning and decision making.

Svamitva Dashboard Application is one of the major achievements. It provides role-based access to update status on Key Performance Indicators of SVAMITVA scheme dealing with drone survey of village abadi area and activities involved there on ultimately resulting in Property card generation and distribution. The key stakeholders are Ministry of Panchayati Raj, Survey of India, State Govts and NIC. The Portal was also used to distribution property card to beneficiaries through SMS as well as intimate MLA/MP about the proposed drone flying program. The drone data which is generated under SVAMITVA project being integrated with Grammanchitra application for rural planning.

Geo-Spatial Technology and Services also plays a crucial role in the management and planning of utility service systems. Utility Service Systems mainly includes Global Positioning System, CORS, Topographic/Cadastral Mapping, UAV / drone survey Photogrammetry and AM/FM/GIS.

The division has launched One Map Series for cities wherein all city level modules like plot information, Utility workflow management, Solid Waste management, Vehicle Tracking and Road information are incorporated. Some of the major projects accomplished in this financial year are One Map Greater Noida Geo portal, One Map Noida Geo portal, Mega City Portal, Delhi Jal Board, E-Dharti web and Goa State Urban Development Agency (GSUDA).

Digital NIC

Digital NIC is a single window G2E portal for all NIC

Employees. All the process workflows have been integrated into this role based portal. It takes care of the complete lifecycle of the employee from recruitment, onboarding, promotions to retirement or resignation. Through this portal, an employee gets all the alerts, can submit various applications for approval and claims for reimbursement. The portal is integrated with eSign, PFMS, email, Sandesh (instant messaging service) etc for a complete paperless flow of all applications.

From the point of view of the organizations, it serves as a massive MIS platform and a repository for all sorts of data that is generated. It provides various role-based dashboard like Personnel dashboard, Finance Dashboard etc.

ICT Solutions for Northeastern Region

The ICT intervention in various schemes / projects implemented in the Northeastern Region by various Ministries/ departments has been improved. An Analytical NER Dashboard with schemes/projects implemented in NER by various Ministries/ Departments has been developed by the Ministry of Development of Northeastern Region involving Centre for Excellence for Data Analytics, NICSI. Institutional supports to NER specific institutions located in NER including Delhi NCR have been provided. The NIC State Offices in State capitals along with their district Centres located in District HQs have been providing supports to State Governments in implementing various state specific eGovernance solutions in addition to the National projects.

Capacity Building

NIC Training Division was established with an aim to develop technical and program management skills covering all the NIC officials at NIC-HQ, Central Government Informatics Support, State/ District Informatics Support and Finance, Personnel & Admin, Purchase and Stores officials. Training in NIC broadly includes continuous up gradation of technical/technological knowledge and leadership skill development. In view of changed environment in all the spheres of governance and the emerging challenges being faced due to technological disruptions, a blended approach of e-Learning (VidyaKosh and Webinar) and Classroom modes of training is designed that provide flexibility to get the subject specific knowledge more efficiently and effectively.

e-Learning Mode

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.

VidyaKosh – A Learning Management System (LMS)

Vidyakosh is the e-learning initiative of NIC, for providing anywhere, any time and any pace learning to the learner by providing a rich set of courses and facilitates efficient administration of self-learning for all NIC officials. Variety of courses on emerging technologies, Security, application, and mobile app development like Microservices, IoT, Data Analytics, Blockchain, AI & ML, Python, Data Science, Security, Database Systems, Software Development, System Admin, Cloud, and Infrastructure are made available in Vidyakosh. As well rich set of courses under Management Development program (i.e., Management skill, Leadership skills, Personal Development & Communication Skill etc.) are also available on VidyaKosh. More than 3000 NIC S&T officials are getting benefited from these courses.

Webinar

NIC has created a Webinar platform, aimed at sharing knowledge among the peer group, updating individual knowledge on the Emerging Technologies, sharing various technical experiences & challenges faced in work, and improving communication skills.

This year around 1390 Webinar sessions have been conducted so far. So far 16 theme - based series have been conducted on topics such as Application Performance Testing, API, NIC Open- source Software Services, Elastic Stack, Blockchain Technology, Enterprise Architecture, Open-Source Data Centre Tools, Containerization etc.

Classroom based Training Programs

Training Division has been instrumental and driving force in organizing various Needs and Assessment based Training programs for all NIC Officers at NIC and Other Institutions as well. Various Training programs have been conducted in NIC itself making best use of existing Infrastructure VC Facility, International Classroom, webcast, and also tied up with other premium organizations such as IIMs, IITs, ISTM, NIFM etc. to utilize their Infrastructure and faculty to make the participation in training programs feasible for all the officers across country.

Classroom/online Training

Training Division, NIC has conducted multiple nos. of online, Residential & Hybrid mode training programs and workshops on various Emerging Technologies, ranging between half day, one day & five days program. A total of 43 training programs were conducted, out of which 9 (nine), five-day long training program (3 residential and 6 online), 5 (five) one day long training program & 29 (26 held & 3 proposed) half day programs are organized. Training division is observing "Cyber Jagrookta Diwas" on the first Wednesday of every month since 4th of May 2022. The month of October is also observed as "Cyber Security Awareness" month during which 12 webinars on Cyber Security Awareness were held. Areas covered in training this year are Artificial Intelligence and Deep Learning, ELK Stack for Data Analytics etc., Development of Mobile Apps on Android and iOS Platforms, Network Technologies and its components, Enterprise Architecture, Cyber Security, Cloud and Data Centre, API Management, Agile Development & Dev OPs, Software Quality etc.

3(three) half days training program was conducted from 6th to 8th June 2022 on Administrative and Finance related matters. SIO, HO of the states and Section Officer, Deputy Director, Assistant Section Officers posted at NIC HQ attended the training.

3(three) batches of Five officers in the rank of Scientist-F and Scientist G were nominated and attended 3 different Online Executive Programs conducted at IIM Ahmedabad, IIM Kolkata, and IIM Bangalore respectively during February, March 2022.

Induction Training

As per DOPT O.M. No. 28020/1/2010-Estt. (C) dated 30th October 2014, newly recruited employees in Government of India have to undergo mandatory Induction Training for minimum two weeks, which is precondition for clearance of probation. Accordingly, 69 Non-Technical officials of various posts namely, JSA, MTS, Drivers, Steno, Security Adviser and Dispatch Rider were given 2 weeklong training in October 2022. Preparation for conducting Residential Induction Training in this calendar year to a new Batch of Scientist-B and Scientific Technical Assistant is underway.

Digital India Internship

Under Digital India Internship, 2022, 11 students have undergone Internships for two months during 1st June

2022 to 31st July 2022. These students successfully completed their internship projects on various subjects namely Artificial Intelligence, Blockchain, eService Delivery, Data Analytics, IoT-AI, Microservices, AR/VR, Cloud Automation, Chabot and Text Analytics and Ontology.

Innovation and IPR

Intellectual Property & Know-How Informatics Division takes care of IPR Management of NIC-developed software solutions with particular emphasis on Copyright Registration and Trademark Protection. Activities involve safeguarding NIC's IPR interests in applications developed for NIC's internal use and for use of Central and State Government Ministries / Departments / Organizations, spreading IPR awareness through Knowledge transfer, webinars, personal discussions, lectures and workshops on IPRs highlighting its importance, coordinating with other government departments for IPR registration, taking care of preparation and Implementation of IP Policy at NIC, preparation of documents like status reports, IPR data input forms, NoC form from the user department, MoU with user departments etc. It reviews agreements with NICSI/MeitY/user departments in connection with NIC's IPR ownership and registration. The division secures NIC's IPRs before internationalization of NIC's software solutions/products aimed at Digital Diplomacy.

NIC's IPR Profile

- Total Copyrights Registered-81; In 2022 Registered – 6, Applications pending at Copyright Office-4, Under Process (in house)- 5
- Total Trademarks Registered-1 Trademark in the USA; In 2022, 28 logos identified for registration and are under process
- Total Patents Granted-1 Patent in the USA; In 2022, 4 CRIs under consideration for patent Filing

eGovernance Services and Products

NIC is playing an instrumental role in executing key IT projects, in close collaboration with Central and State Governments, making the last-mile delivery of government services to the citizens a reality, through a variety of digital solutions. NIC endeavors to cater to ICT needs at all levels of governance including central, state, districts, judiciary, and legislative layer.



PRAYAS - Pursuing Excellence in Governance

PRAYAS-'Pursuing Excellence in Governance' is a monitoring dashboard which provides an integrated & consistent view of the performance of selected KPIs under onboarded Government Programs & Schemes and facilitates insights thereby encouraging a culture of data-driven Governance. The citizen centric scheme's KPIs is getting displayed using appropriate visualization through technology enabled platform across available granularity and periodicity. PRAYAS dashboard is getting updated with MIS of respective schemes through Application Programming Interface (API) to get data at decided periodicity. PRAYAS acts as a robust platform for quick on-boarding of Government Schemes and enabling performance monitoring based on data. As of now, 164 schemes with more than 980 KPIs are enabled on PRAYAS.

Tejas

Tejas (<https://tejasvi.gov.in>) is a single self-service, configurable, end-to-end, and cost-effective data analytics platform developed using open-source technologies. It has been developed through the collaborative effort of NIC and NICSI (CEDA). It is a no coding platform which provides data quality report and data quality analysis. Tejas features include Simple drag & drop interface for designing dashboards, Integration with various data source types including files (JSON, CSV, Excel, etc.), databases (Postgres, MySQL, etc.)

It's in Memory database feature enhances Dashboard rendering performance to many folds. With 30 different Visualization/Charts, Tejas serves as a complete package with different styling properties to tune visuals and dashboard. A fine-grained privilege access mechanism is available till the visual to enable dataprivacy. Through dashboard can be published/embedded in any platform / website, with real time and scheduled changes based on

the refresh rate of live dataset. Tejas is deployed within NIC Cloud as Micro service-based SaaS model and scale-out architecture.

eSamikSha 2.0

eSamikSha is a Digital Governance Platform that offers online monitoring and compliance. It is designed to expedite the compliance of pending Action-Points/ Projects/ Schemes/ Proposals/ Issues/ Targets, etc. It automates the monitoring of actionable items, from submission to compliance, online. It enables an easy, instant & secure method of exchanging digital information. It improves efficiency, increases transparency, and reduces the need for protracted correspondence. Various features of this platform are SSO Enabled, Inbuilt ePatrachar, Meeting Lifecycle Management, Easy and Instant Data Collection Facility, Centre State Coordination Issues System/ Inter-Ministerial issues Monitoring System, Flexi Dashboard, Log Analysis Mechanism and Multi-Tenancy etc.

Digidhan Dashboard for monitoring Digital Payment Transactions

The DigiDhan Dashboard (<https://digipay.gov.in>) has been the primary catalyst to promote the digital payment ecosystem in India. The Dashboard reports the total digital payments transactions across various modes on a single platform and helps to promote digital payments and digital infrastructure for development of a cashless economy. The DigiDhan dashboard is the only portal which provides a consolidated view of 16 digital payments modes such as Unified Payment Interface (UPI), Immediate Payment Service (IMPS), Debit Card, Credit Card etc., from RBI, National Payment Corporation of India (NPCI) and 118 banks, 100 Smart Cities, State and Ministries. Key stakeholders for DigiDhan & associated dashboards are Prime Minister's Office (PMO), MeitY, Reserve Bank of India (RBI), National Payments Corporation of India (NPCI), 110 banks (public sector banks, private sector banks, payments banks, regional rural banks and foreign banks), Ministries such as Ministry of Railways, Ministry of Civil Aviation, Ministry of Road and Transport, Ministry of Petroleum and Natural Gas, Ministry of Power, Ministry of Housing and Urban Affairs (MoHUA) Departments such as Department of Posts, Department of Telecom, Department of Power, Department of Financial Services etc. As on 1st Dec 2022, Total 7282 Cr digital payments transactions have been successfully done in the current financial year.

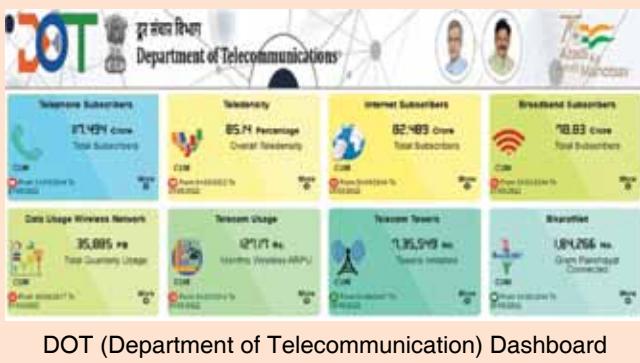
DARPAN

DARPAN is a comprehensive, generic, and configurable multilingual Dashboard product for Hon'ble Governors, Chief Ministers, Chief Secretaries, Divisional Commissioners and DMs/DCs across Districts & States. 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. It enhances analysis through data collection by consolidating multiple data sources into one centralized, easy-to-access platform. Identifying trends in data to gain enhanced perspectives of the projects, the dashboard allows users to personalize their view to prioritize the information they require.

In July 2019, State DARPAN has been extended to various Central Ministry /Departments. Further extension and customization of DARPAN Dashboard Services to fulfill the requirements of Central Ministries and Departments. Hon'ble Minister of Electronics & IT and Hon'ble Minister of DoT has inaugurated the Dashboard for MeitY and Department of Telecom.



MeitY (Ministry of Electronics and IT) Dashboard



DOT (Department of Telecommunication) Dashboard

Awards Portal

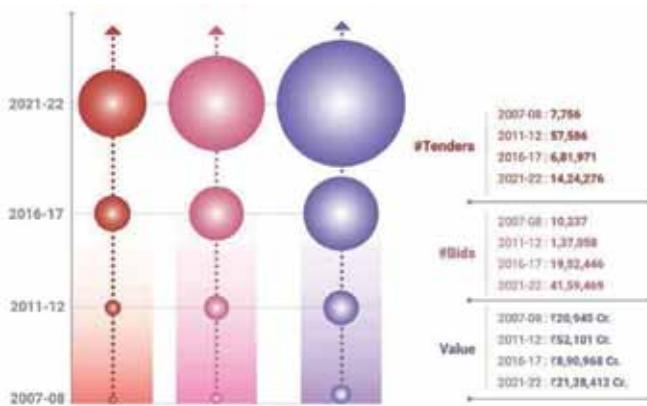
The National Awards Portal is an initiative to bring together all National Awards of the various Ministries/ Departments/Agencies of the Government of India under one digital platform reflecting transparency, accountability, and public partnership (Jan Bhagidari). This portal aims to facilitate citizens to nominate individuals/organizations for various awards instituted by the Government of India to recognize and award them for their exceptional contributions in their respective fields.

With this portal, for the first time in the history of India, information regarding all national awards would be available to the public on a single digital platform including their eligibility criteria, selection procedure, and details of past awardees. Also, people will be able to make nominations for various awards on a single platform, which is simple and user-friendly.



GePNIC

Government eProcurement system of NIC (GePNIC) marches into 15th year of its implementation in 2022-23. GePNIC provides a platform to conduct online tendering for various kinds of procurement carried out across Government. This is implemented in Software as a Service model (SaaS) where in quick onboarding, continuous capacity building and handholding support is an integral part of the implementation. Central Public Procurement Portal (eprocure.gov.in) is one of the vital implementations of GePNIC in which around 1.3 Lakh tenders with an average value of Rs 2.7 Crores are processed each month.



Electronics Human Resource Management System (e-HRMS)

e-HRMS is a web-based human resource management solution developed by National Informatics Centre for the maintenance of employee record in electronic form, from hiring to retiring. The e-HRMS system is being offered as a cloud-based application via Software as a Service (SaaS) delivery model.

The Department of Personnel and Training (DoPT) is the nodal and sponsoring agency of electronic human resource management system (e-HRMS). The project includes scanning/digitization of service book to capture the legacy data and provision of 28 online services through various modules: namely Service Book, Leave, Personal Information, Tour, Advance, Medical, Leave Travel Concession, Reimbursement, Helpdesk, Performance Appraisal, Training, Grievance, Transfer & Posting, Vigilance & Penalty, Loan & Advance, Dashboard etc. e-HRMS has been integrated with the applications like Public Financial Management System (PFMS). Integration with Bhavishya, Smart Performance Appraisal Report Recording Online window (SPARROW) is under progress. The application also has provision for Dashboards for a comprehensive view of data available in all e-service book, this enables Administrators/ Policymakers to analyze and identify trends, further helping in effective decision making.

Currently, the e-HRMS application has been rolled out in 150+ organizations (ministry/departments/attached offices etc.), onboarding more than 58,000 employees on the system. The e-HRMS web application can be accessed on <https://ehrms.gov.in>.



- 100 Organizations
- Leave
- 88 Organizations
- Personal Information
- 75 Organizations
- LTC
- 57 Organizations
- Reimbursement
- 58 Organizations
- Helpdesk

Educational Products and Solutions

e-Granthalaya

e-Granthalaya is a Digital Platform developed by National Informatics Centre, Ministry of Electronics and Information Technology, Government of India for Automation and Networking of Government & Semi-government Libraries. The platform provides a complete ICT solution for Library Computerization with integrated Library Management Software, Digital Library Module, Cloud hosting environment and a Library Portal (OPAC) with NCSI empaneled Roll-out Services and support. e-Granthalaya is useful to transform traditional libraries to e-Library with Digital Library Services and to provide various online member services using Single Window Access System. Latest version of e-Granthalaya i.e., Ver.4.0 is a ‘Cloud Ready Application’ and provides a Web-based solution in enterprise mode with a centralized database for cluster of libraries. The ICT solution is well compliance with international standards prevalent in Libraries with use of latest ICT technology and Cloud hosting.

The software has been implemented in 200 libraries during current year, and thus, total 6000 libraries have been automated using this application, providing e-Library services. Out of these, 3000 libraries are on NIC/NCSI Cloud which have made available over 1.17 Crore book catalog records with 10000 e-Books made available for reading and downloading to their members.

Recently, during this year, the MP Government has decided to bring all its 528 Government Colleges and 16 Government Universities on e-Granthalaya Platform for better online member services.

CollabFiles

CollabFiles is an indigenous platform to Connect, Create, Share and Collaborate on Office Documents. It is a web-based, cloud-enabled, and scalable platform to create and manage documents, spreadsheets in a collaborative mode with a strategic control so that Government users could use it through secured and privileged access to Parichay, the Single-Sign-On platform for Government officials.



Mobile Apps Store

Mobile Application Division has Nodal center in NIC-HQ Delhi and four competency centers at Chennai, Shimla, Patna, and Kannur. All the centers are collectively working for development and hosting of mobile apps in android and iOS. To bring all these apps under one umbrella for better visibility and global reach from single point of contact NIC has subscribed to user accounts in Google play store and iOS/ iTunes. Total mobile app count reached to 883 published mobile apps on Android App store. Total count on iOS Account reached to 57.

Proctoring Based Online Examination (P-BOX)

Proctoring Based Online examination system is designed by Odisha team of NIC, using emerging technologies like AI/ML & scalable computing with the aim of monitoring candidate activities and prevent any violations of policies set for the exams conducted on the platform. All features such as face recognition, multi-person detection, person swapping, absence detection, embedded web browser, embedded kernel level firewall is developed to ensure detection of any kind of cheating attempts initiated by the candidate during the exam. It can easily block any remote administration tools like Anydesk, Team viewer etc. during the exam using its embedded firewall. It is fail-safe for network discrepancies and can sustain occasional disconnection during the exam. Exam

continues in the same state as it was left if the network disconnects for some time. The P-BOX also provides on-campus version for deployment on local campus server. It provides a cost-effective way to convert the paper-based exams conducted in the controlled environment to online and paper-less exams that could be taken from the comfort of home. In addition to exam specific core functionalities PBOX also provide QPAD- Question paper authoring and delivery tool for preparing, reviewing, and distributing question papers in much secured way. It's plug-able nature of the component made it a suitable candidate for many use cases.

Swagatam

Swagatam is an initiative by the Government of India to facilitate the common man. Swagatam facility enables the citizens to have a smooth and simple process of making an appointment. It will bridge the gap between the Government and the common man and will enhance the opportunity of a common man to meet a government officer, hassle free. It has advanced features of eliminating all the cumbersome and tedious procedure of making a request for an appointment and then visiting the premises.

It is a cloud-based application software developed with an easy-to-use graphical interface and embedded with comprehensive security features. This is a unified and centralized application and can be easily implemented in any Government offices / Ministries / Bhawans with some configuration efforts. It assists in maintaining all-relevant information about the visitor, which is automatically saved in a database.



Centre of Excellence and Software Development Unit

Data Analytics

Centre of Excellence for Data Analytics (CEDA), a joint initiative of NIC & NICSI, was established in February 2018 and formally inaugurated by Hon'ble MEIT in

September 2018. CEDA has undertaken several Projects for various Ministries/Departments; notable among them are:



A Dashboard of Dashboards developed for the PMO

A Robust Platform with three Components – Data Collection, Analytics layer, Dashboard



Provides analytical insights for Flagship Programs & Schemes of the Government

168 Schemes, 1021 KPIs across 62 Min/Depts. already onboarded; data updating through API



Demonstrated successfully to the Hon'ble Prime Minister on 4.9.2020 and to all Union Cabinet Ministers and MoS during Oct-Nov 2021



Dashboard for M/o DoNER- (In Progress)

Development of a Data Analytics Dashboard is under progress for M/o DONER to monitor the Schemes/Projects Implemented in North-Eastern Region

Artificial Intelligence

Artificial Intelligence as a Service (AlaaS): NIC's Super compute infrastructure available over Meghraj Cloud is 12 AI PFlops in Active – Active mode with 7 AI PFlops with half a petabyte high speed storage for compute in Delhi and 5 AI Pflops in Kolkata which facilitates AI Inference models through API based services in the fields of Computer Vision, Natural Language Processing and Text Analytics, Automatic Speech Recognition and Speech Synthesis to eGovernance Applications.

Service Logo	Service Description
	VANI Virtual Assistance by NIC (VANI) supports ➤ Multi Lingual Chatbots and ➤ Bi Lingual Voice Support Services over Basic Telephony in English & Hindi
	Panini Panini Text Translation Services Support in 11 Indic languages • Assamese, Bengali, Gujarati, Hindi • Kannada, Malayalam, Marathi • Oriya, Punjabi, Tamil & Telugu
	Matra Matra Text Transliteration Services Support in 12 Regional languages • Assamese, Bengali, Gujarati, Hindi • Kannada, Malayalam, Marathi, Nepali • Oriya, Punjabi, Tamil & Telugu

VANI (Virtual Assistance by NIC): Under VANI framework, NIC is providing a wide range of Conversational AI services from Multilingual chatbots

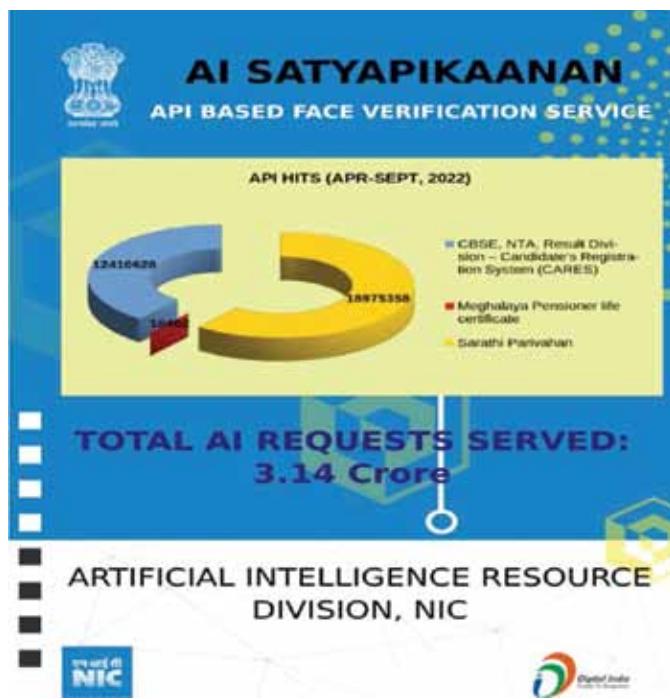
to Bilingual voice support over Basic telephony through Conversational IVRS. It is also providing Virtual OPD services to patients of Lady Hardinge Medical College under Vaidya Vani telemedicine services. It is a unique End to End Solution providing medical facilities to poor and illiterate patients for free. A patient can call up during an OPD slot, wait in queue, speak to a junior resident doctor in Hindi or English, move to a senior resident or specialist queue as required and doctors can get all history on their laptop pertaining to a repeat patient while seeing current complaint on the screen and speaking on the phone to the patient. It also facilitates Video calling if the doctor so desires and can generate prescription over SMS and email.

Panini Text Translation Services: This API based services for converting from Indic languages to English & vice versa facilitating conversion from any of the Indic Languages Assamese, Bengali, Gujarati, Hindi, Kannada, Malayalam, Marathi, Oriya, Punjabi, Tamil, Telugu to any other is another service that is available over Meghraj cloud and is being adopted by many Ministries and Department like Lok Sabha Secretariat, Ministry of Ayush, Daksh Portal of LBSNAA, S3WaaS, eCourts, eGranthalaya, CollabFiles etc..

Service Logo	Service Description
	Satyapikaan Satyapikaan Face Verification Services Supports ➤ Face Detection ➤ Face Verification ➤ Antispoofing & Image Quality Analysis ➤ Gesture Recognition
	Shruti Shruti Automatic Speech Recognition Services ➤ Support for Text Transcription in English & Hindi ➤ Speech Recognition & Synthesis ➤ Upcoming Services in other Indic Languages
	Saradha Saradha Document Summarisation Services in English ➤ Supports both Extractive Text Summarisation & ➤ Abstractive Text Summarisation

Satyapikaanan Face Verification Services: This facilitates a wide variety of applications from Pensioners Life Certificate Mobile app for Meghalaya treasury where pensioners can apply from home to Mobile app based attendance to for example in case of RTO, it facilitates identity verification for driver's license renewal & learners permit application, the license holder/applicant images serves as a base to detect and match the features with existing pictures in RTO database for Driving License Renewal or in case of Learner License Tests with Aadhar based photo at time of online exam.

These API based services facilitate a wide range of services from image quality analysis to face detection to face verification entirely using highly accurate deep learning models pipelines. Localization of human faces in every frame/image comes under the face detection task while matching the entities in two images is referred to as verification task. It is also being extensively by National Testing Agency for JEE/ NEET exam for Real Time Image Quality Analysis for online form submission by students.



Blockchain Technology

The Centre of Excellence has been established at NIC, Karnataka with a vision to build niche applications using Blockchain technologies in close coordination with the Government, which can be rolled out across the

country. Blockchain networks have been established with Blockchain nodes distributed across NIC Cloud infrastructure. The Centre was instrumental in deploying Blockchain platforms for Certificate Chain for CBSE & Karnataka Education boards, Drug Logistics Chain to track and trace medicines issued to patients in Government Hospitals of Karnataka, Property Chain for storing urban property details, Document Chain for storing certificates issued by Government. The marks sheets and other certificate store is used by Government of Karnataka to electronically verify the claims made by student for admission to professional colleges. These platforms are generic to facilitate easy roll-out for any State.

Certificate Chain	Document Chain
Marks cards	Caste, Birth & Death Certificates
CBSE 1.3 crores	Karnataka Board 1 crore
90 lakhs	
Property Chain	Supply Chain
Urban & Rural Property	Drug Logistics and Tracking
12 thousand transactions	20 lakhs transactions

Application Security

CoE in Application Security is established to provide state-of-the-art Security solutions & services for the Information Technology needs of the Government of India, and establishing best practices, standards, and initiatives in Application Security. The centers are located at Bhubaneshwar, Guwahati, Jaipur, Lucknow, and Thiruvananthapuram.

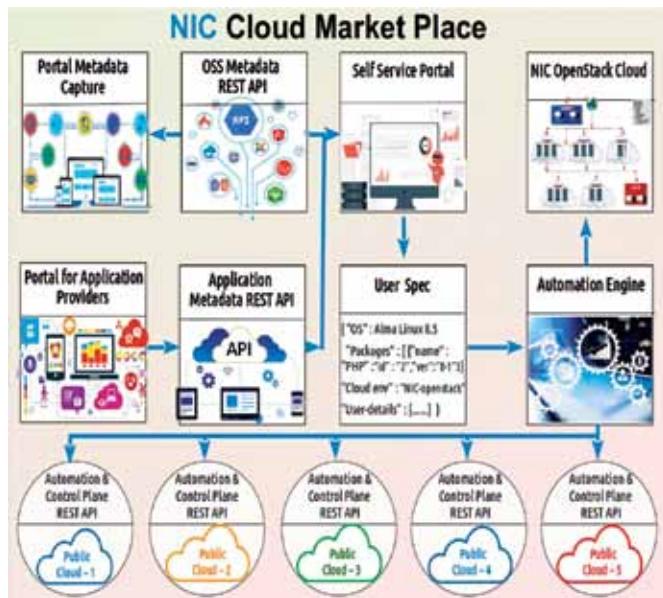
NIC Software Development Units (SDU)

Software Development Units of NIC provide state of art services using latest tools and technology. NIC Software Development and Training Centers are engaged in important e-Governance projects in respect of development of software on turnkey basis, implementation, project level training and subsequent support.

Open Technology Group (OTG)

OTG focus areas are to evaluate and recommend Open-Source Software (OSS) for e-Governance Solutions, maintain distribution repository of recommended OSS for usage across NIC, guide and handhold NIC teams in keeping their OSS driven system secure and provide training on OSS. Open-Source Stack 2022 was prepared

and released after consultation with stakeholders. As Linux 7 is moving towards end of life, OTG has prepared and provisioned necessary artifacts for adopting Linux 8 and Linux 9 in NIC Cloud Infrastructure. Additional Public Repositories such as NGINX, Docker, GitLab, EPEL, NPM and PGDG were replicated and made available in NIC Cloud Environment which will reduce the effort required to provide latest packages.



CEM Microservices

Centre of Excellence of Microservices was setup with a vision to facilitate NIC fraternity in adopting agile and DevOps methodology with Microservices for delivering e-Governance services. NIC-CEM acts as the resource center of consultancy, development of microservices based projects and support for identifying and moving feasible monolithic applications to microservices based applications. A state-of-the-art walk-through demonstration-cum-lab on Microservices is completed at Kochi to enable any individual visiting the center to understand the features and benefits through live demonstrations on the design, development, and deployment of Microservices. The Centre has been instrumental in educating the NIC Units across the country about the benefits of using microservices based architecture in designing new software projects as well as migrating existing monolithic applications to microservices based architecture.

The CEM Kochi had provided PAN India support on migrating Monolithic Applications to Microservices

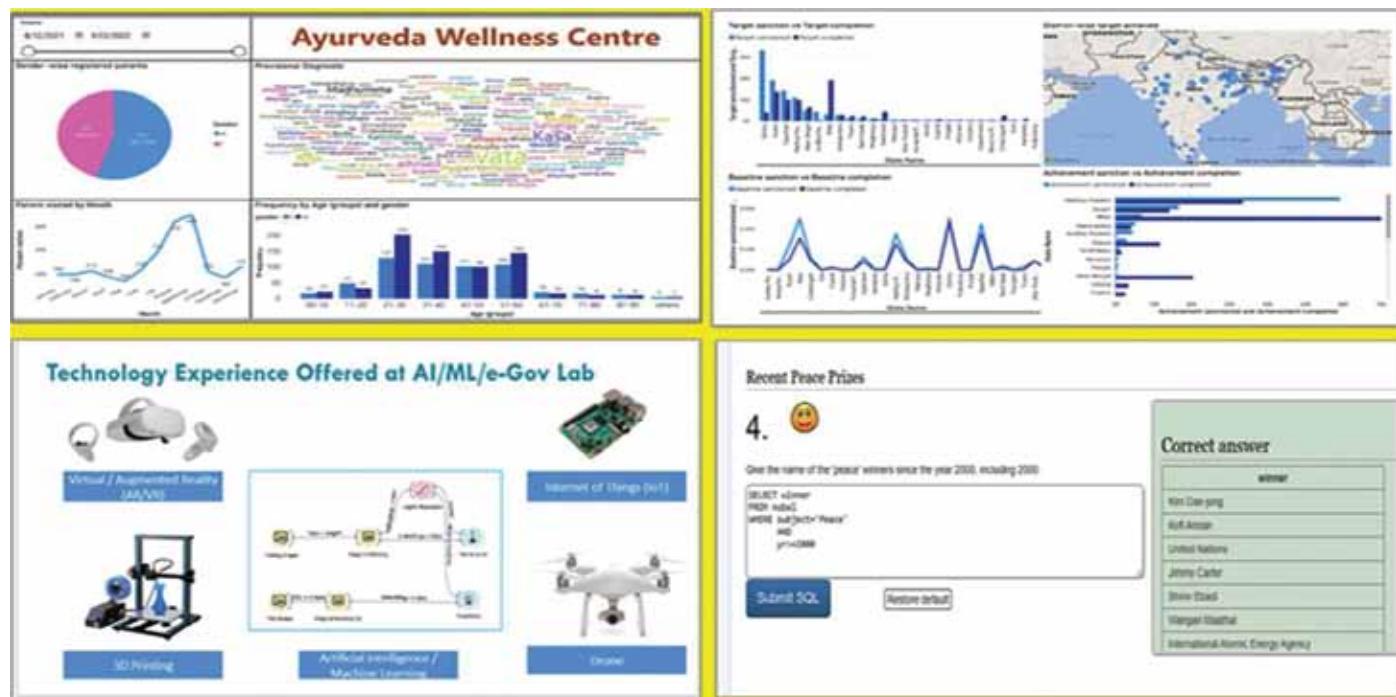
enabled application. The centre has also brought out PoCs, SoPs and Reference Architecture document for the use of NIC fraternity. 34 webinars, 21 workshops covering 20 state centres, 2 induction programme were conducted by NIC-CEM during the year supporting more than 1100 NIC Officials across the country. Several case-to-case support were also offered to various units of NIC.

NIC's Training Unit (NICTU) at the Lal Bahadur Shastri National Academy of Administration, Mussoorie

NICTU contributed to setting it up as an 'AI/ML and eGov Experience Lab' and got it operationalized immediately. This lab along with Govind Ballabh Pant Hall – Digital Learning Theatre, is named as 'Digi TAG Arena', and is meant to cater to all training activities related to the 'Digital Transformation in Administration and Government (Digi TAG)'. NICTU prepared demonstrable working models and imparted necessary hands-on training to the selected Officer Trainees of the 96th Foundation Course. NICTU coordinated with the experts invited by the academy from MeitY, NIC, Academia, Industry and Government/Administration for the workshops, sessions on AI/ML and emerging technologies, Data Analytics, and e Gov applications.



The lab has since been further equipped with separate workstations having Smart TVs, Drones, IoT kits, Oculus Metaverse VR headsets, 3D printer, Smart writing boards, use cases and training exercises. In all, 133 ICT sessions have been delivered for 1310 participants during 97th Foundation Course (2022 batch), IAS Phase-II (2020 batch), IAS Phase-I (2021 batch) and 96th Foundation Course (2021 batch) respectively. NICTU also trained the Officer Trainees to make a presentation before the Hon'ble PM at SoU, Kevadia on 31st Oct '2022.



In addition, NICTU arranged the implementation of the Enterprise Architecture based Solution Architectures prepared for Academy's software and ICT infrastructure requirements, various dashboards and analytics reports for decision-making, and activities/ events of Computer Club/ Innovation Club of the Officer Trainees.

NICSI

National Informatics Centre Services Inc. (NICSI) is a Section 8 Company under the Companies Act, 2013, a Government of India Enterprise under National Informatics Centre (NIC), Ministry of Electronics & Information Technology (MeitY). Its services include resource provisioning i.e. support for procuring and operationalizing state-of-the-art ICT infrastructure viz. hardware, networking etc. Data Centre Services, facilitating Project management, software design & 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), facilitating various projects like e-Procurement, e-Office, e-Hospital, iRAD, Diksha, Contactless Biometric Attendance System etc.

With a turnover of more than Rs.1478 Crores (FY 2021-22), NICSI has successfully executed more than 21,500 projects in India and other developing nations by

providing state of art and cost effective solutions for all their growing ICT needs.

Recently, NeVA, Design and Development of Unified Blockchain Framework, Cyber Security has been undertaken as some of the new initiatives along with NIC. Besides, dedicated IT support to Government Departments has been extended.

NICSI achieved another milestone by setting-up a Product Business Division (PBD) with an aim to productize, standardize and promote Software Products developed by NIC/NICSI at International Level. NICSI has been exploring opportunities for international implementation of NIC/NICSI Products. Several foreign countries have expressed interest in NIC/NICSI Software Products including Ecuador, Venezuela, Kazakhstan, Nigeria, Bangladesh, Paraguay, Guyana, UAE etc.

International Collaboration

The Government of Mauritius (GoM) had shown keen interest in implementing citizen friendly eGovernance initiatives for delivery of eservices. On request of the GoM, a 3 Member NIC delegation visited Mauritius in February 2022 for assisting Ministry of IT, Communication & Innovation, Mauritius to work-out a Blueprint for Digital Government for Mauritius to draw a medium to long-term digital roadmap. The document titled "Transformational Blueprint for Digital Mauritius" based on interactions with various Ministries of GoM, prepared by the delegation,

was submitted to High Commission of India (HCI), Mauritius as well as to GoM. Later, The GoM agreed for a generic agreement, Memorandum of Cooperation (MoC) with NIC. The GoM has obtained the Cabinet approval for the draft MoC sent to them and has indicated their willingness to quickly sign the MoC. At present, the necessary approvals for finalization of MoC is under process.

An Orientation session on 'Digital India', chaired by Shri Sushil Pal, JS(IC) was organized, by MeitY, for a delegation of Indian origin youth under 'Know India Programme' of MEA. Shri IPS Sethi, DDG &HoG (IC) delivered a talk on NIC's Digital Products & Platforms to youths from 14 Nations.

In response to the interest shown by the Embassy of India, Cairo, Egypt the details regarding NIC's e-governance Products/Platforms being implemented or available for implementation for other countries, were shared.

A fresh MoU/MoC between NIC and Uzbekistan, for collaboration in the area of eGovernance, is being worked-out with MeitY, as the earlier agreement was terminated by Uzbekistan side.

Participation in the 1st Joint Working Group meeting on Trade and Investment (JWGTI) between India and Cambodia organized by FT(ASEAN) Division, Department of Commerce held virtually, to brief about important NIC's Digital Products and Platforms for a possible future collaboration in the area of eGovernance.

Participation in BRICS Working Group meeting, on ICT Cooperation, at Sanchar Bhawan, DoT, held to discuss the Concept Note on Focus Group on Digital Public Goods platform for BRICS Nations.

Inputs provided to various National/ International Forums such as United Nations International Computing Centre (UNICC), United Nations Office at Geneva (UNOG), BRICS, G20, MEA, FT(ASEAN) Division Department of Commerce, 10th Conference of Head of Mission (HoM); Inter-Ministerial Meeting on the 1st India-Central Asia Summit etc.



Meeting of Indian Delegation with the Officials of Government of Mauritius & High Commission of India, Mauritius at Port Louis, Mauritius



An Orientation session on 'Digital India', organized by MeitY, for a delegation of Indian origin youth, under Know India Programme of MEA.

Major Events

NIC Tech Conclave 2022

Tech Conclave is an annual event being organized by NIC at national level. It provides a platform to understand the ICT best practices being adopted by the industry and helps in spreading awareness about the latest technologies and trends, effective in the major digital transformation of the society. The event is attended by the Secretary, Ministry of Electronics & Information Technology and other dignitaries from Centre and State Governments, Head of Groups and Head of Divisions at NIC(HQ) and State Informatics Officers/ Additional State Informatics Officers of NIC State Units.

The theme of Tech Conclave 2022 was NextGen Technologies for Digital Transformation and was organized in the Plenary Hall, Vigyan Bhawan. Inaugural Session was on 03rd March 2022 with Technical Sessions 03rd and 04th March 2022. The speakers were experts from the IT industry who shared their expertise in various areas like Artificial Intelligence, Data Analytics, Next Gen Database Solutions, Cyber Security, Future of Cloud, and various e-Governance Solutions, etc.

Shri Rajeev Chandrasekhar, Minister of State in the Ministry of Skill Development and Entrepreneurship; and Ministry of Electronics and Information Technology graced the event as the Guest of Honour.



Digital India Week

Digital India Week 2022 with the theme 'Catalyzing New India's Techade' was held in Gandhinagar, Gujarat in the month of July. In the Digital Mela, NIC's stall showcased its digital products, applications and services like eShram Portal- National Database of Unorganized Workers, Face Authentication based Jeevan Pramaan, Faceless learner license service, Amarnath Yatra Registration, One Map City, Blockchain based property chain for citizens, FRUITS - Farmer Registration & Unified beneficiary Information System, SVAMITVA etc.

Over 120 NIC Officers from NIC Hqrs., State & District Centres, along with more than 100 beneficiaries of various citizen-centric Government schemes attended the event.



Hon'ble Union Minister of State for Electronics & IT Shri Rajeev Chandrasekhar visited NIC/NICSI's stall at the exhibition organized during Digital India Week 2022 at Mahatma Mandir, Gandhinagar, Gujarat.

Cyber Security Awareness Month

The month of October was observed in NIC as Cyber Security Awareness Month under the aegis of the Network and Application Security Divisions. Theme this year was 'Do Your Part; #BeCyberSmart', reminding individuals and organizations about their role in protecting cyberspace. A series of webinars on state-of-the-art topics on cyber security were conducted in collaboration with the Training Division for knowledge sharing among peers. Tips and Quotes on Cyber Security were displayed and distributed every day of the month through various media with the help of the Media Division. The month-long program concluded with a webcast session on Basics of Cyber Security for employees of Central and

State government and an invited talk by industry expert. A Tech Quiz on "Cyber Security and App Security" was also conducted for NIC employees. A special edition of Informatics with Cyber Security as cover story is also being brought out in this connection.

Media and Outreach

Brand NIC - its products & services, projects, apps, software applications are highlighted and actively promoted regularly on NIC website <https://www.nic.in> as well as on various social media platforms - Twitter, Facebook, LinkedIn, Instagram, KOO, Lok Samvaad and YouTube. Events, inaugurations, awards, workshops related content is showcased on official website and NIC social media platforms through live posts, streaming on YouTube, webcasts etc. Special Important events/ programs including NIC States & District office initiatives are covered on all digital platforms and print media.

'Har Ghar Tiranga Campaign', Digital India Week 2022 events were covered across www.nic.in and NIC social media. The month of October was observed in NIC as Cyber Security Awareness Month. Theme this year was 'Do Your Part; #BeCyberSmart'. Tips and Quotes on Cyber Security were displayed and distributed every day of the month through various media.

Media Division compiled the eBook # 75 Digital Solutions from NIC that outlines the benefits of various Government Schemes & initiatives achieved, through Digital Transformation facilitated with the help of NIC developed technology-driven solutions for the Citizens, Businesses, and the Government.



Commemorating Azadi Ka Amrit Mahotsav, MoS Hon'ble Shri Rajeev Chandrasekhar released the eBook (<https://75dsn.nic.in/>) at NIC's Tech Conclave 2022 on 03.03.2022 at Vigyan Bhawan.

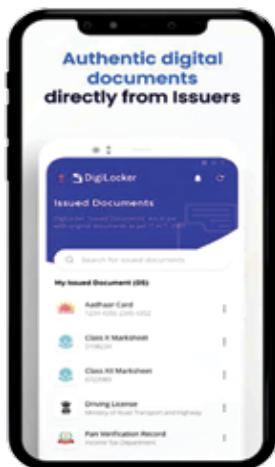
A social media campaign across NIC handles is being executed showcasing these flagship 75 Solutions.

9.6 National E-Governance (NeGD)

National e-Governance Division (NeGD) is an Independent Business Division (IBD) within Digital India Corporation (erstwhile Media Lab Asia), under the Ministry of Electronics and Information Technology (MeitY). NeGD's major operational areas include program management, project development, technology management, capacity building, awareness and communications related activities under Digital India program. NeGD provides technical and advisory support to Central Ministries / Departments, State Government Departments and other Government organizations in their Digital India initiatives. NeGD has developed and is managing several national public digital platforms such as DigiLocker, UMANG, Rapid Assessment System, OpenForge, API Setu, Poshan Tracker, Academic Bank of Credits, National Academic Depositories, National AI Portal, MyScheme, India Stack Global, Meri Pehchaan, etc. The details can be seen at **Chapter 2**.

9.6.1 DigiLocker

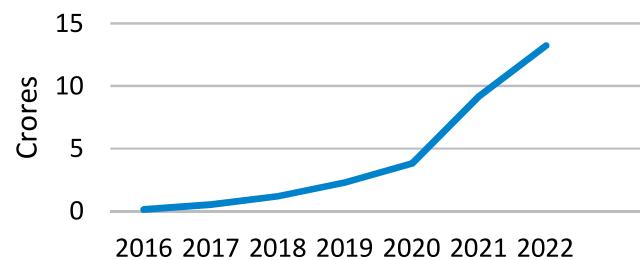
DigiLocker is a key initiative under Digital India Program aimed at transforming India into a digitally empowered society and knowledge economy. Targeted at the idea of paperless governance, DigiLocker is a cloud-based platform providing personal space to residents for issuance and verification of documents & certificates digitally, thus eliminating the use of physical documents. Currently there are over 13.09 Crore users registered with DigiLocker and over 561 Crore authentic digital documents available via the platform.



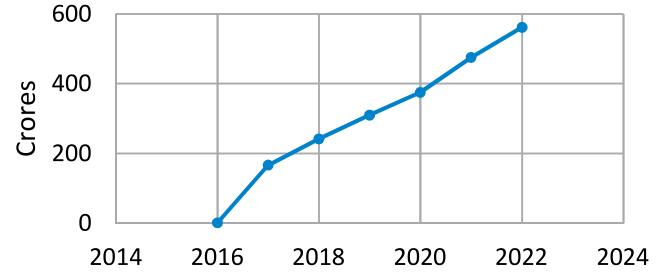
The sustainability and success of the platform has been in part due to certain steps taken by MeitY post the platform launch. These include notifying the Information Technology (Preservation & Retention of Information by Intermediaries Providing Digital Locker Facilities) Rules, 2016 under Information Technology Act 2000. In addition

to the above rules, MeitY held various consultations with sectoral regulators and Central and State agencies to further issue amendments to their own Circulars to include DigiLocker services as part of their Standard Operating Procedures.

DigiLocker- user registration



DigiLocker-documents issued



Progress (April 2022 – October 2022)

New Users	New Document count	New partners onboarded
2.84 crore	53.9 crore	203

9.6.2 National Academic Depository

Ministry of Education (MoE) notified DigiLocker under NeGD, as a sole National Academic Depository (NAD) for managing academic records and documents. NAD is an online storehouse of academic awards viz. certificates, diplomas, degrees, mark-sheets etc. lodged by academic institutions / boards / eligibility assessment bodies in a digital format. NAD not only ensures easy access to and retrieval of an academic award but also validates and guarantees its authenticity and safe storage. NAD can act as a deterrent to fake and forged paper certificates, reduce administrative efforts and eliminate the need of physical records. It facilitates students to get authentic documents/certificates in digital format directly from their original issuers anytime, anywhere without any physical

interference. The project was started in March, 2020. The platform is ready and operational at <https://nad.digilocker.gov.in>.

Progress (April 2022 – October 2022)

Description	Between Apr to Oct 2022	Cumulative Status till date	Cumulative target till March 2023
Institutions Registered	288	1706	2100
Total Academic Records	12Cr+	60Cr+	

14 Awareness workshops held during the year, out of which 7 were physical workshops.

9.6.3 Academic Bank of Credits

In July' 21, the MoE allocated DigiLocker as the technology partner for implementing Academic bank of Credit (ABC) in the country. ABC is a virtual/digital repository that houses data on the credits that certain students have accrued over the course of their academic careers. Students will be able to create an account and have a variety of alternatives for enrolling and exiting colleges or universities. Throughout the period of higher education, there will be "many exits" and "multiple admissions," and credits will be easily transferred through the ABC. ABC is a reliable resource that can be used to examine any student's credit history at any given moment. ABC Increases the student's freedom in choosing their courses and academics and enables them to drop out in any year and then exchange the credits earned so far with a certificate/diploma if they are eligible. The Hon'ble Prime Minister launched the project on 29th July 2021. The platform is ready and operational at <https://www.abc.gov.in>.

Status as on 31-10-2022

701 Academic Institutes have been onboarded, and 37 Lakhs students have created ABC account.

9.6.4 APISetu

APISetu is an Open API Platform, developed and maintained by NeGD. The main objective is to build open and interoperable digital platforms to enable seamless service delivery across government silos. It enables safe and reliable sharing of information and data across various e-Governance applications and systems. It is based on Government's Open API policy notified in

2015. The platform is looked as key enabler for real-time data verification and validation.

APISetu hosts a vast number of API's that are published and consumed by various government and private entities, who in turn can develop user-centric innovative products for various sectors such as health, education, business etc.

API's of Co-win platform powered several vaccine scheduling apps, which ensured that India could fight the pandemic effectively. API's of DigiLocker are transforming document access, sharing and verification through various partners. The platform is fully functional and is available at <https://apisetu.gov.in>

Current Status as on 31-10-2022

Publishers	Consumers	Transactions
976	320	Approx. 7 Crore per month

Progress (April 2022 – October 2022)

Parameter	Count (cumulative)
Number of APIs published	1879
Number of Requestors	320
Number of Publishers	976

9.6.5 MyScheme

MyScheme (<https://www.myscheme.gov.in/>) is a Schemes eMarketplace, where citizens can discover eligible schemes based on his/her demography. It helps in reducing the time and effort of citizens by doing away with requirement of searching multiple websites of government departments, studying of multiple scheme guidelines to check for eligibility. MyScheme also acts as the single national platform, for launching any Government scheme. The MyScheme platform is multilingual, ensuring wider reach and accessibility. The platform has been designed and developed by NeGD in the record time. MyScheme was dedicated to the nation on July 4, 2022 by the Hon'ble Prime Minister during the Digital India Week held in Gandhinagar, Gujarat.



Progress (April 2022 – October 2022)

More than 155 schemes of the Central and State/UT Governments across 13 diverse categories have been hosted. Two States/UTs namely Jammu & Kashmir, and Tripura have been on-boarded on the platform. The number of visitors on the MyScheme portal has crossed 300K. The Monthly Average Users are 230K+

9.6.6 MeriPehchaan

MeriPehchaan – National Single Sign-On (NSSO) is a user authentication service in which a single set of credentials provide access to multiple online applications or services. This offers major benefits for both users and application administrators. For users, it eliminates the need to repeatedly prove their identities to different applications and hold different credentials for each application and helps in identifying the real applications as opposed to fake ones. To the application owner it helps in saving time, effort, and cost to build the authentication systems for every service independently.

Current Status & Progress (April 2022 – October 2022)

187 services are integrated with DigiLocker MeriPehchaan and since launch 16.31 crore transactions have taken place.

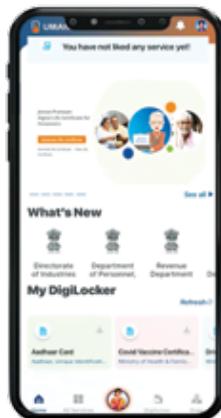
9.6.7 Unified Mobile Application for New-Age Governance (UMANG)

Launched by Hon'ble Prime Minister in November 2017, UMANG has been conceptualized with an objective to improve ease-of-living by providing major government services anytime, anywhere with just few clicks on a single unified mobile application integrated with DigiLocker, PayGov, Rapid Assessment System (RAS) etc.

It enables the citizens to access e-Government services of various sectors such as Agriculture, Education, Health, Housing, Employees, Pensioners, Students, Ration Card, Railways etc.

Achievements:

UMANG is available in 23 multilingual languages, including English & Hindi and has been hosted on cloud. UMANG aims to bring power to the fingertips of citizens.



UMANG has been integrated with NSSO (National Single Sign On) and can be logged in using NSSO platform.

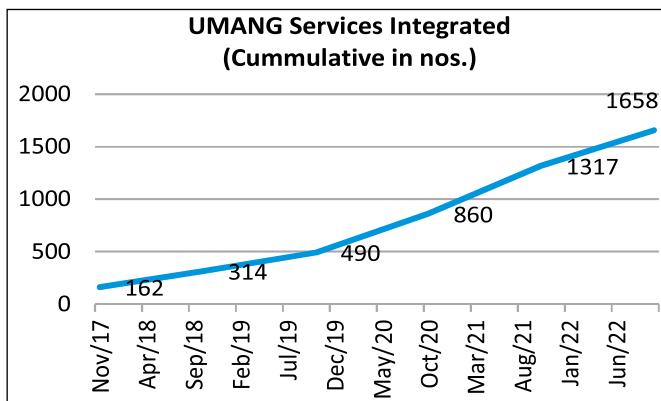
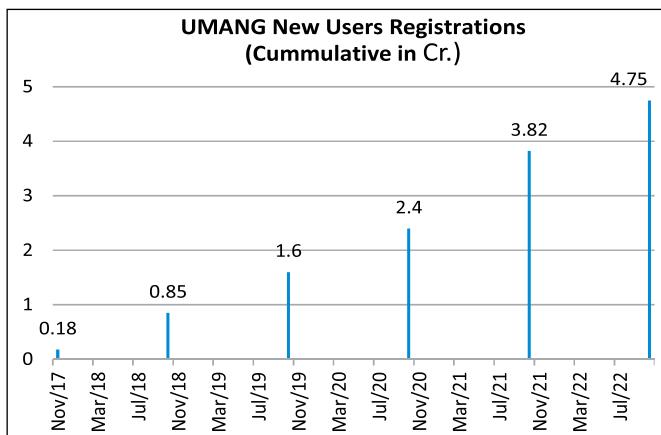
AI-BOT (Beta Version) has been launched on UMANG with support of 20 services in 2 languages i.e. English and Hindi.

UMANG's International version is helping in taking India to the world through 'Indian Culture' services available on UMANG and create interest amongst foreign tourists to visit India, helping Indian international students, NRIs.

~550 selected services of UMANG were made available to citizens through CSCs in assisted mode. Further to this, 8 more partners have been deployed to provide services via assisted mode. Out of which, 3 partners have gone Live and 5 are under process of integration.

~174 suitable services have been enabled on Feature Phones running on KaiOS Operating System (Jio phones).

489 DBT (Direct Benefit Transfer) schemes were made live on UMANG till September 2022.



Status

UMANG has about 21840 services (1658 – Central

and State Govt. services and 20197 –Bill Payment services) from 300 departments of Central Government and 34 departments of States/UTs and many more are continuously being on-boarded. Over 4.75 Crore users are registered and benefiting from services on UMANG.

9.6.8 OpenForge

OpenForge is a platform for open collaborative software development of e-governance applications. The objective is to promote the use of open-source software and sharing and reuse of e-governance related source codes. OpenForge emerged as an important platform that enabled remote work to support operations of national importance. During the first and second wave of lockdown of COVID19, DigiLocker, UMANG and NAD teams could access source code from their homes and could actively work not only in terms of providing support in running the applications but also in the development of new features. The platform is being managed by NeGD.

Current Status & Progress (April 2022 – October 2022)

Description	Between Apr- Oct 2022	Cumulative Status till date	Cumulative target till March 2023
User added	784	10010	11000
Project added	227	2107	2500
Repositories added	717	4500	5000
Git push done	74337	352000	400000

9.6.9 PoshanTracker

The ‘PoshanTracker’ is a mobile based application rolled out by the Ministry of Women and Child Development, on 1st March 2021. It is a critical and beneficiary-centric service delivery Application under POSHAN Abhiyaan. It promotes real time data with analytics. The objective is to provide a 360-degree view of the activities of the Anganwadi Centre (AWC), service deliveries of Anganwadi Workers (AWWs) and complete beneficiary management for pregnant women, lactating mothers, and children. The public dashboard helps to impart transparency on services delivered to beneficiaries. The app is designed, developed, and maintained by NeGD.

Status as on 31-10-2022

Registered Anganwadi Centers (AWC)	Beneficiaries
13.97 lakhs	9.85 crore

9.6.10 UX4G

The project is initiated in January, 2022. The objective is to make the citizens' interaction with the Government websites/apps easy, efficient, relevant, and pleasant. For this, the Government Applications (Web/App) are examined and areas of improvement in respect of User Experience /User Interface (UX/UI) are identified. The next step is to create a design framework and guidelines to help Govt. Departments to adopt better UX/UI, reusable design systems. Govt. Departments are sensitized through various workshops and technical hand-holding support on use of web components for improving the quality of UI/UX.

Status as on 31 November 2022

6 projects have been onboarded viz. DigiLocker, National Academy of Depository (NAD), Academic Bank of Credits (ABC), APISetu, Co-win, PoshanTracker.

9.6.11 National AI Portal (<https://indiaai.gov.in/>)

National AI Portal has been developed to provide all information related to Artificial Intelligence to all stakeholders at a single place and promote awareness and communication on AI in the country. It also strengthens the AI ecosystem in the country by pooling together and showcasing the latest developments happening in Central and State Governments, Industry, Academia, NGOs, and Civil Societies.

Status

As on 31 October 2022, it has published 1520 articles, 799 news, 262 videos, 114 research reports and 120 government initiatives, all related to AI.

9.6.12 India Stack Global (<https://www.indiastack.global/>)

One of the initiatives that can be shared globally is India's leadership in Digital Technologies and experience of implementing Digital Transformation projects at population scale. Portal on India Stack Global has been developed to showcase the India Stack and its building blocks globally. At present, 12 key projects namely Aadhaar, UPI, Co-Win, API Setu, DigiLocker, AarogyaSetu, GeM, UMANG, Diksha, E-Sanjeevani, E-Hospital, and E-Office. The platform's details include brief background, objectives, implementation methodologies, architecture, GitHub/OpenForge links, videos, and contact details. The portal is available in all UN languages.

9.6.13 India Enterprise Architecture (IndEA)

NeGD is also entrusted with India Enterprise Architecture and its evolving version-India Digital Ecosystem Architecture (InDEA) framework, which is based on the whole-of-the-government approach. The IndEA framework is based on Federated architecture approach and recognizes need to accommodate both greenfield (new) and brownfield (existing / legacy) eGov initiatives.

Accordingly, a generic India Enterprise Architecture (IndEA) framework, comprising of a set of architecture reference models have been prepared to enable to initiate EA transformation in Indian Governmental organizations, States and Indian Government as a whole. Based on this framework, several sectoral platforms in the priority areas like Health, Agriculture, Education, Tourism, etc. are being worked out / developed.

9.6.14 Program Management & Project Appraisal Policy level/Technical/Advisory support to MeitY/ Central Ministries/Departments

NeGD is also assisting MeitY and other Central Ministries/ Departments in tasks like preparation of SFC/EFC/ DRAFT Cabinet Note (DCN), RFP documents, project appraisal etc. The brief details of the work done in the FY IS as given below:

DCN on Digital India 2.0

- EFC Notes pertaining to each of 8 Sub-Schemes of Digital India in 2021
- EFC Notes pertaining to each of 8 Sub-Schemes of Digital India in 2022
- SFC on Artificial Intelligence for Development
- EFC on ShramikSetu Portal
- RFP for the Digital Amplification, Social Media Management & Website Development/ Maintenance for DMEO, NITI Aayog
- Inputs on “Smart & Digital NCR” to NCR Planning for ‘draft Regional Plan -2041’
- Inputs to MeitY on digitization of Police Department
- Proposal on IT Modernization Project (Dept of Posts -IT 2.0)
- National Strategy on Blockchain
- Appraisal of proposals of 26 States for special assistance for digitization
- Policy for National Digital Tourism Mission (NDTM) for Ministry of Tourism

Support to Ministries/ Departments in websites/ Mobile apps developments

NeGD is providing support to other Central Ministries/ Departments in e-Governance projects related to web application/portal/Mobile app. Development etc. The details of the assistance provided in the current FY is as given below:

S.N.	Department	Application details
1	Delhi Police Licensing Unit	Website revamped and maintained with new design & look. Developed Tatpar unified mobile app.
2	Delhi Police Shastra Mobile App	Developed the app for Beat constables for tracking the Arm license in real time with the licensee details. Also integrated with Digi locker.
3	Public Feedback System for Delhi Police	A QR code based public feedback system developed.
4	DoPT CSCMS	Online portal developed to provide services to the employees of Central Secretariat Service (CSS), Central Secretariat Stenographers' Service (CSSS) and Central Secretariat Clerical Service (CSCS).
5	LBSNAA Alumni Portal, LBSNAA SSO, Portal	Developed the Alumni portal for the Officer trainee (LBSNAA) with features like discussion forum, best practices, and video with live event and integrated with e-Parichay SSO.
6	GOA Tourism PMIS	Developed PMIS for GOA Tourism.
7	DPE MoU Dashboard	developed for automation of MoU generation and assessment of the CPSE's.
8	UDHYAM Bharat	Developed for the Independent Directors of CPSE's. It functions as a survey/feedback application. It is integrated with the OTNS platform of DPE and LMS of NeGD.

Project Development Fund (PDF)

The World Bank funded scheme provides financial assistance for conceptualization / development of innovative citizen-centric e-Governance projects. Following 3 projects have been provided financial assistance during the year:

- Virtual Office for State Public Service Delivery Commission, Meghalaya: Rs 17.50 lakhs

- Application of Drone technology (Madhya Pradesh) :Rs 13.50 lakhs
- Effective e-Governance (Haryana Institute of Public Administration): Rs 15.35 lakhs

Support to State Governments/UTs –Deployment of State e-Mission Teams

To provide technical knowhow and to assist the State Govt./UTs in effective implementation of e-Gov Projects, NeGD has deployed State e-Mission Team (SeMT) comprising of on an average four officers of middle management level per State/UT. Under the Capacity Building Scheme of NeGD, these officers are provided Thematic Trainings on leveraging Emerging Technologies on regular basis. Currently 139 personnel are deployed as part of SeMT.



9.6.15 Capacity Building (CB)

Capacity Building Scheme under the Digital India program

It envisions to bring adequate and relevant capacities at all levels in the government and provide need-based trainings to conceptualize, lead, design and implement e-Governance projects.

The focus of Training Programs are the officials and members of Project Management Team in Central Line Ministries and States/UTs Line Departments. The objective is to develop a holistic understanding on visualizing, conceiving, and delivering projects. Technology platforms such as Learning, and Knowledge Management Systems (LMS&KMS) have been developed to facilitate anytime anywhere learning and knowledge sharing. During FY 2022-23, following are the major initiatives and achievements, in capacitating government officials:

S. No.	Name of the scheme/ Initiative	Details of Programs/ Course/Training	No. of programs conducted	No. of participants attended
1	CB Scheme	"Digital India Dialogues– Building Capacities" webinars for Government leaders, policy practitioners on adoption of emerging technologies in collaboration with Intel India and UNDP.	02	624
		The Post Graduate program in Digital Governance and Management (DG&M) 2-years program launched by NeGD, in partnership with the Indian Institute of Management, Visakhapatnam (IIM_V) in the domain of digital governance and management, The program is a combination of lectures, case studies, workshops, capstone project including domestic and international immersions.	02 (Domestic and International Immersion program)	36
		'e-Governance Senior Leaders' Program' in collaboration with Indian Institute of Management, Bangalore (IIM_B) for government officers from 10th – 15th October 2022on cutting edge technologies, various aspects of IT governance and data management and legal provisions.	01	30

S. No.	Name of the scheme/ Initiative	Details of Programs/ Course/Training	No. of programs conducted	No. of participants attended
		Training on Emerging Technologies 2 days' workshop conducted in collaboration with the Wadhwani Institute of Technology & Policy (WITP) as knowledge partner, and the Indian Institute of Public Administration as the implementing and venue partners on Blockchain technology.	02	21
		SeMT Orientations and Interactions Interactions were organized with State e-Mission Teams(SeMTs) onvarious digital transformation initiatives..	04	451
2	Cyber Surakshit Bharat Initiative	Chief Information Security Officer (CISO) programs for government departments to set-up a secure and resilient e-infrastructure.	04	162
3	'MeghRaj' Cloud Initiative	Regional workshops on Cloud Computing for government officers of Central/ State/UT Departments.	04	105
4.	Other Capacity Building Programs/ Events	Online webinars on Cyber Jagrookta on online financial fraud, cybercrimes, social engineering tactics, security measures, and social media frauds on behalf of MeitY	05	1124
		"India Stack Knowledge Exchange 'virtualprogram was organized from July 7 - 9, 2022 as part of 'Digital India' week.	11 brainstorming thematic sessions by 51 experts.	over 6300 participants from 60 countries.

Learning Management System (LMS) / Knowledge Management System (KMS)

LMS/KMS is an e-learning tool, designed to facilitate anytime anywhere learning for government employees.

Progress in LMS/KMS

	01 st April 22	As on 31 st Oct 2022
Departments onboarded	81	110
Registered users	268562	343381
E-contents uploaded	20213	23130
Number of Webinars conducted	10548	10573
No. of LMS Videos on Youtube channel	750	826
No of subscribers on Youtube channel	48.01k	48.42k

Online PG Diploma Cyber Law, Crime Investigation and Digital Forensics Program (CytrainSetu)

CytrainSetu is an online capacity-building program on cyberlaw, cybercrimes, and digital forensics launched in Nov 2020 by NeGD in collaboration with NLU Delhi, NLU Bhopal NJA, Bhopal. The program has received good trainee feedback.

The first batch of 500+participants' training is completed, and 258 participants qualified to receive PG Diploma. The Batch 2 of the program has been inaugurated by Hon'ble MEIT on 5th Sep 2022. The program has received more than 2000 nominations comprising of police officials, Judges /Public Prosecutors, officers of Indian Army /Navy/ Airforce /BSF/ NSG/ MEA /CeG /CBI/ MHA/SSB/EPFO etc.

The course is comprising of 89 lectures, 30 storyboards & 6 Alpha level e-modules. Classes are conducted every Saturday. Till now, 05 lectures have been completed.

9.6.16 Awareness and Communication

Awareness and Communication (A&C) is an integral component of "Digital India Program". A&C performs the crucial role of generating and raising the level of awareness about Digital India, related services and schemes amongst diverse stakeholders across the country. It also facilitates demand creation for various services leading to more adoption of services.

Support to MeitY in organizing Events/Conferences/ Launches

SemiconIndia: Future Design (October 17, 2022)

To give a boost to the semiconductor design industry in India, a series of SemiconIndia Future Design

roadshows have been planned across the country. The Hon'ble Union Minister of State for E & IT Shri Rajeev Chandrasekhar flagged off the first SemiconIndia Future Design roadshow, in Gandhinagar, Gujarat on October 17, 2022. The event was designed and organized by NeGD in collaboration with ISM, MeitY and Karnavati University, Gandhinagar, Gujarat.



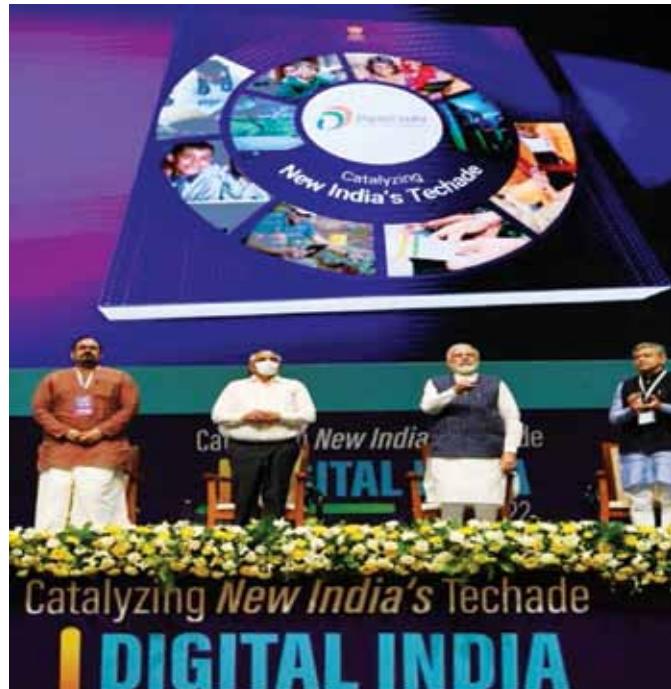
Digital India Conference of State IT Ministers/Secretaries; Oct 1-3, 2022, Pragati Maidan, New Delhi

The 3 days conference was held along with the Indian Mobile Congress at Pragati Maidan, New Delhi which was inaugurated by Hon'ble Prime Minister Shri Narendra Modi.

It was attended by 12 States and UTs. It was also attended by State IT Secretaries and State officers from all States and UTs and senior officers from MeitY and DoT. 5 thematic panel discussions with State IT Secretaries organized on attracting Start-ups, emerging technologies, India Talent Nation, Digital Governance and Semiconductors were organized wherein State IT Secretaries participated.

Digital India Week 2022

To celebrate the unprecedented digital transformation in the country, Digital India Week was celebrated during July 4-9, 2022 in physical format in Mahatma Mandir, Gandhinagar as well as in virtual mode via the India Stack Knowledge Exchange program. The over-arching theme for Digital India Week was 'Digital India: Catalyzing New India's Techade'.



A grand exposition named 'Digital Mela' was set up at the Mahatma Mandir in Gandhinagar, Gujarat was attended by over 50,000 visitors.



The entire event was managed and coordinated by NeGD right from selection of event management agency to arrangement of transport, accommodation, media, press release & social campaign.

FIT India Run

NeGD, MeitY as part of the Azaadi Ka Amrit Mahotsav celebrations organized the 'FIT India Freedom Run' on 2nd October, 2022 commemorating the Mahatma Gandhi's birth anniversary. Based on the theme 'Azadi Ke 75 Saal, Fitness Rahe Bemisaal', the run involved a cleanliness drive as well. About 350 employees of the Ministry actively participated in the plog-run which was in and around JLN Stadium.

Launch of programs & Campaigns

YUVAI- Youth for Unnati and Vikas with AI NeGDIn collaboration with its partners, has launched 'YUVAI: Youth for Unnati and Vikas with AI'- A National Program for School Students with the objective of enabling school students from classes 8th to 12th with AI tech and social skills in an inclusive manner. The program will provide a platform for youth to learn and apply AI skills in 8 thematic areas- Krishi, Aarogya, Shiksha, Paryavaran, Parivahan, Grameen Vikas, Smart Cities, & Vidhi aur Nyaay.



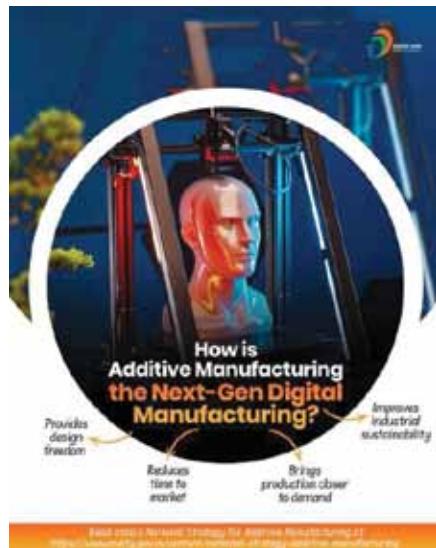
Digital India Bhashini awareness campaign

In order to generate awareness about Digital India Bhashini amongst citizens and potential stakeholders, a campaign on Digital India and MeitY's social media channels is being run in multiple languages, to create buzz about Bhashini as the mission has been launched and encourage citizens to contribute to Bhasha Daan as much as possible and feel sense of pride for contributing to Bhasha Daan.

#Bhashini www.bhashini.gov.in **#BhashaDaan**

Launch of National Strategy on Additive Manufacturing

A booklet on Additive manufacturing was designed and printed by NeGD for the launch event. A video was prepared on Additive Manufacturing (by an agency empaneled with NeGD for video production) that was launched by Hon'ble Minister for Electronics and IT.



Activities on social media

Rigorous promotional activities on Digital India Facebook, YouTube, Instagram, Twitter, LinkedIn & Koo accounts

Coverage of 8 Years of Digital India on social media channels in terms of – event coverage with still creative copies, video testimonials, Facebook live coverage of the event, live tweeting

Weekly social media organic activities across all channels with the help of weekly social media calendar in terms of still creatives, video content, video testimonials, Facebook live sessions, live Tweets, micro campaigns (Service/Initiative based) etc.

Print Media Campaigns for Amrit Mahotsav

Independence Day Special (15th August 2022) in the Week Magazine- 2 Page Advertorial (English)

Independence Day Special (15th August 2022) in the Outlook Magazine- 3 Page Advertorial

Procurement of Merchandise items- for delegates for multiple conferences/ exhibitions/events

- 12 Booklets were designed and printed.
- Printing of spiral pad, folders for Capacity Building Commission
- Procurement of Coffee Mugs for MyGov
- Procurement of Coffee Mugs, Pen, Writing Pad, Pen-drive, Kit Bag and Face Masks for various meeting organized NeGD and MeitY.
- Procurement of Coffee mug, Pen, Dairy, Pen-drive, Kit Bag (khadi cloth), Face Masks Cotton Khadi and Sanitizer

Other A&C activities includes

- Logo and Financial Support for Workshops/ Seminars/ Conferences/Exhibitions/Events
- Support to national events
- Logo Design for multiple organizations/projects- India Stack, Bhashini, CytrainSetu, Call before you dig, LBSNNA
- Brochure Design

9.7 Standardisation, Testing and Quality Certification (STQC) Directorate

9.7.1 Introduction

STQC Directorate is an attached office of Ministry of Electronics and Information Technology (MeitY), Government of India. STQC Dte. has established a network of fifteen testing and calibration laboratories in the country including North-Eastern region. STQC laboratories offer quality assurance services in the field of electronics and information technology including e-Governance applications as per national/ international standards/ best practices and obtained many national and international accreditations/ recognitions. STQC Dte. also supports Government policies, initiatives and programs concerning Standardization, Quality Assurance and Management besides providing above services to the industry on commercial basis. A gist of their country wide locations and services being offered are mentioned below –

Laboratories/ Centres	Locations	Services offered
Electronics Regional Test Labs (ERTLs)	Delhi, Kolkata, Mumbai, Thiruvananthapuram	Testing and Calibration both for electronics products. and information technology.
Electronics Test & Development Centres (ETDCs)	Bengaluru, Mohali, Hyderabad, Chennai, Guwahati, Pune, Goa, Agartala, Jaipur, Solan and Ajmer	
STQC IT Centres	Delhi, Kolkata, Bengaluru, Thiruvananthapuram, Hyderabad, Chennai, Guwahati, Mohali, Pune, Agartala and Jaipur. (Co-located with respective ERTLs/ ETDCs)	Testing for information technology products and services. (IT testing activities are taken up at all labs except Mumbai, Goa, Solan and Ajmer)
Indian Institute of Quality Management (IIQM)	Jaipur (Co-located with respective ETDC)	Training courses on Quality Management, Information Security, Website Quality testing etc.
Centre for Reliability (CFR)	Chennai (Co-located with respective ETDC)	Reliability testing
Regional Certification Centres	Delhi, Kolkata, Mumbai and Bengaluru (Co-located with respective ERTLs/ ETDCs)	Certification services for Quality Management and Product Safety

9.7.2 Major services offered - Information Technology (IT)

STQC IT centres have successfully executed testing and assessment of the number of e-Governance, Defence, Space and IT Projects of Central and State Governments. In the time of Covid-19 pandemic, our

scientists have been facilitated to access office network office infrastructure from home for conducting audit activities with an intent to provide uninterrupted service to the clients. Some of the major jobs undertaken are indicated below -

Services offered	Name of the Project
IT Services	<p>ERTL (North), Delhi</p> <ul style="list-style-type: none"> • Independent Verification and Validation of Drone System for Raphe –mphibr Pvt. Limited for Indian Army • Indian Defense Projects: Independent Verification and Validation of Integrated Command and Control System [IACCS] Batch 3 of Airforce and AKASHTEER – Air Defense Control and Reporting System for Indian Army • Testing and Evaluation of Smart City IT Infrastructure and Applications • Comprehensive Functional , Process and Security Assessment of MCA 21 version 3.0 Comprehensive Security and quality Assessment • Comprehensive Functional , Process and Security Assessment of Income Tax Projects – ITBA, CPC TDS, Income Tax Portal and INSIGHT • Functional Security Testing of HaltDOS Platform for WAF, SLB and DDOS Mitigation • National Common Mobility Card Testing for DMRC • Formulated the Guidelines for Implementation and Assessment of Zero Trust Architecture Framework and Mobile Device Security as a part of working groups formed under Security and trust for IT infrastructure and application standardization project of MeitY. • Assessment of Cloud Service Providers under MeitY empanelment Scheme : Completed for Google Cloud , Railtel and TCL • MeitY'sBhashadaan and Bhashini Website assessment [Functional , Security and Performance] • Secure Code Review for Indian Security Press e-passport and Precision Biometric device • EPS Certification: Testing, Evaluation and certification of Government E-Market Place [GeM] and CPWD eProcurement System. • Web Services and API Security Assessment for iFMS, Exam Online and SSC Examination System • Testing of Smart Cards under SCOSTA Certification scheme. • Security testing of iGOT 3.0 Mission Karmyogi Project of DoPT <p>ERTL (East), Kolkata</p> <ul style="list-style-type: none"> • Completed Conformity assessment of 5 G Spectrum Auction Platform of DOT. • Completed e-Auction project for Commissioner of Geology and Mining, Govt. of Gujarat, developed by (n)Code Solutions, • Completed Conformity assessment of 12 no. of e-Procurement and e-Auction platforms of different organizations; the systems are successfully used in different e-Auction exercises for Coal India, M/s MSTC, DoT, and Director General of Hydro Carbon (DGH) etc. • Completed Load Testing of different social welfare websites of Govt. of West Bengal like 'Bangla Sahayata Kendra', 'Student Credit Card', 'Student Internship portal' etc. for 5000+ users. The capability of Load Testing of web applications has been enhanced up to 20,000 virtual concurrent users (through Server/ Client mode, embracing Virtual Machine technology). • Successfully completed quality and security assessment of one 'In-Motion Weighing Bridge Application'; this application provides real time weightment data of rail wagon to Freight Operating Information System (FOIS) of Indian Railways. • Carried out audit on Cloud Services as per MeitY's requirements for leading Cloud service providers. • Undertaken Security Vulnerability assessment for the websites of no. of Indian Missions, Ministry of External Affairs, and Govt. of India. • Conducted security audit of websites of 10 Indian Embassy / HCI / CG. • Started new activity of source code audit of the website of Indian Mission and successfully completed one such project. • Completed security audit of Exam Engine to be used by PSC, UPSC exams. • Completed web application security audit for 14 nos. e-Governance web Applications of Govt. of West Bengal like 'Swachh Bharat project under Panchayats and Rural Development Department and web applications of the Office of the Director of Land Records and Surveys and Joint Land Reform Commissioner etc.

Services offered	Name of the Project
	<ul style="list-style-type: none"> Conducted security vulnerability assessment of Servers and Network infrastructure of 'Powergrid Corporation of India Limited', 'Mahanadi Coalfields Limited', '5G spectrum auction platform' etc. Security evaluation of Servers and network devices (on sample basis) of 5 smart city (Varanasi, Bhopal, Chandigarh, NDMC, Surat) to assess the status of cybersecurity of the Smart City Mission Conducted Remote Penetration Testing of 'Reverse Auction and Integrated Tendering portal' of Powergrid Corporation of India Limited, 5G Spectrum auction portal, Websites of Uttar Pradesh Vigilance Department, Mumbai Metropolitan Region Development Authority (MMRDA), National Council of Science Museums , Gun and Shell Factory , Cossipore etc. <p>ETDC (CHN), Chennai</p> <ul style="list-style-type: none"> Conducted cybersecurity gap assessment on Cybersecurity Architecture of Tamil Nadu (CSA-TN) based on NIST cyber security framework that enhances the layer on cyber security controls by mitigating vulnerabilities. Carried out Web Application Security testing for PM Momentos – Open Auction, Coastal Aquaculture Authority, Chennai, Assam State Portal, CIPET and IPRC, Mahendragiri. Conducted Information security gap assessment of IT infrastructure of CPCL (Tamil Nadu) as per the NSA advice to bridge the configuration-based vulnerabilities of SCADA devices. Conducted Audit of Digital forensic laboratories in India to enable them to be notified as Cyber Forensics Laboratories as per section 79A of the IT Act. This helped the labs to conduct the forensic activities within the framework and thus enhancing the acceptability of their findings. Instituted the Model Cyber Forensic Laboratory in Chennai to demonstrate the best practices to CFSL/RFS laboratories to inculcate quality in cyber forensic assessment and also to train the laboratory personnel and investigating officers on operational security practices. <p>ETDC (BG), Bengaluru</p> <p><i>Testing & Evaluation:</i></p> <ul style="list-style-type: none"> Software Application Testing (Functional & Non-functional, Code Review) Information Security Audit & Testing: Vulnerability Assessment, Penetration Testing, Application Security Testing and Mobile Application Security Testing) Assessments for Product Certification: Website Certification, Biometric Device Certification, e-Procurement SystemCertification, Common Criteria Certification <p><i>Audits:</i></p> <ul style="list-style-type: none"> Process Audit as part of Product Certification (e-Procurement system, Biometric Device, Website) State Data Centre TPA Audit ServiceQuality (SLA Compliance) Audit ISMS Audit AUA/KUA Audit for Third Party requesting agencies of UIDAI BDCS Surveillance audit Cloud Service Provider (CSP) Audit STQC Empanelled Test Laboratories (SETL) surveillance audit Audit of Smart Cities (Surat, Bhopal, Varanasi, Chandigarh, New Delhi) Secure Manufacturing Facility Audit. <p>Major Achievements:</p> <ul style="list-style-type: none"> Biometric Device Testing Lab established to facilitate availability of quality assessed Pre-Certified Hardware (PCH), Authentication and Enrolment Devices along with QR Code scanner devices to meet UIDAI requirements. The testing was conducted for eight nos. of L0 registered devices. AUA/KUA Audit completed for State Bank of India and Bank of India 3rd Party Audit for State Data Centre of CeG, Karnataka Government Drafted Guideline document for Data Centre Certification Scheme as per ISO/IEC 22237-4 Information technology — Data centre facilities and infrastructures — Part 4: Environmental control. Functional and Security Testing of EVM M3 Upgrade and other peripheral units was conducted for Bharat Electronics Limited Secure Manufacturing Facility (SMF) audit for manufacturing of Electronic Voting Machine was conducted for BEL.

Services offered	Name of the Project
	<ul style="list-style-type: none"> • Conducted SLA audit of CPC 1.0 and eFiling 1.0 for Income Tax department. • First cycle assessment for five pilot Smart Cities (Surat, Bhopal, Varanasi, Chandigarh, New Delhi) from Cybersecurity aspects (for IoT, TEVCCS, Process Audit and VA/PT) was conducted. • Web Application Security Testing services were provided to National Career Services Portal, Khajane for Treasury Department & DPharm Examination Management System for Government of Karnataka, CSIR 4PI, NAAC and CoE Postal Technology of India Post. <p>ERTL (West), Mumbai</p> <ul style="list-style-type: none"> • Carried out IT Infrastructure Audit/ Assessment for Crime and Criminal Tracking Network & Systems (CCTNS project) for Data Centre at Itanagar, Arunachal Pradesh including physical verification of hardware supplied to Police department, Hand-holding support, Supply & Installation of hardware/software, Data Digitization (Sign off Document) and Web Application- Functionality check for CCTNS • Part of Vulnerability Assessment and Penetration testing for Smart Cities under “Strengthening Cybersecurity for Smart Cities Mission”. • Part of End Point Security testing & audit team for Smart Cities under “Strengthening Cybersecurity for Smart Cities Mission”. • Conducted Security testing for Customs Department's Seal s/w application, Protector of Emigrants PoE) s/w Application for Ministry of External Affairs and RRB s/w application. • Software testing for ORS application from Maharashtra State Road Transport Corporation - PORS facilitates on-line booking of tickets for buses, Long Range Identification and Tracking (LRIT) application used for National and International Search & Rescue, Security and Environmental protection. • Carried out Digital Forensic Lab assessment for Air Force Cyber Group New Delhi, CFL CERT-In, State Forensic Lab Bengaluru and SFIO New Delhi. <p>ERTL (South), Thiruvananthapuram</p> <ul style="list-style-type: none"> • Completed security assessment of “DigiYatra” Central Ecosystem App of Airports Authority of India – a Seamless, Contact-free, Hassle-free, Secure travel experience in airports. • Completed Security Assessment of 14 nos. of Treasury applications of Kerala State Treasuries Department. • Completed security testing of mobile Apps from Kerala Police, Directorate of Industries and Commerce, Kerala Water Resources Information System and Kerala Digital University. • Completed web application security audit of 14 nos. of web Applications of Kerala Administrative Tribunal, Kerala Dairy Farmer's Welfare Fund Board, Irrigation Design & Research Board, Mangalore Port Trust, Kerala Digital University, Kerala Minerals and Metals Ltd, Directorate of Industries and Commerce, Directorate of Industrial Training, CPWD, Kerala Water Resources Information System and Kerala PSC. • Conducted Security testing of IOT-Smart Camera • Conducted Vulnerability Assessment and Penetration Testing of Servers and Network infrastructure of LPSC, ISRO Tender wizard, CPWD <p>ETDC (HYD), Hyderabad</p> <ul style="list-style-type: none"> • Emergency management services applications of the state of Uttar Pradesh- 108 (Emergency medical response ambulance service) and 102 (Emergency and general services for pregnant women and infants) were tested for whole setup including the infrastructure hosting the applications, Web applications, Android applications and Call center facility. • Carried out verification testing of Mission Computer Software and other subsystems in 3 phases for Project Varunastra, an advanced heavyweight anti-submarine torpedo developed by NSTL Visakhapatnam laboratory of DRDO. • E-Procurement systems were evaluated for compliance with “Guidelines for compliance to Quality Requirements of E-Procurement Systems” which includes requirements of IT Act, CVC, GFR and ISO/IEC 27001 including Functionality and Performance Testing, Application Security, Vulnerability Assessment and Penetration Testing.

Services offered	Name of the Project
	<ul style="list-style-type: none"> Robust functionality testing was carried out for Block Chain based Property Registration System implemented by Center for e-Governance, Govt of Karnataka, covering all the possible type of transactions like sale deed, partition deed, gift deed, agreement of sale, encumbrance deed, power of attorney, lease deed etc. <p>ETDC (PUNE), Pune</p> <ul style="list-style-type: none"> Functional Testing of Automated Fare Collection System for Pune Mahanagar Parivahan Mahamandal Ltd. (PMPML), for streamlining ticket collection and revenue generation activities. Part of Vulnerability Assessment and Penetration testing for Smart Cities under "Strengthening Cybersecurity for Smart Cities Mission". Part of End Point Security testing & audit team for Smart Cities under "Strengthening Cybersecurity for Smartcities Mission".

STQC is entrusted to perform cyber security evaluation of applications, devices and network deployed in Smart Cities as per the best practices. The evaluation to be done for 100 smart cities. Pilot test/evaluation activities were conducted for 05 Smart cities

Common Criteria (CC) Testing/ Certification Infrastructure

Common Criteria Security Test/ Evaluation Laboratory(s) as well as a Certification Scheme based on Common Criteria standard have already been established at ERTL(East), Kolkata, ERTL(North), Delhi and ETDC(Bengaluru) and one SETL at Mumbai. Till date 16 products have been certified from EAL 1 to EAL 4. Presently following services are being provided :

By ERTL(East) :

The lab completed successful Common Criteria (CC) evaluation of three (3) telecommunication products and eight (8) more products are running for different Evaluation Assurance Levels (EAL). Products from BEL and C-DOT are also under evaluation. Evaluation for one (1) product is expected to be completed by Dec, 2022.

By ERTL(North) :

CCTL lab is accredited successfully by IC3S for EAL 4 valuation. Currently various products like VCL-Enigmatron, High Security Data Encryption & Firewall Equipment, Cygnet OSS software and Array Security Firewall (ASF) ArrayOS are under evaluation.

National facility for Quality Assessment of Biometric Devices :

In order to eliminate the use of stored biometrics, UIDAI has mandated the use of Registered Devices for Biometric authentication. STQC is the only Conformity

Assessment body to verify the compliances of Bio--metric Devices for Aadhar ecosystem. STQC has certified Bio-metric Devices which are being used for Aadhar based Payments, Public Distribution System, e-KYC, Authentication, Enrollment, applications like Jeevan Praman, Point of Sale, Aadhar based attendance etc. Presently, testing facilities are available at three locations in India at Delhi, Bangalore & Mohali. New facility for testing is being created at ERTL (East), Kolkata. Before deployment of Registered Biometric devices in the field, Hardware and RD services of the Registered Devices were certified by STQC.

ERTL(North) completed UIDAI AUA/ KUA Compliance audit for National Health Authority and EPFO, RD Services [L1 Device certification], RD Services [L0 & L1 Compliance Testing] and L1 device Process audit for industries.

ERTL(West) carried out Functional Compliance under Provisional Certification Scheme of STQC for FRR/ FMR Assessment of Biometric Devices.

Till date STQC labs have certified 25 Bio-metric products and 6 PCH in various sub-schemes mentioned above.

Website Quality Certification Services

Website Quality Certification Scheme based upon national and International standards /best practices 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 2.0).

The award of the mark "Certified Quality Website (CQW)" is a recognition that the website complies with the requirements of GIGW-2018 and the organization has adequate procedures and processes in place to provide

reliable and dependable information and service through their website. Under the Website Quality Certification Scheme, 310 websites belonging to Central or State governments Ministries/ Departments/ Offices and e-Voting private websites have been certified till date.

9.7.3 Major services offered - Testing and Calibration

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 jobs undertaken during the period are indicated below -

Name of Laboratory	Services offered
ERTL (North), Delhi	<p>Safety Testing:</p> <ul style="list-style-type: none"> • Air Disinfection System as per IEC 60335-2-65 • Kitchen Chimney Hood as per IEC 60335-2-31: 2002 • Point Of Sale Terminal as per IEC 62368-1 • Water Purifiers per IEC 60335-1 <p>EMI/EMC Testing</p> <ul style="list-style-type: none"> • Ultra sonic Flaw detector Machine for Railway Track flaw detecting system • Low Voltage IoT Automation IoT device • Grass & Shrub Shear Machine (Domestic appliances) • Weather Terrain Smart Sprinkle Irrigation system • RF Gate Way (an IT Product) • Wound Healing System (a Medical Product) • OttomedInsight Video Processor (a Medical Product) <p>Environment Testing</p> <ul style="list-style-type: none"> • Energy Meter testing for different overseas clients. • Testing of Office Equipments like Interactive Panels/Boards, Multifunctional Devices (Printer/Copier/Scanner) for DGS&D • Climatic Testing of AXC F 1152 Controller with Phoenix Contactor used in smart power management and remote monitoring system. • High Humidity test conducted on Ultrasonic Flaw detector System used in Indian Railways/Metros for checking cracks and other flaws in the rail tracks. • Fixture designed to conduct Random vibration test as per IEC 60571/IEC 61373 on Relay Module, Master Controller, Driver Display Unit, etc. used in electric locomotive and Indian Railways. • Thermal Shock and Vibration tests were conducted on Acoustic Pinger (PCB) used in Indian Navy Submarines & underwater ranged weapon like Torpedo witnessed by Naval Officer, Ministry of Defence. • Various Environmental tests conducted on 4G and Cloud related services equipment like RF Gateway and LTE e-Node B VBS-W10. • Lab initiated/ participated in 10 PT/ ILC programs for different testing and calibration areas. • The following T & M facilities were installed for upgradation of EMI-EMC and Safety test facilities : • Radiated Immunity Test facility 1-6 GHz for 10V/m Field as per IEC61000-4-3 • Radiated Emission as per CISPR 32 & other specification from 30 MHz to 6 GHz • Tensile Test Machine • Test Vessels for testing as per IEC 60335-2-6 • Test Probes (1 mm & 3 mm) according to IS 1293/ IEC60884-1 • Flexion Test Jig for Screw Terminals as per IS 1293 & IEC 62052-31 • NABL assessment done successfully with addition of above parameters.

Name of Laboratory	Services offered
ERTL (East) Kolkata	<ul style="list-style-type: none"> Conducted Type testing of Energy Meters & Tri-Vector Meters of various types up to 100A (Imax) for major Indian manufacturers under Licensing Scheme of BIS and requirements of Electricity Boards across the country. Conducted testing of Lead Acid Battery and PV Module to support Non-Conventional Energy movement initiated in the country Conducted Safety testing of Smart as well as Conventional type Single & Three Phase Energy Meters as per IEC 62052-31 for STQC 'S' Mark scheme. Conducted revalidation testing & certification of Flameproof, Intrinsically Safe & Increased Safety Electrical Equipment intended to be used in potentially hazardous atmospheres in underground Coal/ Oil mines and Surface Industries dealing with hydro-carbon and other combustible materials as per revised edition of IS/IEC 60079-series for BIS Product Certification and DGMS & PESO approval. Conducted Climatic conditioning, Mechanical Endurance & Ingress Protection tests on electrical/ electronic equipment/ system for Telecom, Defence, Railway & other Industrial applications Established test facility of 2020 edition of IS 13779 & 2021 edition of IS 14697 for Type approval testing of Energy Meters and got Recognition of BIS Facility upgradation for calibration of precision 8.5 Digit Digital Multimeter , AC DC Current upto 100 A, AC Current Clamp upto 6000A through procurement of Fluke 5730A High Performance Multifunction Calibrator, Transconductance Amplifier Fluke 52120A and 50 Turn 6000A Current Coil, Fluke 52120A/COIL 6KA Facility extension for Oscilloscope calibration from 600 MHz BW to 1.1 GHz BW after incorporating Fluke 5522A Multifunction Calibrator with 1.1 GHz Oscilloscope option. Upgraded specialised Calibration services for Avionics equipment has been provided to Air Traffic Control of Airport Authority of India across the country Laboratory is able to provide traceable calibration services to the industries for Optical Power Meter, Optical Source and Optical Attenuator in addition to accredited calibration of x,yColour Coordinate, Colour Temperature, Optical Wavelength and Illuminance. Maintaining NABL accreditation for Electro-Technical, Optical and Non-Electrical Calibration facility as per 2017 edition of ISO/IEC17025. Participated in ILC program for Testing of Energy Meter [IS14697, IS13779], PCB for Creepage & Clearance, PVC Insulated Single Core cable for Conductor resistance @ 20 degree C, SMPS Adapter for Leakage current etc. Continuation of Accreditation of Laboratory Quality Management System as per ISO/IEC 17025:2017 by NABL
ERTL (West), Mumbai	<p>Environment Testing</p> <ul style="list-style-type: none"> Environmental Stress Screening (ESS) Testing carried out on assembled PCBs, Sub-assemblies of various manufacturers, deployed in different defense projects. Compliance of operation Octaglide Drone tested by simulating Vibration & shock tests parameters. Compliance of operation Portable Digital Ultrasonic Single Rail Tester & Double Rail Tester under Climatic & mechanical simulation deployed in Railway Applications. <p>EMI/EMC Testing</p> <ul style="list-style-type: none"> For IoT Gateway - a centralized hub that connects IoT devices and sensors to cloud-based computing and data processing and designed to simplify and streamline IoT device communications and management.

Name of Laboratory	Services offered
	<ul style="list-style-type: none"> • GPS time synchronizer tested for EMI/EMC compliance having UTC time reference. • Rezycure- a handheld high intensity portable blue light system tested for EMI/EMC Compliance • Ultrasonic Rail tester with D-Scan, deployed on rail tracks to detect the defects in rail tracks, is tested for EMI/EMC. • Tested Portable Matter and Air Quality Transmitter-Air Quality Sensor uses an advanced MEMS metal oxide semiconductor sensor to detect air quality tested for EMI/EMC Compliance. <p>Safety Testing</p> <ul style="list-style-type: none"> • Under S MARK SCHEME – Electricity meters tested as per IEC 62052-31:2015: Electricity metering equipment (AC)- General requirement, tests and test conditions- Part 31: Product safety requirement and tests. • Electric Vehicle Conductive charging system tested as IS 17017 (part 1): 2018. • Microprocessor constant current Regulator of NASU system of 4kW, 10 kW, 15 kW, 50kW has been Tested as per Federal Aviation Administration- Advisory Circular no. 150/5345-10H. • Welding Machine as per IS 4559 has been tested for Safety and Performance. • NOVOPEC Curotherm system and UPAC Device has been tested for Patient leakage current, touch current and Dielectric strength test as per medical Std IEC 60601-1. • Semi automated clinical chemistry analyser and Universal Three Phase Protective relay tested as per IEC 61010-1 standard. • Testing of Automatic Cartoning Machines, Denester Machine, Plunger Rod Assembly and Labelling Machine tested as per latest edition of the standard IEC 60204-1: 2021. • BIS Recognition for Testing / evaluation of electrical & Electronics products as per IS 13252 / IEC 60950-1, IS 616 / IEC 60065, IEC 61010-1, IEC 60335 -1 / IS 302-1, IS 302-2-25, IS 302-2-26, IEC 61558-1, IEC 62040-1 / IS 16242, IS 15885-2-13, IEC 60255-27. IS 13779/IS 14697/IS 15884 standards. • TEC Recognition Testing / Evaluation of products as per IS 13252 / IEC 60950-1 standards. • Testing / Evaluation Electrical / Electronics/ IT product for S-Mark Requirements as per IS 13252 / IEC 60950-1, IS 616 / IEC 60065, IEC 61010-1, IEC 62052-31 standards
ERTL (South)	<ul style="list-style-type: none"> • Climatic, Temperature cycling ,Vibration & Leak testing jobs for customers like - • VSSC and its sub contractors • LPSC • Defense Organizations like Indian Navy • Public Sector like Brahmos, Keltron • Screening of different types of electronic components like Leaded and SMD devices. • Test & Evaluation of modules/packages and stacks like Power Modules, Data Acquisition Units, Automatic Telemetry System Stacks. The above testing is for the main launch vehicles of VSSC - PSLV& GSLV for the following missions • Chandrayaan • Gaganyaan. • Also started testing packages for RLV (Reusable Launch Vehicles) & SLV (Small satellite Launch Vehicles) • Safety Testing & type testing of Medical electrical Equipment as per IEC Standards. • Tested wearable ECG(IOT) based on IEC 60601 • Continuation of Accreditation of Laboratory Quality Management System as per ISO/IEC 17025:2017 by NABL • Approval from NABL obtained for ILC participation for different Electrical Calibration parameters.

Name of Laboratory	Services offered
ETDC (BG), Bengaluru	<p>System Testing</p> <ul style="list-style-type: none"> Taken up the project third party testing of EVMs & VVPATs manufactured by BEL and ECIL Public sectors for Election Commission of India as per the ECI's Acceptance sampling criteria and Test procedure which includes : Random audit of IGQA/IGQC, HALT testing of Capacitors, Audit of Secured manufacturing facility, Acceptance testing of EVMs & VVPATs covering functional, electrical, mechanical, environmental and RF compliance requirements and Acceptance testing of repaired EVMs & VVPATs Successfully completed HALT testing Capacitors of lot size of approx. 2.4 crores, random audit of IGQA/IGQC (65 man days) and SMF audit of MMF & NCS business units. <p>Safety Testing</p> <ul style="list-style-type: none"> The lab has been recognized by BIS to test 31 products under CRS scheme. Following products were tested under CRS scheme: Stackable Terabit Router – CDOT Make Fertility Monitor – INITIO Make Thermal Receipt Printer- PR-65 Power Adapter – LITE ON Carried out Testing/ Pre despatch Inspection of 13 Batches of Thermal Papers used in VVPAT, according to TEC/ ECI requirements. <p>Quality Assurance Activities</p> <ul style="list-style-type: none"> Successful participation in 1 ILC/ PT programme as per three safety standards Obtained extension of BIS recognition up to 31 Dec-2023 Obtained TEC CAB recognition up to March 2024 Completed STQC S mark assessment for Safety Lab Electro-Technical Calibration Automation carried out for Oscilloscope Calibrator model no. F5502E. Calibrated Dynamic Signal Analyser HP35670A and RF Ref source F96270A. Calibrated news items like Process calibrator – Victor 14T, LCR Meter Octagon 4910, DMM GW Instek GDM 541 & 542 True rms DMM and AC/DC Current coil, Transmile – EA002 Procured & installed new GPS Frequency Standard, Fluke 910R Successfully carried out/participated for ILC parameters for RF Power, RF attenuation & frequency. <p>Non-Electrical Calibration</p> <ul style="list-style-type: none"> Participated in PT programme for RH% calibration range 20% to 90%. Participated in PT programme for temperature calibration in the range -100 Deg C to 660 Deg C. Participated in PT programme for temperature calibration in the range -200 Deg C to 1000 Deg C.
ETDC (HYD)	<ul style="list-style-type: none"> Third Party Testing of Electronic Voting machines (EVMs) Evaluated Control Unit(CU), Ballot Unit(BU), Voter Verifiable Paper Audit Trail (VVPAT) Secure Manufacturing Facility Audits for Electronic Voting Machines Secure Manufacturing Facility (SMF) Audits were carried out on the infrastructure that is in place to store the EVM manufacturing data, applications used to track and trace the manufacturing progress, traceability data, alarms in manufacturing, data availability etc.

Name of Laboratory	Services offered
	<ul style="list-style-type: none"> • Functionality Testing for Automated Smart Street Light System • 4th phase of functionality testing was carried out to conform the defined requirements for the automated smart street lights system for the city of Hyderabad. The features like auto switch off based on set timings, auto on/off based on the intelligent sensing of weather, automatic detection of faults in lights, power consumption statistics, reporting of power theft from feeder pillars, analysis of data, auto calculation of light burn hours, auto adjustment of dimming as per sunlight, issuance of commands from mobile/control center etc were tested onsite to perform conformity assessment against all the requirements of the smart street light system.
ETDC (CHN), Chennai	<p>Contribution to Ayushman Bharat (Health)</p> <ul style="list-style-type: none"> • Carried out qualification testing for Dry Heat, Cold and Humidity Stress conditions for Omni, a peritoneal dialysis equipment which helps a kidney failure patient to manage dialysis at home, instead of going to hospital. • Conducted IP testing for protection against Solid Foreign Objects and protection against falling water drops as per IEC 60529 on the product Accuflow Drip Monitor, used to monitor the gravity infusion and alerts the caregivers during critical condition. Being a Wi-Fi enabled device, the caregiver can view the infusion parameters and alarms remotely from the comfort of the nursing desk. • Carried out qualification testing for Vibration Stress as per IEC Specifications for Rover- Voyager - Solar Tracking Unit. This Solar tracking system allow solar panels to follow the sun's path in the sky to produce more solar electricity. • Carried out IP testing as per IEC: 60529, for Smart Lock Systems, with no physical keys and the entire system operates with One Time Passwords (OTPs). The system has the option of entering the OTP conveniently either through the device or mobile apps. This device is used in fuel truck, dairy truck, package truck, container or tipper truck. • Carried out testing of Long-Term Evaluation (LTE) 4G Tactical LAN, having 128-bit algorithm with AGC Software to protect data and secure communication link, under different Climatic conditions and Mechanical endurance testing for its functionality check.
CFR, Chennai	<ul style="list-style-type: none"> • Carried out Accelerated Life Demonstration Testing for LMD (Liquid Mosquito Destroyer), Consumer electric device as per MIL HDBK 781A & IEC 60605. Through this testing 4 Year field life was demonstrated by studying the life characteristics deterioration in leakage current, dielectric withstanding capability, Volume Resistivity and insulation Resistance of two varieties of machine made of Virgin and Composite materials. • Carried out Reliability estimation (as per RDSO requirements) and based on MIL-HDBK-217F-Notice 2 by Parts Stress Method for 6 models of Full HP IP Colour Camera with Varifocal lens, 4K UHD Fixed IP Colour camera with varifocal lens, Full HD Bullet type IP Colour Camera, 4K UHD Bullet type IP Colour Camera, Full HD Fixed Dome Type IP Colour Camera, Full HD PTZ(pan,Tilt,zoom) IP Colour Camera for M/s. Prama India Private Limited, Mumbai. and 3 models of Network Vandal Dome Camera and Network Bullet Camera for Aditya Infotech.
ETDC (Goa)	<p>Provided Test & Calibration services to following organizations in the region :</p> <ul style="list-style-type: none"> • Goa Shipyard Ltd., • Murmugoa Port Trust, • Nuclear Power Corporation of IndiaLtd., • Indian Navy, • Airports Authority of India Ltd., • Indian Oil Corp. Ltd., • District Hospitals of Goa Govt., • Private industries like TCS, IFB Industries, Siemens, Goa Instruments, Pharma Industries, Hospitals, Hotels, Test/Calibration laboratories etc..

Name of Laboratory	Services offered
ETDC , Pune	Following products were tested : <ul style="list-style-type: none"> • Batteries for VVPAT machines for ECI • EMI/ EMC Testing for ICU Ventilator, LED Bulb and Rectifier • Participated in proficiency testing program and inter laboratory comparison. • Obtained NABL accreditation as per ISO/IEC 17025 : 2017

STQC Certification Activities :

STQC has established and operated 3rd party independent Certification schemes for industry and Government departments namely :

- Quality Management System (QMS) as per ISO: 9001 standard,
- Information Security Management System (ISMS) as per ISO: 27001 standard,
- Product Safety Certification (S-mark) as per applicable ISO/IEC/IS standard,

In addition to these certification schemes, STQC also provided support to its Ministry (MeitY) for Assurance activities in the area of Compulsory Registration Order (CRO), e-Procurement System, Digital Forensic labs as 'Examiner of Electronic Evidence' (Section 79 of IT Act) and empanelment of Cloud Service Provider(s). Meanwhile STQC has prepared a draft Certification Scheme for Business Continuity Management System (BCMS) as per ISO 22301:2019 standard. STQC Clientele includes organizations like UIDAI, DRDO, ISRO, BHEL, IOCL, Mphasis, Hero MotoCorps etc. Till date –

- 33 e-Procurement Systems have been certified.
- 18 Cloud Service Provider(s) have been for empanelled.
- 12 labs have been notified as Examiner of Electronic Evidence u/s 79A of the Information Technology Act 2000 under the scheme

ERTL (East) Kolkata also offered ISMS certification and surveillance audits services to two foreign clients of iMerit Inc., New Orleans, USA and iMerit Bhutan Private Limited, Thimphu, Bhutan to certify/ensure continuity of their Information Security Management Systems as per ISO 27001:2013 thorough online audit mode.

9.7.4 Major Service Offered - Training

Following trainings have been provided by STQC labs -

Name of Laboratory	Services offered
ERTL (North)	<p>Delivered lectures on Mobile Device Security and Cyber Security Testing and Audit [Compliance Assessment and Evaluation Techniques] in CISO deep dive training under Cyber Surakshit Bharat Project of MeitY for CISO's in Online and Classroom i.e. physical mode.</p> <p>Training to STQC Employees on Cyber Security Awareness, Protection from Cyber Fraud, Cyber Laws and Cyber Crime reporting, Vulnerability assessment of EPS, application security.</p>
ERTL (East)	<p>Conducted 3-days training courses on ISMS Internal audit course as per ISO 27001:2013/ ISO 27002:2022 standards for Damodar Valley Corporation (DVC)</p>
CFR- Chennai	<p>Conducted the Certified Reliability Professional training program, CRP-IN, exclusively for Officers of Indian Navy. For the first time the course content was tailored to include the requirements of Indian Navy's PLCS RAM document. 22 Naval Officers from across the country participated and got trained.</p> <p>Conducted the 3 Day "Design Reliability Engineering Techniques" training program for 116 DRDO Scientists spread across the country through VC mode.</p>

9.7.5 Activities in North-East Region (NER)

ETDC, Guwahati and ETDC, Agartala are the two laboratories established by STQC Dte in North-East region. These laboratories have been extending the following services to eight states in the NE region:

- Test & Calibration services to the industries, technology users & service providers.

- Testing of e-Governance s/w as well as State portals/ websites of Govt. Ministries, Department and PSUs etc.
- Audit of IT Infrastructure/ third party auditors for the e-Governance projects like State Data Centres (SDC)/ SSDG/ e-District/ SWAN etc.

Training services in the field of Electronics & Information Technology / Quality & Reliability.

Initiatives in Test & Calibration services

Test & Calibration services of ETDC Guwahati & ETDC Agartala are extended to the organizations located throughout the NE region covering all the 8 (eight)-states towards improvement of Quality of their products and services. The services are received by most of the Small, Medium and Large Scale Industries covering the Industrial sectors like – Oil & Natural Gas, Oil Refineries, Exploration units, Railways, Indian Air Force (IAF), Power - Generation, Transmission & Distribution, Paper, Cement & Building material, Food & Beverages, Cosmetics, Cable & Conductors, Fertilizer, Plywood, Carbon Products, Steel, and Service sectors like – Aviation, Engineering & Construction, Telecommunication, Automobile, Service & Maintenance units, R&D and Test Labs, Hospitals, Pharmaceutical & Pathological Laboratories etc. About 187 calibration jobs being executed by ETDC Guwahati – covering more than 45 nos. of LSI, MSI, SSI Industrial units, Govt. PSUs, Private and other technology user organizations of NE- region.

On-Site Calibration Camps

To make the STQC services available at the door steps of the client's' site located at various remote places in the NE Region, on-site calibration camp being organized by ETDC Guwahati at Oil India Ltd., NEEPCO, BCPL, GAIL, AGCL, BVFC, AAI to facilitate the qualitative requirements of the industries and technology users.

NABL Accreditation & Inter Laboratory Comparison (ILC)

Calibration services of ETDC,Guwahati are accredited (No. CC-2009) by the National Accreditation Board for Testing and Calibration Laboratories (NABL) in conformance to ISO/IEC 17025, 2017 international standard for accreditation in the fields of Electro-Technical (AC/DC Current, Voltage, Power, Energy, Frequency, Resistance, Inductance & Capacitance), Thermal (Temperature), Mechanical (Acoustics, Pressure, Mass,

Balance, Dimension & Volume) & Optical (Optical -Power, Wavelength & Stability) calibration services. Inter Laboratory Comparisons (ILC) programme is also being participated for parameters like Power, Frequency, Temperature, Pressure, Dimension & Acoustics at various reference labs towards achieving satisfactory qualitative performance level.

Initiatives in IT Test & Assessment Services

Initiatives have been taken by ETDC Guwahati & ETDC Agartala towards facilitating services in the field of Testing/Assessment of Software Applications, Website/ Web Applications, IT Infrastructure under various e-Governance projects like –Website Quality, e-District, SSDG/SP/eForms, SDC, SWAN etc. being implemented in the States of NE Region. More than 10 Nos. of Websites corresponding to Govt./PSU/Research Labs/Academic Institution/University/Semi Govt. organisation of the country being Tested/Evaluated/Assessed in compliance to the “(GIGW) Guidelines For Indian Government Websites” & 661Nos. of IT infrastructure - verification/ assessment jobs being executed by ETDC Guwahati & ETDC Agartala together, for their Functionality & Quality. Websites of Govt. Ministry/Departments covered under the EGDI (E-Government Development Index) are also being Tested & Assessed by both the centresfor Website Quality Certification. ETDC, Agartala in association with ERTL (East), Kolkata also initiated 06-Nos.of Security Test/Assessment of Web Applications/Websites of various Govt./PSU organizations of NE-Region, from time to time in compliance to security requirements of OWASP international guidelines.

9.8 National Institute of Electronics and Information Technology (NIELIT)

9.8.1 Introduction

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 IECT such as FutureSkills, Cyber Law; Cyber Security; Cloud Computing; ESDM and related verticals. It offers courses in Degree/ Diploma Levels as well as Skilling Courses and is also one of the National Examination & Accreditation Bodies which accredits institutes/ organizations for the conduct of courses in the Non-Formal Sector. NIELIT is also rolling out Digital Competency Programmes for many

State Governments for its employees and the masses. NIELIT is recognized by NCVET as an Awarding Body and Assessment Agency for NSQF aligned courses.

NIELIT has its presence at forty-seven (47) locations at Agartala, Aizawl, Ajmer, Alawalpur, Aurangabad, Bhubaneswar, Calicut, Chandigarh, Chennai, Chuchuyimlang, Churachandpur, Daman, Delhi, Dibrugarh, Dimapur, Gangtok, Gorakhpur, Guwahati, Haridwar, Imphal, Itanagar, Jammu, Jorhat, Kargil, Kohima, Kolkata, Kokrajhar, Kurukshetra, Lakhnupur, Leh, Lucknow, Lunglei, Majuli, Mandi, Pasighat, Patna, Pali, Ranchi, Ropar, Senapati, Shillong, Shimla, Silchar, Srinagar, Tezpur, Tura and Tezu with its Headquarters at New Delhi.

Besides the own Centres, NIELIT is also well networked through about 750+Accredited Training Institutions for training of O/A/B/C level courses and through a network of about 4100+ Facilitation Centres engaged in training of Digital Competency Courses making NIELIT distinctly positioned in terms of its outreach to all corners of the country and all segments of the society.

NIELIT plays an important role in skilling of youth in the area of IECT. The wide repertoire of NIELIT Courses includes: (a) Degree/Diploma Level Courses such as ME/M.Tech, BE/B.Tech, MCA, BCA programmes offered by the NIELIT Centres in association with State Universities/Technical Board; Aurangabad Centre is also facilitating PhD Program in the area of Electronics (b) Skilling Courses (Long Term) such as O Level(IT), A Level (IT), CHM-O Level, CHM-A Level, MAT-O Level etc. (c) Skilling Courses (Short Term) in niche areas such as IoT, Cloud Computing, Machine Learning, Cyber Security etc. and (d) Digital Competency Programmes for the proliferation of Digital Literacy in the country; besides specialized programmes in emerging technologies targeted towards empowering the employees of the State Governments and Departments of Central Line Ministries. In addition, NIELIT has also created expertise for the roll out of customized skilling, upskilling and reskilling programmes as per specific needs of public and private sector firms.

NIELIT qualifications are widely accepted across the country. Owing to the quality, some of the NIELIT digital competency courses are linked with both promotion & recruitment by number of state governments viz; Arunachal Pradesh, Bihar, Chandigarh, Daman & Diu, Gujarat, Rajasthan, Sikkim, Uttar Pradesh.

Since last 10 years, NIELIT has trained more than 80 lakh candidates. Taking into the account advancement 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 and 3D Printing. In this regard, NIELIT Centres at Aurangabad, Calicut, Kolkata have been identified as Technology Resource Centres to offer blended learning programmes under the Future Skills prime initiative which is being jointly conceived by MeitY and NASSCOM.

Training summary: 1st Quarter of 22-23

NIELIT plays an important role of skilling people in the area of Information, Electronics and Communication Technology (IECT). Number of candidates skilled/trained in various courses during 1st quarter of 22-23 are as follows:

S. N.	Course Category	Number of Skilled
1	Degree/Diploma Level Courses (M.Tech/ BCA/MCA/ Diploma etc.)	1,779
2	Skilling Courses (Long Term) (O/A) Level in IT/Hardware etc., CABA-MDTP)	15,034
3	Skilling Courses (Short Term)	36,651
4	Digital Competency Programmes (Appeared in Examination)	1,12,149
Total No. of Candidates		1,65,613

9.8.2 Inauguration of NIELIT Centres in FY 22-23

9.8.2.1 Inauguration of 05 NIELIT Centres (Dimapur, Dibrugarh, Jorhat, Pasighat, Senapati) in North Eastern States



To fulfill the Hon'ble Prime Minister Shri Narendra Modi's vision of Digital North East India, Shri Rajeev Chandrasekhar, Hon'ble MoS (E & IT), inaugurated 05 NIELIT Centres (Dimapur, Dibrugarh, Jorhat, Pasighat, Senapati) in North Eastern States and also launched NECB 2.0 Project on 06th May, 2022. NIELIT Centres in North Eastern Region will provide opportunities like employment and entrepreneurship in addition to training services.

9.8.2.2 Inauguration of NIELIT Centre Leh and Extension Centre Kargil

Shri Ashwini Vaishnav, Hon'ble Union Minister (E&IT), virtually inaugurated NIELIT Centre Leh, Extension Centre Kargil and IT Enabled Incubation Centre for Handicraft and Handloom Sector in the presence of Sh. R K Mathur, Lieutenant Governor, Ladakh; Sh. Jamyang Tsering Namgyal, Hon'ble MP of Ladakh UT; Sh. Saugat Biswas, Commissioner Secretary IT, Ladakh UT and Dr. Madan Mohan Tripathi, DG NIELIT. Sh. Feroz Ahmad Khan, Chief Executive Councillor, LAHDC, Kargil and Dr. Jaideep Kumar Mishra, Additional Secretary, MeitY also attended the event online. Around 260 artisans from the entire Ladakh UT are currently participating in the Training on Packaging and Parcelling under IT Incubation Project for Handloom and Handicraft Sector



9.8.3 Capacity Building Projects

9.8.3.1 Development of Cyber Forensic Training cum Investigation Labs in North-Eastern States and Cloud based centralized Cyber Forensics Lab Infrastructures.

Project is sponsored by MeitY vide Administrative Approval F.No. 12(03)/2019-CSRD dated 25/03/2020 with financial support of Rs. 1692.20 Lakh over a period of five (05) Years. It is being implemented by NIELIT Kohima in the state of Nagaland. Under the Project, a Cyber Forensic Lab has been set up and a portal for tracking investigation process has been created. Also, approx. 1566 Stake holders have been trained.

9.8.3.2 Initiative for Cyber Security Aware Society in NE States

Project is sponsored by MeitY vide Administrative

Approval No. AAA.22/2/2022-CSRD-MeitY dated 22/02/2022 with financial support of Rs. 725.19 Lakh over a period of three (03) Years. Project is being implemented by NIELIT Kohima in the state of Nagaland. Under the project, process of content development, MIS development have been initiated.

9.8.3.3 Design and Development of EEG Based Real-Time Depth of Anaesthesia (DoA) Monitoring System

Project is sponsored by MeitY vide Administrative Approval No. 1(1)/2022-ME&HI MeitY dated 28/03/2022 with financial support of Rs. 4,55,23,000 over a period of three (03) Years. Project is being implemented by NIELIT Imphal in the state of Manipur. Under the Project, an MoU among collaborating institutes has been signed, publicly available EEG data and BIS values of 6000 patients collected, supply order of 50% of equipment placed through GeM.

9.8.3.4 Skill Development of Youths in Aspirational Districts in area of IECT leading to enhancement in Employability

Project is sponsored by MeitY vide Administrative Approval 1411/10/2019-HRD dated 28/02/2020 with Financial Support of Rs. 29.81 Crore over a period of three (03) Years. Project is being at 18 States in 60 Aspirational Districts. Under the project, a total of 6,084 candidates are registered and 5,130 candidates have been trained so far against the target of 21,600.

9.8.3.5 Empowerment of SC/ ST Youth & Women on Enhancement of Livelihood activities using IT & Tool and PMU for IT for Masses

Project is sponsored by MeitY vide Administrative Approval No.L-14011/3/2018-HRD dated 27/09/2018 with financial support of Rs. 2.41 Crore over a period of two (02) Years. The project is being implemented by NIELIT Kolkata in 2 selected districts of West Bengal i.e. Darjeeling and Alipurduar. Under the project, a total of 598 candidates have been trained of the total training target of 800 Candidates.

9.8.3.6 Training of visually impaired persons in Manipur on Course on Computer Concepts (CCC) of NIELIT

Project is sponsored by MeitY vide Administrative Approval No.L-14011/2/2018-HRD dated 26/03/2019

with financial support of Rs. 30.21 Lakh over a period of two years 6 months (2.5) Years. The project is being implemented by NIELIT Imphal in the state of Manipur. Under the Project, 123 visually-impaired candidates have been trained against the assigned target of 200.

9.8.3.7 Enhancement of livelihood activities for SC candidates of Delhi NCR through Capacity Building using ICT

Project is sponsored by MeitY vide Administrative Approval No. 14011/20/2019-HRD dated 16/01/2020 with financial support of Rs. 1,13,33,280/- over a period of two years. The Project is being implemented by NIELIT Delhi with an objective to promote inclusive growth among potential candidates from SC community as ICT professionals. Under the project, 1248 SC candidates have been trained so far out of the assigned target of 1250 SC Candidates.

9.8.3.8 Skill Training for Empowering SC/ST in Kerala & Karnataka

Project is sponsored by MeitY vide Administrative Approval No. 14011/18/2019-HRD dated 07/02/2019 with financial support of Rs. 1,92,48,450/- over a period of two years. The primary objective is to provide free training in job-oriented skill courses to 1500 candidates belonging to SC/ST category in the selected districts of Kerala and Karnataka. Under the project, 698 Candidates have been trained so far against the target of training of 1500 candidates.

9.8.3.9 Awareness Campaigns/Events for empowerment of Senior Citizens in e-Services through ICT Tools.

Project is sponsored by MeitY vide Administrative Approval No. 14011/11/12/2019-HRD dated 27.02.2020 with financial support of Rs. 532.98 Lakh over a period of two years. The Project is being implemented by NIELIT Aurangabad with an objective to bring awareness among elderly persons. Under the project, 7,000 seniorcitizens have been registered and 5,100 seniorcitizens have been trained so far against the target of 15,000.

9.8.3.10 IT enabled Incubation Centre for Handloom and Handicraft Sector

Project is sponsored by MeitY vide Administrative Approval No. 14011/18/2020-HRD dated 23/03/2020

with financial support of Rs. 708.79 Lakh over a period of three (03) years. The project is being implemented by NIELIT Centre at Leh with the objective of modernization of the development of looms and crafts with the added value of technological interventionset towards innovative products development. Under the project, a total of 353 artisans have been trained so far against the training target of 2100 artisans.

9.8.3.11 Capacity Building and Training in Emerging Technologies for Enhancing Employment Opportunities and Skilling

Project is sponsored by MeitY, vide Administrative Approval No. L-14011/11/202-HRD dated 26/03/2021 with Financial Support of Rs. 248.05 over a period of three (03) Years. The project is implemented by NIELIT Agartala to enable entrepreneurship & sustainable development among 1400 Youths of Tripura by providing Skill Development Training. Under the project, 652 youth have been trained so far against the training target of 1,400.

9.8.3.12 Digital Intervention of Handloom and Handicraft Sector for Livelihood enhancement of artisans of NE States

Project is sponsored by Meity, vide Administrative Approval No. L-14011/12/2021-HRD dated 30/03/2021 with financial support of Rs. 619.12 Lakh, over a period of three (03) Years. Under the project, a total of 655 candidates have been trained so far against the total training target of 6,920.

9.8.3.13 Capacity Building in IECT including training in Digital Skill sets and Current Industry Demanding Technologies for various sections of society in the NE States

Project is sponsored by MeitY vide Administrative Approval No. L-14011/33/2021-HRD, dated 02/02/2022 with financial support of Rs. 9232.76 Lakh over a period of two (02) Years. The aim of the project is to bring about overall upliftment of the socio-economic status of NE Citizens by creating a smart ecosystem with necessary IT education and skills. Under the project, a total of 48,428 candidates have been trained so far against the total training target of 1.66 Lakh.

9.8.3.14 ICT intervention in Travel & Tourism (T&T) Industry Through Capacity Building in New Age Digital Technologies

Project is sponsored by MeitY, Vide Administrative Approval No. L-14011/23/2021-HRD dated 18/02/2022 with financial support of Rs. 144.25 Lakh over a period of three (03) Years. The project is to empower the target group with Digital Skills including understanding of e-commerce, digital transaction and associated concepts to help them leverage the benefits of technology for Travel&Tourism. Under the project, Infrastructure Creation is 75% completed, VR Content for Tourist is 15% completed, Mobile application content is 30% completed, e-Content Development is 30% completed, LMS is 35% completed. Training of 36 stake holders has been completed.

9.8.3.15 Self-employment Capacity building of the Engineering pass-out students belonging to Scheduled Caste/Scheduled Tribe

Project is sponsored by MeitY vide Administrative Approval No. L-14016/2/2021-HRD dated 30/03/2021 with financial support of Rs. 443.73 Lakh over a period of Three (03) Years. Project is being implemented jointly by NIELIT Patna, Haridwar and Chennai. Under the project, 122 Candidates (Haridwar- 57, Patna-15, Chennai-50) have been trained.

9.8.3.16 Capacity Building for unemployed ST youths of Manipur in Assembly and Repair & Maintenance of Solar Lighting system, Household Electronics/ Electrical & IoT Devices

Project is sponsored by MeitY vide Administrative Approval No. L-14011/10/2021-HRD dated 24/06/2021 with financial support of Rs. 50.43 Lakh over a period of 1.5 Years. Under the Project, 193 candidates have been trained so far against the target 250.

9.8.3.17 Creation of IT industries ready Software professionals through awareness, motivation and experts training for unemployed Graduate/Diploma holders in Manipur

Project is sponsored by MeitY vide Administrative Approval No. L-14011/05/2022-HRD dated 29/03/2022 with financial support of Rs. 88.6 Lakh over a period of One and half year (1.5) year. The main objective of the proposal is to provide 6-months training to 100 nos. of

unemployed IT Graduate /Diploma holder of Manipur to make them industry ready Software Professionals. Under the project, training of Thirty-Seven (37) Candidates is undergoing.

9.8.3.18 Work Based Learning (WBL) programme to Strengthen and Empower SC/ST/Women/EWS Graduates Engineers through MeitY Institutions

The Project is sponsored by MeitY vide Administrative Approval No. L-14011/19/2021-HRD dated 9/03/2022. The main objective of this programme is to provide an opportunity to SC/ST/EWS/Women candidates to acquire Technical Knowledge Expansion, Real time Working Skills, Technology Use, Problem Solving Skills, Reasoning, Analytical Thinking, Interpersonal Skill etc. on PAN India basis. Under the Project, application has been invited from candidates for training.

9.8.3.19 FutureSkill Prime project (Programme for Re-skilling/Up-skilling of IT Manpower for Employability)

Project is sponsored by MeitY vide Administrative Approval No. L-14011/2/2018-HRD dated 26/03/2019 with financial support of Rs. 433.21 Crore over a period of Three (03) Years. The project is being implemented jointly by NIELIT and C-DAC on PAN India basis. Under the project, three (03) NELIT Centres are working as a Resource Lead Centre and 14 NELIT Centres are working as a Resource Co-Lead Centre in emerging technologies.

9.8.4 R&D, Innovation & Design

9.8.4.1 Smart Hardware Remote Facility - SMDP-IV / 'Chips to Start-Up'



NIELIT Centre Calicut has been awarded project titled "Special Manpower Development Programme for Chips

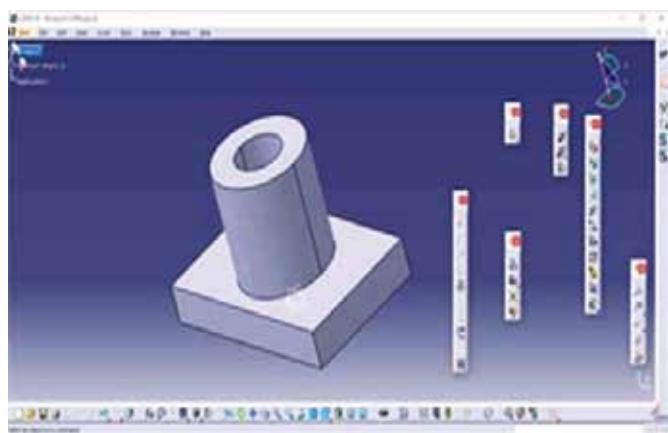
to Startup" (SMDP - C2S) to meet the growing demand on self-reliance in Semiconductor Technology in the country. In addition to be one of the participating institute under this project, MeitY has sanctioned Rs.600 lakhs to establish a Remote Hardware Training Facility at NIELIT Calicut Centre. A Remote Lab has been set up and utilized by the participants and faculties from all over India.

9.8.4.2 NIELIT Centre Aurangabad is Runners-up in Grand Challenge Contest 2021

NIELIT Centre Aurangabad submitted a total of 3 product designs at the Grand Challenge Contest 2021 organized by CDAC, Noida in association with India Cellular & Electronics Association (ICEA) and MeitY. All the 3 project P-005 (To Design a Low-Cost Smart Light System), P-002 (To Design a Low-Cost USB Charger) and P-003 (To Design a Low-Cost Wireless Charger) were declared as runner-up in the respective categories. The Jury Members emphasized that these ideas have high potential and hence the ideas should be implemented in the Prototype Phase.

9.8.4.3 NIELIT Centre Chennai developed Virtual Lab for CATIA-V5

NIELIT Centre Chennai has developed a novel Hybrid Virtual Lab facility using licensed VM ware vSphere Std Ed. and Apache open source software. This Virtual Desktop Infrastructure (VDI) concept can deliver even HPC performance like facility to students to do their lab Storage can be increased on-demand basis (Eg.: 128 GB or more RAM, 94 core v CPU, multi virtual NIC, etc. to each student), where the students registered for the course can remotely access the CATIA-V5 Software from anywhere via browser.



9.8.5 Synergy through Collaborations &MoUs

9.8.5.1 Training in Advanced Capabilities in Electronics Design & Manufacturing (TRIAC-EDM):

Memorandum of Understanding (MoU) for "Joint Training Program in the field of Electronics and IT" for a period of five years was signed between National Institute of Electronics and IT (NIELIT) and Institute for Information Industry (III) in "India Taiwan Industrial Collaboration Summit" held on 17th October 2019 with the core objective of expanding and enhancing cooperation in training and skill development in the field of Electronics and Information Technology through the exchange of institutional experience, training and skill development. Project has been approved vide No. W-13/4/2019-ESDM-MeitY dated 09.06.2020 with total budget outlay of Rs. 3,08,92,365 and GIA/MeitY's contribution of Rs.1,41,59,365. In next 5 years, 5 training programs (one program in each year) will be conducted.

For the first batch, Project "Training in Advanced Capabilities in Electronics Design & Manufacturing (TRIAC-EDM)" was launched by Joint Secretary, Electronics (MeitY) on 14th October, 2020. The first training program is in the area of Mobile Communication. 71 participants/ candidates were shortlisted for online theory sessions. The online theory sessions were conducted by Taiwanese experts and sessions got completed in July 2021. Out of the 71 participants, 43 participants have passed the theory part. Practical hands-on training is on halt due to travel restriction in Taiwan. As soon as travel curbs are relaxed, participants will be further shortlisted for practical hands on training. In addition, to kick start the second batch of the training program, preparatory work has been initiated.

9.8.5.2 Agreement with National Council for Vocational Education and Training - NCVET



NIELIT has signed an agreement with National Council for Vocational Education and Training - NCVET in the presence of Dr. Nirmaljeet Singh Kalsi, Chairperson, NCVET, Dr. Madan Mohan Tripathi, DG, NIELIT & other senior officials of NIELIT & NCVET. NIELIT has been recognized by NCVET as its Awarding Body & Assessment Agency to award certificates to trainees for NCVET approved qualification.

9.8.5.3 Agreement with JDT Bangalore

NIELIT Calicut has signed the ToT agreement with JDT Bangalore for Commercialization of indigenous Color Doppler Ultrasound Scanner NIELIT Calicut has signed the ToT agreement with JDT Bangalore for commercialization of indigenous color Doppler Ultrasound scanner in the presence of Shri. Alkesh Kumar Sharma, Secretary, MeitY, Dr. Madan Mohan Tripathi, DG, NIELIT, and other senior officials during Digital India Week 2022.



9.8.5.4 MoU with ESCI, Hyderabad

NIELIT signed an MoU with ESCI, Hyderabad for collaborations in terms of conducting various training programs & Examinations and R&D projects. Dr. Madan Mohan Tripathi, DG, NIELIT and Dr. G Rameshwar Rao, Director, ESCI exchanged the signed MoU.



9.9 Software Technology Parks of India (STPI)

9.9.1 Introduction

Software Technology Parks of India was set up in 1991 as an autonomous society under the Ministry of Electronics & IT (MeitY), 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 startup units. Apart from this, STPI is also executing various initiatives i.e. Centres of Entrepreneurship (CoEs), Next Generation Incubation Scheme (NGIS) etc. for promotion of startup ecosystem in the country.

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 the software industry and growth of Start-Ups and SMEs without any locational constraints. As on 31st August, 2022, 4736 units are registered with STPI and 68 units are registered under EHTP scheme.

Till second quarter of FY 2022-23, IT/ITES export from STPI registered units stands at Rs. 2,75,168.78 crore (tentative) and Electronics Hardware export of Rs.1,989 crore (tentative) under EHTP scheme.

9.9.2 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 date, a total of 62 STPI centres/ Sub-centres are operational across the country, out of which 54 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-the-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/EHTP Schemes. STP scheme provides these units with various benefits 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-the-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 organizations 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.

9.9.3 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 job opportunities for the local youths of smaller towns by setting up BPO/ITES operations and also to attract investments in the respective regions for all round development. These schemes are helping in creating right ecosystem required for the growth of smaller towns and bringing prosperity to those locations.

The schemes provide financial support along with several special incentives like encouraging employment to women and specially enabled persons, setting up operations at other than State Capitals, promoting local entrepreneurs etc. up to Rs 1 lakh/ seat in the form of Viability Gap Funding (VGF). 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, as on 31st August 2022, 227 BPO/ITES units of 154 companies on 44,092 seats are either operational or completed tenure, which are distributed across 93 locations covering 21 States/ UTs. These BPO/ITES units have reported employment of 50,187 persons. Viability Gap Funding (VGF) of amount Rs 94.4 crores have already been disbursed/approved to units under IBPS.

Under NEBPS, as on 31st August 2022, 19 BPO/ITES units of 16 companies on 1,451 seats are either operational or completed tenure, which are distributed across 11 locations covering 6 States/ UTs. These BPO/ITES units have reported employment of 823 persons. Viability Gap Funding (VGF) of amount Rs 0.82 crores have already been disbursed/approved to units under NEBPS.

9.9.4 Centres of Entrepreneurship (CoEs)

To ensure India builds leadership in the emerging technologies such as IoT, BlockChain, FinTech, Artificial Intelligence, Augmented & Virtual Reality, Medical Electronics & Healthcare, Gaming & Animation, Machine

Learning, Data Science & Analytics, Cyber Security, Chip Designing, ESDM, etc. and to build next wave of budding entrepreneurs, CoEs are being setup by STPI in collaborative approach in different domain across the country. Each CoE acts as single-window facilitation center to extend requisite plug & play space, lab support, funding, mentoring, industry & customer connect. The CoEs have dedicated chief mentors & eminent experts who would also act as brand ambassador of particular CoE.



The vision is to create more than 25 such domain specific CoEs in diverse areas/emerging technologies to stimulate technological innovation and promote entrepreneurship. With this vision, STPI has already launched 20 domains focused CoEs in collaboration with suitable partners in various parts of the country and 04 CoEs will be launched soon.

As on 31.08.2022, 24 STPI CoEs are at various stages of implementation and operations.

Overview and status of CoEs:

Electropreneur Park-An ESDM CoE at New Delhi: 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's aims to support 50 startups in

ESDM space and to create at least 5 global companies over a period of five years. The park focuses 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 August 2022, total 9 seasons have been completed wherein 56 startups have been supported. Total estimated valuation of all startups is INR 459 crores. 56 IP have been filed by startups along with development of 52 products and 90 prototypes. 16 startups have been funded more than Rs 15 Lakh while 24 start-ups are funded less than Rs 15 lakhs.

IoT OpenLab- A CoE in Internet of Things at STPI Bengaluru: To support innovative IoT startups working across the spectrum of IoT applications, STPI has established an IoT Open LabCoE at Bengaluru in partnership with MeitY, Arrow Electronics, and several other stakeholders. The IoT OpenLab intends to support & nurture 500 startups over a period of 5 years.

Till 31st August 2022, 33 startups have been onboarded. So far, 9 products & 18 prototype have been created.

FINBLUE - A CoE in FinTech at STPI Chennai: To support innovative fintech startups working across financial sectors, FINBLUE CoE has been established at Chennai in collaboration with MeitY, Govt of Tamil Nadu, IIT Madras, TiE Chennai and various industry partners such as Intellect Design, NPCI, Yes Bank, PayPal, Pontaq Ventures, RBS, Torus Innovations etc. This CoE targets to onboard 58 start-ups over a period of 5 years with special focus on areas like Trading, Banking, Lending, Remittance, Insurance, Risk & compliance, Wealth advisory, financial inclusions, Saving, Payment and alike.

Till 31st August 2022, FINBLUE has onboarded 23 startups. So far, 90 products and 56 prototype have been created.

Electropreneur Park- An ESDM CoE at STPI Bhubaneswar: Replicating the successful model of Electropreneur Park at New Delhi, establishment of EP-Bhubaneswar, an ESDM CoE with the objective of creating a holistic ecosystem to promote ESDM

innovation, R&D and create Indian intellectual property in the eastern region of the country was initiated. Subsequently, to support innovative start-ups having special focus on areas such as Energy, Process Control & Industrial Automation, Education, EP CoE has been established in collaboration with MeitY, Government of Odisha, IIIT Bhubaneswar and IESA. It aims to support 40 start-ups over a period of 5 years.

Till 31st August 2022, 21 startups have been onboarded. So far, 21 products & 51 prototype have been created.

NEURON– A CoE in AI/Data Analytics, IoT & AVG at STPI Mohali (“Start-up Punjab Hub @ STPI” (SPHS)): Neuron has been established in collaboration with MeitY, Govt. of Punjab, ISB-Mohali, PTU and industry. It is targeted to support 250 start-ups over a period of 5 years in key domains like AI, ML, DA, IoT & Virtual Reality to solve real world problems in Education, Agriculture, Healthcare etc.

Till 31st August 2022, 36 start-ups have been onboarded. So far, 20 products & 53 prototypes have been created.

MOTION – A CoE in Autonomous Connected Electric Shared (ACES) Mobility at STPI Pune: The future of automotive is electric, shared, autonomous, and connected. Accordingly, a CoE in “ACES Vehicles” called “MOTION” has been established at Pune in collaboration & partnership with MeitY, Government of Maharashtra, M/s. Tata Motors, M/s. Kinetic, M/s. Visteon, M/s. MathWorks India, M/s. Intel, College of Engineering Pune, and associations like ARAI, SAE-India, TiE-Pune etc. It is targeted to incubate 50 domain-specific start-ups over a period of 5 years in Autonomous, Connected, Electric & Shared (ACES) Mobility.

Till 31st August 2022, 28 start-ups have been onboarded. So far, 34 products and 73 prototypes have been created.

VARCoE – A CoE in Virtual & Augmented Reality at IIT Bhubaneswar: With an intention to create an ecosystem for carrying out R&D in immersive visualization, give impetus to R&D, Incubation, IP Creation, Product Development, Skill development and Entrepreneurship in AR, VR and allied fields, the VARCoE has been set-up at IIT Bhubaneswar. To further research & development of tools and technologies along with nurturing start-ups in the field of Augmented Reality and Virtual Reality, a Centre of Entrepreneurship has been established at IIT-Bhubaneshwar. This CoE targets 300 incubatees including startups and individual researchers over

a period of 5 years in Health, Art and architecture, Transport, Construction, Tourism, Entertainment, and Education. The VARCoE has started operations with first set of projects working on various applications of VR/AR admitted.

Presently, nine major projects on AR&VR applications in various domains involving 12-15 highly qualified faculty and researchers of IIT Bhubaneshwar are in progress.

IMAGE - A CoE in Gaming, VFX, Computer Vision and AI at STPI Hyderabad: IMAGE has been established at Hyderabad in collaboration with MeitY, Govt. of Telangana, academia, & industry partners like HYSEA (Hyderabad SW Enterprises Association) & TVAGA (Telangana VFX, Animation & Gaming Association). This CoE targets 140 start-ups in the said domain over a period of 5 years.

Till 31st August, total 20 start-ups have been onboarded. 48 products & 31 prototypes have been created.

APIARY- A CoE in Blockchain at STPI Gurugram: APIARY has been established in collaboration with MeitY, STPI, STPINEXT, Govt. of Haryana, Padup Venture Private Limited, IBM, Intel, GBA and FITT. This is an initiative, to identify and evaluate promising start-ups in the field of Blockchain Technology that will be hosted in the STPI Gurugram Incubation Facility. This CoE targets 100 innovative start-ups over a period of 5 years.

Till 31st August 2022, 26 start-ups have been onboarded. So far, 12 products and 37 prototypes have been created.

MEDTECH- A CoE in Medical Electronics & Health Informatics at SGPGI Lucknow: Given the large dependence of India on imports and the fact that demand of medical products & services is going to rise exponentially, the MedTech CoE has been established at SGPGI, Lucknow in collaboration with MeitY, Government of UP, SGPGI, AMTZ and AiMed to boost start-ups in this field and contribute to “Make-in-India”. The MedTech CoE targets to support 50 start-ups over a period of 5 years.

Till 31st August 2022, 16 start-ups have been onboarded. 12 products have been created.

OCTANE CoEs under Phase-I: As per the objective laid down in the vision document for Digital Northeast 2022, STPI was assigned with the responsibility to setup CoEs & Start-up Innovation Zones (SIZs) in each of the state of northeast India. Accordingly, with support of MeitY, STPI

has established eight CoEsin emerging technologies with SIZs along with e-commerce facilitation in capital city of each Northeastern state of India (NER) in phase-wise manner. The network of 8 nos. of CoE+SIZ in NER is named as "OCTANE".

Under Phase-I, 3 CoEs having technology/sector focus viz. IoT in Agriculture at STPI Guwahati, Animation at STPI Shillong, Emerging Technology AR/VR at Imphal have been established. CoEs in Phase-I have a target to incubate 164 start-ups over a period 5 years.

Till 31st August 2022, total 21 start-ups have been selected. 8 start-ups have been onboarded and the onboarding of remaining start-ups is underway.

OCTANE CoEs under Phase-II: Under Phase-II, 5 CoEs in five locations of NER having technology sector viz. Data Analytics & AI at Agartala, Gaming & Entertainment at Aizawl, GIS application (including drone technology) at Itanagar, IT application in Graphic Design at Kohima and IT application in Healthcare & Agritech at Gangtok have been established. CoEs in Phase-II have a target to incubate 203 start-ups over a period 5 years.

Till 31st August 2022, total 25 start-ups have been selected. 4 start-ups have been onboarded and the onboarding of remaining start-ups is underway.

Atal Incubation Centre (AIC) at STPI Bengaluru: Under AIM, STPI has established an Atal Incubation Centre (AIC) at Bengaluru in collaboration with NITI Aayog. The AIC has focus on IoT and its applications in Health & Pharmaceuticals, E-Commerce, Big Data, Artificial Intelligence etc.

It is targeted to support about 65 innovate disruptive technology start-ups over a period of 5 years. The CoE was launched on 09.07.2021 along with the Open Challenge Program.

Till 31st August 2022, 17 start-ups have been onboarded. 16 products & 21 prototypes have been created.

FASAL (Fostering AgriTech Startups for Augmenting Livelihood): A CoEinIoT in Agriculture at Dr. Panjabrao Deshmukh Krishi Vidyapeeth (PDKV), Akola: The CoE has been set up in collaboration with partners comprising of leading stakeholders from Government, Academia, Industry & Industry Associations such as MeitY, STPI, Dr. PDKV Akola, ICAR-Indian Agricultural Research Institute (IARI) New Delhi, Agriculture Insurance Company of India Ltd. (AIC), KVAK Akola, College of Engineering &

Technology Akola, Sat Sure Analytis India Pvt. Ltd. Bangalore, Amazing Aerial Solutions Pvt. Ltd. Pune, ioCare Pune, Indian Society of Agricultural Engineers (ISAE) New Delhi and TiE Mumbai. This CoE targets 25 start-ups in the agri-domain over a period of 3 years.

Till 31st August 2022, 19 start-ups have been onboarded.

A CoE in Efficiency Augmentation at Bengaluru: A CoE on efficiency augmentation is being setup in collaboration with Dept. of IT, BT & ST, Government of Karnataka, Software Technology Parks of India, STPINEXT Initiatives, Hewlett Packard Enterprise (HPE), Vidyarthi Shikshana Seva (VSS) Trust, Yuvaka Sangha and India Electronics & Semiconductor Association (IESA). The CoE is the first of its kind in India which is an immersion of innovation, creativity and new business development for augmentation of the efficiency in all the business verticals, service sector & also in Government operations/projects leveraging emerging Industry 4.0 technologies. The CoE intends to support & nurture 100 start-ups (90 Physical and 10 Virtual) over a period of 5 years which are developing products and/or services/ solutions around "EFFICIENCY AUGMENTATION". The CoE is getting ready for launch.

Smart Agri CoE at Patna and Satellite centre at Pusa: A CoE on SmartAgri at Patna and the satellite centre at RPCAU, Pusa is being set up in collaboration with MeitY, Govt. of Bihar, Dr. Rajendra Prasad Central Agricultural University, Pusa, ICAR-RCER Patna and NIT, Patna. This CoE targets 54 start-ups in the agri-domain over a period of 5 years. The CoE is getting ready for launch.

KALPATARU at Visakhapatnam: A CoE on Industry 4.0 at RINL, Visakhapatnam is being set up in collaboration with MeitY, Department of IT, Electronics & Communications (Govt. of AP), Rashtriya ISPAT Nigam Ltd. Visakhapatnam, STPI, STPINEXT and other partners from Academic & Industry partners and called as KALPATARU. This CoE targets 175 start-ups in industry 4.0 sectors over a period of 5 years.

The CoE is expected to be launched in September 2022.

Emerging Technology CoE at Bhubaneswar & Satellite Centre at BPUT, Rourkela: ACoE on Emerging Technology at Bhubaneswar & Satellite Centre at BPUT, Rourkela is being set up in collaboration with MeitY, Electronics & IT Department (Government of Odisha), STPI, STPINEXT, Biju Patnaik University of Technology, Odisha, Rourkela and IIIT Bhubaneswar. This CoE

targets around 150 startups in technologies like Analytics, Machine Learning, Cyber Security Artificial Intelligence (AI) over a period of 5 years. The CoE is getting ready for launch.

9.9.5 Next Generation Incubation Scheme (NGIS)

NGIS has a vision to drive the rise of India as a Software Product Nation so as to make it a global player in development, production and supply of Innovative, Efficient and Secure Software Products (including embedded software) thus facilitating the growth across the entire spectrum of ICT sector as envisioned in the National Policy on Software Products (NPSPI)-2019. NGIS is focusing on 12 Tier-II locations of India viz. Agartala, Bhilai, Bhopal, Bhubaneswar, Dehradun, Guwahati, Jaipur, Lucknow, Prayagraj, Mohali, Patna & Vijayawada with an aim to support 300 start-ups/ Entrepreneurs/SMEs in the field of IT/ITeS/ESDM over a period of 3 years.

NGIS's partners & stakeholders include MeitY, STPI etc. as well as a vast spectrum of industry, academia, investment & funding agencies to support the innovative product-focused start-ups in the most comprehensive manner. So far, STPI has selected 261 startups through 3 challenge programs (CHUNAUTI - Challenge Hunt Under NGIS for Advanced Uninhibited Technology Intervention). 4th Edition of CHUNAUTI has been launched with 11 contests by 11 STPI Directorates. Screening, Evaluation & Selection process for CHUNAUTI4.0 is underway.

9.9.6 Modified Electronics Manufacturing Cluster (EMC 2.0) Scheme

The EMC 2.0 scheme was notified on 1st April 2020 with an implementation period of 8 years (i.e. up to March 2028) and launched by Hon'ble Union Minister for Electronics & IT, Communications, Law and Justice on 2nd June 2020. The objective of the scheme is to create a comprehensive supply chain/ecosystem for strengthening electronics manufacturing base and attract big Manufacturing units to set up production along with their supply chain. Total budgetary support for Scheme is Rs. 3,762 crores. STPI is the Project Management Agency (PMA) for implementation of the scheme. As on 31st March 2022, 6 applications have been received on EMC 2.0 portal from Haryana State Industrial and Infrastructure Development Corporation (HSIIDC), Andhra Pradesh Industrial Infrastructure Corporation (APIIC), Maharashtra Industrial Development (MIDC), State

Infrastructure and Industrial Development Corporation of Uttarakhand Limited (SIIDCUL) and Telangana State Industrial Infrastructure Corporation Limited (TSIIC) and Karnataka Industrial Area Development Board (KIADB).

Out of 06 applications received, approval for APIIC and HSIIDC has been accorded. The other 04 applications are under process.

Moreover, 07 nos. of Expression of Interest (EoI) have been received from the state of Punjab, Himachal Pradesh, Bihar, Tamil Nadu (03 nos.), and Karnataka (01 nos.).

9.9.7 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.



18th India Innovation Summit 2022 at Bengaluru

Some of the major events in which STPI participated/ sponsored include:

- Tiecon-Mumbai 2022 held on 10th June 2022 at Jio World Convention Centre, Mumbai
- India Innovation Summit 2022 held during 25-27 August 2022 at Hotel Taj West End, Bengaluru
- Technology Sabha 2022 held during 25-27 August 2022 at Hotel The Oberoi Grand, Kolkata
- Global AVGC Summit "Summit FX 2022" held during 29-31 August 2022 at Hotel Lalit, Delhi
- Indo-US Economic Summit held during 12-13 September 2022 through virtual platform

9.10 Digital India Corporation (DIC)

9.10.1 Introduction

Digital India Corporation (DIC) has been setup & promoted by Ministry of Electronics and Information Technology (MeitY), Govt. of India as a not-for-profit (Section 8 of the Companies Act, 2013) Company. The Company leads & guides in realizing the vision, objectives and goals of the Digital India program. It provides the strategic support to Ministries / Departments of Centre / States to carry forward the mission of Digital India by way of capacity building for e-Governance projects, promoting best practices, encouraging Public-Private Partnerships (PPP), nurturing innovations and technologies in various domains. The company is also managing Project Management Unit (PMU) for MeitY's Visvesvaraya PhD Scheme in Electronics & IT.

Achievements during FY 2022 – 2023 (up to Oct 2022)

9.10.2 Poshan Tracker

“Poshan Tracker” is an overarching system, providing facilities, services and inter-linkages, and thereby also promotes real time data with analytics. Poshan Tracker management application provides a 360-degree view of the activities of the Anganwadi Centre(AWC), service deliveries of Anganwadi Workers (AWWs) and complete beneficiary management for pregnant women, lactating mothers and children. The system enables real-time monitoring and tracking of all AWCs, AWWs and beneficiaries on the defined indicators.

Mission POSHAN 2.0 is an Integrated Nutrition Support Programme. It seeks to address the challenges of malnutrition in children, adolescent girls, pregnant women and lactating mothers through a strategic shift in nutrition content and delivery and by creation of a convergent ecosystem to develop and promote practices that nurture health, wellness and immunity. Poshan 2.0 will seek to optimize the quality and delivery of food under the Supplementary Nutrition Program.

Poshan Tracker contribute to human capital development of the country; address malnutrition challenges; promote nutrition awareness and good eating habits for sustainable health & well-being and address nutrition related deficiencies through key strategies. Under the programme, nutritional norms and standards and quality and testing of THR will be improved and greater stakeholder and beneficiary participation will be promoted besides

additional community food habits.

Poshan Tracker application is multilingual in order to serve the heterogeneity across the country and enable the user-friendly aspect of the software usage. Two languages are supported for each State/UT and a total of 22 languages are available.

Impact of Intervention

Digital Infrastructure under the “Poshan Tracker” rolled out by MoWCD on 1st March 2021 through as a governance tool, has strengthened and brought transparency in nutrition delivery support systems. Technology under Poshan Tracker is being leveraged for:

- Dynamic identification of stunting, wasting, under-weight prevalence among children;
- Last mile tracking of nutrition service delivery
- mapping all AWCs for GIS services

Poshan Tracker Application serves as a job aid tool and provides a monitoring solution, eliminating ten out of the 11 registers, and enhancing service delivery by AWWs. By easing reporting, the application empowers the Central Ministry, State Governments, as well as various district and block level personnel to undertake monitoring of activities at the ground level and design appropriate interventions.

The data collected at different levels is aggregated in the application ecosystem and web-based dashboards and reports are provided to users in order to facilitate quick and informed decision-making from the data captured. The dashboard displays aggregate and beneficiary data from National to the AWC level.

The drilling down of the report can happen to the level of actual rawdata of beneficiaries.



Total number of Beneficiariesas on Oct 31, 2022-

Sr. No.	Category	Consolidated (as on Oct 31, 2022)
1	Pregnant Women	77,74,924
2	Lactating Mothers	49,18,931
4	Children (0-6 Months)	42,63,083
5	Children (6 Months-3 Years)	4,08,08,594
6	Children (3-6 Years)	4,07,30,529
	Total	9,84,96,061

Total number of AWC and AWWs as on Oct 31, 2022:

Total AWCs sanctioned	Total AWC Operational	AWW	AWH
1399697	1397177	1362262	662161

New Features introduced in Poshan Tracker:

- Verify Aadhaar section added on Homepage
- 3 languages added in the mobile app
- New Homevisit scheduler based on Formula provided by Word bank
- Comprehensive dashboard for AWW to monitor growth of the child, supplementary nutrition due and provided.
- Feedback from beneficiary regarding services provided.(SMS)
- Beneficiary interface to login and view the services provided.
- Provide the history of all services provided in chronological order.
- Provide API's to all States for their respective data through API Setu.

Interactive Information Dissemination System (IIDS) for National Commission for Women (NCW) Women Help Line



In order to facilitate the women victims and provide them psychological support, the National Commission of Women (NCW) has taken initiative to start a helpline. DIC has been providing technical support to NCW for developing and hosting the helpline platform which is based on IIDS platform of DIC. A dedicated helpline number 7827170170 has been provided for the purpose. Any woman or girl (above 18 yrs.) in distress within public or private sphere of life (aggrieved woman) seeking redressal /help can call to the helpline.

The NCW 24/7 helpline was inaugurated by the Union Minister for Women and Child Development Smt. Smriti Zubin Irani on 27th July 2021. This helpline is being operated from NCW premises which is located in New Delhi with the technical support from DIC. During the year, 1,03,270 calls have been received from women from across the country on NCW women helpline.

9.10.2.1 Interactive Information Dissemination System (IIDS)

IIDS is a pull & 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 & back).

The details can be seen in Chapter-2.

IIDS Deployments during the year 2022 - 23 are as given below:

A. Mobile based Agro Advisory System in Meghalaya - 1917 iTEAMS

Glimpses from Meghalaya



DIC signed a MoU with Govt. of Meghalaya (GoM) for implementation of IIDS with their integrated program for Connecting Farmers to Market viz. 1917 iTEAMS. 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 program implementation.

During the year, 23,595 new farmers from Meghalaya were registered under the project and with this the total no. of registered farmers has reached to 1,22,307. Total 276 queries of the farmers were resolved by 1917 iTEAMS through the system. During the period 1093 requests received from farmers to buy-sell their produce (Buy – 18 and Sell - 24) and 5,79,215 Ton of farm produce transported in 445 trips as per the requests received from farmers.

B. Mizoram (Ran VulhtuteThian):

The project has been taken up in collaboration with College of Veterinary Sciences & Animal Husbandry, Central Agricultural University (CAU), Aizawl, Mizoram to empower the farmers (esp. livestock farmers) by providing right information at right time through mobile based agro-advisory system. The project is supported by eGovernance Division, MeitY.

The project has been taken up in collaboration with College of Veterinary Sciences & Animal Husbandry, Central Agricultural University (CAU), Aizawl, Mizoram to empower the farmers (esp. livestock farmers) by providing right information at right time through mobile based agro-advisory system. The project is supported by eGovernance Division, MeitY.

During the period, following activities were undertaken: 11 Awareness programme; 5 Health Camps and 2 Training programme were conducted benefiting 610+ farmers. During the year, 208 new farmers were registered for the services and with this 7,085 farmers are now registered under the project. Total 3,250 calls received on the Toll Free number and 4,079 outbound calls were made for registration, enquiry and advisory related services. 3,809 text messages (consuming 2,33,609 SMS) and 19 voice messages (consuming 83,349 voice messages) in local language were pushed to farmers on various aspects of agriculture and animal husbandry.

Glimpses from Mizoram



One Day Health Camp at Rulpuihlim Village, Mamit, Mizoram



Free Animal Health Camp at Sialhawk Village, Khawzawl, Mizoram



Awareness Camp at Sumsuih Village, Aizawl, Mizoram



Training Programme on Scientific Management Practices and Techno- Economic Empowerment of Pig Farmers



Distribution of Agricultural Inputs at Sesawng Village, Aizawl, Mizoram



Free Anti Rabies Vaccination Drive at Sairang Village,
Mizoram



Black Quarter Vaccination, Haemorrhagic Septicemia
Vaccination Cum Health Camp in Cattle & Dewormer,
Multivitamins, Probiotics Supplement Distribution Programme.

C. Tripura (Matsya Varta):

The project has been taken up in collaboration with College of Fisheries, Central Agricultural University (CAU), Tripura to empower the farmers (esp. fish farmers) by providing right information at the right time through mobile based agro-advisory system.

During the period, following activities were undertaken: Total 16 awareness programme, 1 Health Camp, 6 Training were conducted benefiting 642 farmers. During the year, 575 farmers were registered and with this total 9,030 farmers have been registered under the project. 1,959 text messages (consuming 6,06,393 SMS) and 11 voice messages (consuming 38,856 voice messages) were sent to registered farmers in local language on various aspects of agriculture and animal husbandry. Total 499 calls were received on Toll Free number and 5,815 outbound calls were made for registration, advisory and enquiry purpose.

Glimpses from Tripura



Awareness and Sensitisation Programme at Satdubia Village
(Mohanpur Block)



Training on Breeding Techniques of Angel Fish and Gourami Fish and Aquarium Management.

D. Kisan Sarathi: Implementation of 'Interactive Information Dissemination System (IIDS) with Indian Council of Agricultural Research (ICAR)

The project has been taken up in partnership with Indian Council of Agricultural Research (ICAR) with an objective to showcase the Interactive Information Dissemination System (IIDS) model of DIC for adoption and promote as a new 'Brand' with ICAR for replication across India.

To showcase the IIDS model for adoption and promote as a new 'Brand' for replication across India, "KisanSarathi" brand name has been finalized. In order to facilitate farmers by providing location specific 'Demand Based Tele Agriculture Advisories' in their local languages, the second phase of Kisan Sarathi has been initiated though all the Krishi Vigyan Kendras (KVKs) of the remaining states and UTs including the first phase 6 States viz. Uttar Pradesh, Madhya Pradesh, Maharashtra, Bihar, Andhra Pradesh and Telangana.

Kisan Sarathi has been launched jointly by Union Minister of Electronics & Information Technology Shri Ashwini Vaishnav jointly with Union Minister for Agriculture and Farmers' Welfare Shri Narendra Singh Tomar in the presence of Union Minister for Fisheries, Animal Husbandry and Dairying Shri Parshottam Rupala, Union MoS for Agriculture and Farmers' Welfare Shri Kailash Choudhary and Ms. Shobha Karandlaje on 16th July 2021. Remaining states included from May 2022 onwards.



Awareness and Sensitisation Programme at Uttar Bamutia Village (Bamutia Block)

Following are the progress of the project during the period:

Software platform has been set-up on cloud and the IVRS has been customized to suit the requirement of Kisan Sarathi call flow.

Toll Free Numbers 14426 and 1800-123-2175 has been taken for Kisan Sarathi.

During the period 453 new KVKS added, with this the total of 738 Krishi Vigyan Kendra (KVKS / District Agricultural Advisory and Transfer of Technology Centers (DAATCs) have been enrolled.

In this period 2040 KVKS experts enrolled with this total of more than 2,930 subject matter experts are also onboarded for implementation of Kisan Sarathi from all states and UTs.

Farmers' registered in the period 27.13+ Lakh, with this total of 45.51 Lakh + farmers have been on-boarded in the system so far.

Glimpses for KisanSarathi



PusaKrishiVigranMela(2022), IARI Campus, New Delhi



KisanSarathi at Digital India Week –AzadikakaAmrustav –
Gadhinagar, July 2022



Kisan Sarathi Home Page

During this period 29,446 the advisories are being delivered in Hindi, Marathi and Telugu to the farmers. So far, 64,000+ calls have been received from the farmers. 5,600+ outbound calls have been made to the farmers.

During the period 98,967 text messages sent (consumed messages 13.24 Crore)

Total 17 training program for KVKS have been conducted jointly by ICAR and DIC team on the operations of the IIDS platform. Every Friday conducting interaction session, along ICAR team with all KVKS to resolve the issue in fields and new trainings.

9.10.2.2 Customization, Enhancement & Deployment of Digital Solutions for Empowerment of Citizens of North-East India

DIC as an integrated approach with an objective to empower the citizens of North-East India by providing digital solutions to ease their job and enhance their productivity & livelihood with special focus on Farmers, Artisans, Weavers and Teachers (special schools). The project is focused on deploying DIC technologies / applications in the area of ICT in Agriculture, Embroidery & Weaving and Differently Abled which have lots of potential for large scale deployment in all the North-Eastern States for the benefits of farmers, women, embroidery artisans, weavers and teachers at special schools.

Total 39 Awareness Programme and 15 Trainings were conducted benefitting 2170+ farmers. During the year, 3108 farmers were registered and with this total 7763 farmers have been registered under the project. 4193 text messages (consuming 25,96,084 SMS) and 244 voice messages (consuming 5,41,810 voice SMS) were sent to registered farmers in local language on various aspects of agriculture and animal husbandry. 1178 calls were received on Toll Free number and 7849 outbound calls were made for registration, advisory and enquiry purpose.

Glimpses from Manipur



Awareness and Sensitization Program for Loumisingi Paojel at
Chairel Mangjing, Bishnupur District, Manipur



Three Days Training Program on Pig Farming and its Management at Lamshang Bazar, Imphal West



Three Days Training Program on Low Cost Oyster Mushroom Production at Pangaltabi, Kakching District



Field visit at Broiler farm Pangei village, Imphal East District, Manipur to see the progress of the farm.

Meghalaya: Integration and Application of UAV for Crop Health Assessment and Monitoring with IIDS in Providing Evidence Based Agro-Advisory Services to Farmers of North-East India (DHaBReT)

The sub-component has been taken-up in collaboration with North-East Space Application Center and College of Post Graduate Studies in Meghalaya to develop a model for enhancement of the farm productivity by providing evidence based agro-advisory services generated by UAV data and integrating with IIDS platform. During the period following activities were undertaken:

UAV aerial surveys have been conducted using RGB and Multispectral cameras for the six crops viz., (1) Cabbage

(4.6 Km² approx.), (2) Cauliflower (4.2 Km² approx.), (3) Paddy (4.8 Km² approx.), (4) Ginger (5.5 Km² approx.), (5) Pineapple (6.2 Km² approx.), and (6) Turmeric (5.8 Km² approx.) in three (3) districts viz., (i) East Khasi Hills district, (ii) West Jaintia Hills district and (iii) Ri-bhoi district of the state Meghalaya.

Provided 206 numbers of proactive evidence based agro-advisory services; pushed 28 numbers of SMSs; and performed 9 awareness programmes.

Development of NDVI (Normalized Difference Vegetation Index) of White Grub infected Turmeric crops and Dissemination of Evidence Based Agro-Advisory Services to registered farmers on scientific management of White Grub Insects of Turmeric Rhizomes.

Glimpses from Arunachal Pradesh



Arunachal Pradesh: Mobile Based Agro Advisory System (Arik AbikLumon)

The sub-component has been taken up in collaboration with College of Horticulture and Forestry, (CoH&F), Pasighat, Arunachal Pradesh to empower the farmers by providing right information at the right time through mobile based agro-advisory system.

During the period, following activities were undertaken: Total 36 awareness programme, 2 Health Camp and 23 Training programme were conducted benefiting 3270+ farmers. During the year, 2167 farmers were registered and with this total 4011 farmers have been registered under the project. 2269 text messages (consuming 1,44,746 SMS) and 67 voice messages (consuming 19838 voice SMS) were sent to registered farmers in local language on various aspects of agriculture and animal husbandry. 619 calls were received on Toll Free number and 753 outbound calls were made for registration, advisory and enquiry purpose.

Glimpses from Arunachal Pradesh

One day Fishery Health Camp at Ledum, East Siang, Arunachal Pradesh



Animal Health Camp - Mebo, East Siang, Arunachal Pradesh



Training Programme on Modern Agro-Techniques in Cultivation of Groundnut – Damroh, Arunachal Pradesh



Training programme on scientific cultivation of Khasi mandarin in hilly regions of Arunachal Pradesh – Damroh, Arunachal Pradesh

Sikkim: Mobile Based Agro Advisory System (Jaivik Varta)

The sub-component has been taken up in collaboration with College of Agricultural Engineering & Post Harvest

Technology (CoAE&PHT), Ranipool, Gangtok, Sikkim to empower the farmers by providing right information at the right time through mobile based agro-advisory system.

During the period, following activities were undertaken: Total 38 awareness programme, 2 Health Camps and 2 Training programme were conducted benefiting 1,400+ farmers. During the year, 1,049 farmers were registered and with this total 3,955 farmers have been registered under the project. 1,963 text messages (consumed 8,51,106 SMS) and 76 voice messages (consumed 63,050 voice SMS) were sent to registered farmers in local language on various aspects of agriculture and animal husbandry. 5202 calls were received on Toll Free number and 418 outbound calls were made for registration, advisory and enquiry purpose.

Glimpses from Sikkim

Training program on Management practices on mushroom cultivation, Namchi, South Sikkim District



National Mushroom Day Celebration at Rongli, East Sikkim District



Animal Health Care Camp at Nandok, East Sikkim District



In campus training on turmeric processing, Ranipool, East Sikkim District

Component 2: CAD Tools (DigiBunai™ & DigiKadhai): Empowering Weavers, Designers & Artisans

This component is concerning to handloom and handicraft sector which aims to provide digital solutions for weavers artisans. This helps to create the design, reduce the time for production and improve the quality of product as well as employment opportunities.



Awareness Building Workshop at Weaver's Service Centre, Imphal

Various awareness-building programs and training sessions have been conducted in association with the Textile Sector Skill Council (TSC) in various regions of North-East India. More than 24 awareness programmes were conducted (totaling to 41) along with 293 (totaling to 786) designers/master weavers/trainers/students/artisans trained in the respective states (Meghalaya, Manipur, Assam, Arunachal Pradesh, Tripura, and Sikkim) of NE India. More than 500Artifacts have been created by the trainees during the training sessions on CAD Tools



Training Certificate Distribution at Weaver's Service Centre, Guwahati

Component 3: Punarjani™: Empowering Teachers of Special Schools & Children with Intellectual Disabilities. It is a web based tool that assists Special Teachers in assessment of children (6 -18 years of age group) with Intellectual Disabilities (IDs)



Fabric Sample develop based on generated output from DigiBunai™ CATD



DigiBunai™ CATD Trainings at CAD lab, Guwahati, Assam

The project includes implementation of the tool in 18 Special / Inclusive Schools in North East region of the country through training of Special Educators, requisite hardware support for Special / Inclusive Schools, incentives for Special Educators and follow ups. In the Third year of the project, the tool is to be implemented in State of Manipur (2), Arunachal Pradesh (2) and Tripura (1) in Special / Inclusive Schools.

Follow-ups with the Schools / Special Educators encouraging them to use the tool are going on.

Online / Physical training sessions have been conducted for the following 5 Special / Inclusive Schools from the State of Manipur, Tripura and Sikkim:

1. B.B. Paul Mental Development Home, Manipur
2. Social and Health Development Organisation (Special school for Disabled), Manipur
3. Ferrando Rehabilitation Centre, Tripura
4. Samarth Model School, Tripura
5. Special School for Children with Disabilities, Sikkim



Training Sessions on Punarjani in B.B. Paul Mental Development Home, Manipur



Training Sessions on Punarjani in Social and Health Development Organisation (Special school for Disabled), Manipur



Training Sessions on Punarjani in Special School for Children with Disabilities, Sikkim

Empowers special teachers for easy, efficient, quick and regular assessment, evaluation & monitoring of children with IDs:

1. Training & Technical support provided to Special/ Inclusive Schools and they were encouraged to upload case records of children with IDs.
2. No. of Special / Inclusive Schools registered in Punarjani web tool has reached 14
3. No. of Children with ID registed has reached at 712
4. No. of Special Teachers using the tool has reached 103
5. Assamese version of the tool has been made available as per the feedback of the Teachers.

9.10.2.3 QR Coded Check Post & Challan Management System (Q3CMS):

Q3CMS has been conceptualized by Govt of Meghalaya with a vision to streamline the Challan & Check-post Management process for transportation of minerals, cement, forest products, etc. so as to significantly increase revenues for the State Govt. of Meghalaya through an IT-enabled Integrated System. DIC has developed and hosted the QR Code application (for a pilot run with 2-4 gates) for minerals (Limestone, Coal & Boulder) with an aim to eliminate duplicate or fake challans through QR code. The Q3CMS Mobile and Web application is deployed in Department of Forest and being piloted at 2 gates. So far, 2,01,833 QR codes have been scanned at 2 gates carrying Limestone and Boulder in two gates namely Majal and Khanapara of Meghalaya.

9.10.2.4 E-SARAS

With the initiative of National Rural Livelihoods Mission (NRLM), Ministry of Rural Development (MoRD), Government of India, an efficient and effective online platform has been developed for the enhancement of the livelihood of the rural people. This online platform showcases the products made by self-managed Self Help Groups (SHGs) and federated institutions.

Its mission is to curate authentic handcrafted products from across the country. It is a tangible step in order to help artisans in their unceasing plight by empowering them. Our artisans get remunerated fairly with no middlemen to manipulate prices. Through this online portal, customers get access to 100% authentic handcrafted products emerging straight from the heart of India. We are well on our way with a solemn goal to provide economic uplifting of the rural artisans that are involved in preserving the heritage of the handicrafts industry in India.

Hence, we have crafted this platform that connects you to the artisans of India and showcases their work by providing you with the best handicraft items online. We aim to make the experience of buying aesthetic and contemporary for customers. Also, the core motive is to make sure the handicraft industry in India gets a digital boost. We work with these talented people who are registered with various Self Help Groups, who proudly make all of their beautiful, amazing and unique handicraft products in India using natural materials from sustainable sources.

LAUNCH OF E-SARAS

The Union Minister of State for Rural Development and Steel, Faggan Singh Kulaste inaugurated the “ESARAS – e commerce portal” in New Delhi on 28 October 2022. Women from self-help groups (SHG), formed under the flagship program ‘National Rural Livelihoods Mission’ of the Union Ministry of Rural Development were present at the event.

This e-commerce portal has been launched for better and more effective marketing of SARAS products prepared by women of self-help groups. Speaking on the occasion the minister said that efforts are on to have at least 25% of all sales by women self-help groups through e-commerce portal annually.

9.10.2.5 Bhashini

The Hon’ble Prime Minister launched the National Language Technology Mission known as ‘Digital India Bhashini’ on 4th July 2022. This will overcome the humongous challenge of breaking the language barrier using data-driven AI technologies.

Bhashini aims to enable all Indians an easy access to the Internet and digital services in their own language and increase the content in Indian languages. Bhashinibuild a National Public Digital Platform for languages to develop services and products for citizens by leveraging the power of artificial intelligence and other emerging technologies.

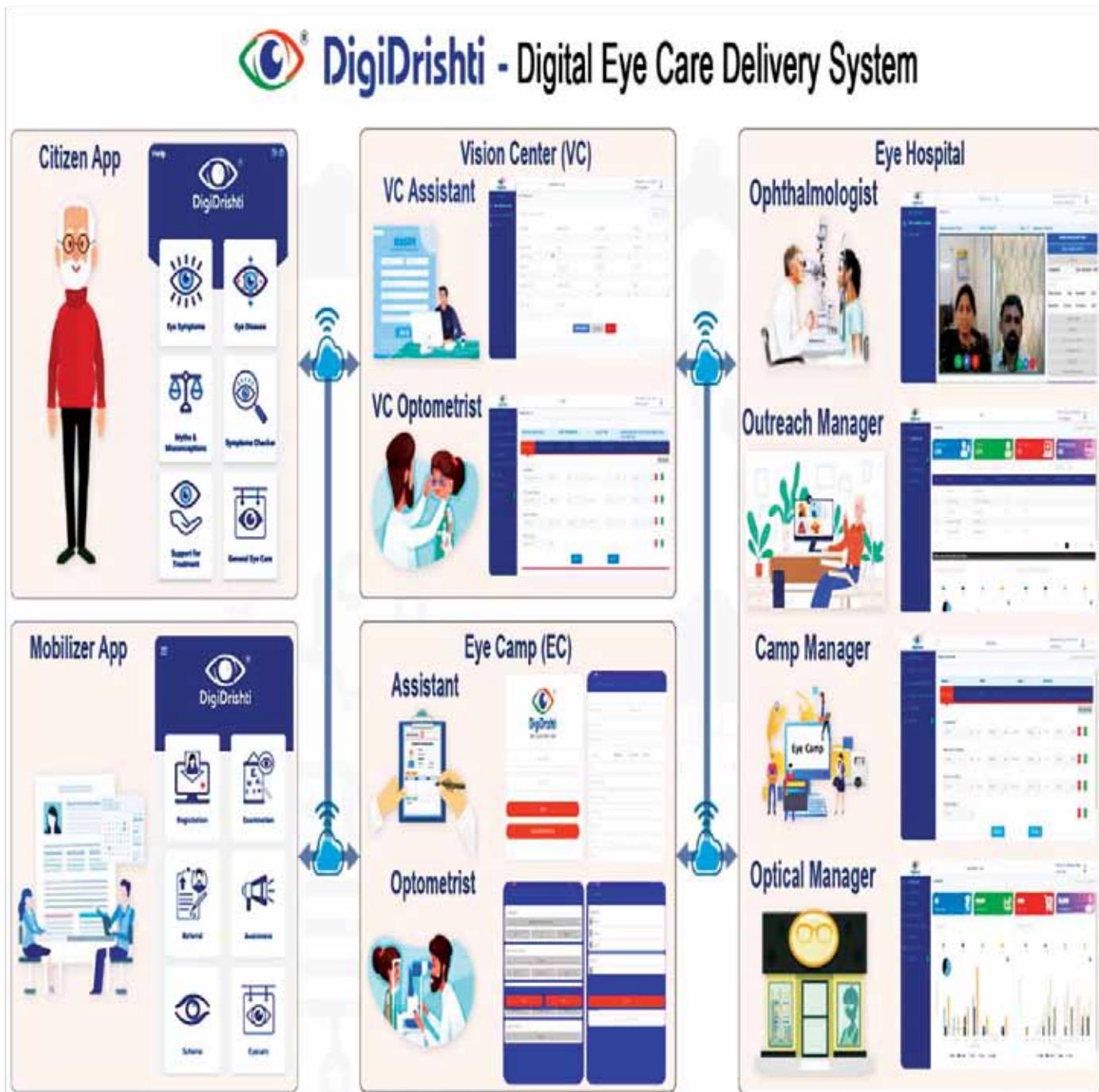
Now MeitY has Setting up of an Independent Business Division within Digital India Corporation for implementing National Language Translation Mission:Bhashini and pilot projects under Natural Language Translation Mission — Bahu-Bhashak. The details can be seen at Chapter 2.

9.10.2.6 DigiDrishti - Digital Eye Care Delivery System

A project is being implemented jointly by Digital India Corporation and PBMA’s H.V. Desai Eye Hospital to develop an interactive mobile-enabled centralized remote eye care delivery system, to improve the health care behavior of the community and provides eye care services digitally. It consists of mobile apps for citizens & community workers and web app for mid-level ophthalmic personal & ophthalmologist.

The ‘Citizen Eye Care Mobile App’ creates awareness among people who might have eye problems, with or without symptoms and avoid wrong information (misconceptions) in society relating to eye care. The app also intend to improve the health-seeking behavior among common people and provide self-referral facility. The app is available on UMANG and Google Play Store for its wider utilization by the citizens.

The ‘Vision Guardian Mobile App’, vision guardians are trained people who keep a close vigil on the eye health of people within the community, through door-door surveys or other means. The app consists of a smart task list which provides information about people who need help and a step by step guide for actions. The App has been presently used by 30+ vision guardians for door-to-door eye screening.



A 'DigiDrishti - Digital Eye Care Delivery System', web based eye care delivery system aim to support vision center functioning and management of patient digitally. The system also serves as teleophthalmology tool which helps the patients to get specialty eye care service at their nearby vision center, which saves patient eye testing & travel time as well as cost of the service. The

web app is hosted on cloud (www.digidrishti.dic.gov.in) where 19000+ citizens screened and 10000+ referred to vision centers/ hospital for advanced eye care services.

9.10.2.7 Academic Bank of Credits (ABC)

Academic Bank of Credits (ABC) is a virtual/digital repository that houses data on the credits that certain

students have accrued over the course of their academic careers. Students will be able to create an account and have a variety of alternatives for enrolling and exiting colleges or universities. Throughout the period of higher education, there will be “many exits” and “multiple admissions,” and credits will be easily transferred through the ABC. ABC is a reliable resource that can be used to examine any student’s credit history at any given moment.

Project progress Status as on date

The Hon’ble Prime Minister launched the project on 29th July 2021. The platform is ready and operational at <https://www.abc.gov.in>. 701 Academic Institutes onboarded and 37 Lacs students created ABC account.

9.10.2.8 Visvesvaraya PhD Scheme for Electronics & IT

MeitY has entrusted DIC with implementation of

Visvesvaraya PhD Scheme for Electronics & IT Scheme to enhance the number of PhDs in Electronic Design & Manufacturing (ESDM) and IT / IT enabled Services (ITES) sectors. The details can be seen at **Chapter 7**.

9.10.2.9 Ayush Global Hub & Mobile App

A project to design, develop and maintain a global portal and mobile application for the Ministry of Ayush (MoA) with respect to missions’ website to propagate Ayush systems all over the globe and to provide Ayush related information to citizens of various countries is being implemented. This portal / application will be hosted on infrastructure provided by MoA. The work is to understand, design, develop, test and implement / rollout the system i.e. web and mobile apps (iOS & Android) and to have country specific microsites. The work also includes linking Ayush Global Portal with the websites of the respective Ayush country missions. The portal & app to support multiple languages.



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 & Drafting in Hindi. Under this Incentive Scheme, previously there were five prizes of Rs. 500/- each under the Incentive Scheme but in order to make this scheme more attractive the prize money has been increased from Rs. 500/- per prize to Rs. 1000/- per prize and officers/ employees who can write at least 2,000 words in Hindi during the month can participate in this Incentive Scheme.

Hindi Pakhwada was organized in this Ministry during September, 2021 and winners were awarded. In order to promote the progressive use of Hindi in day to day official works various other competitions were also be held from time to time.

To ensure the implementation of official language policy in the offices under the administrative control of this Ministry, official language inspection was done by Committee of Parliament on Official Language at STPI, Noida; NIELIT, Gangtok; C-Dac, Noida; CCA, New Delhi; NIELIT Delhi Centre; C-Dac, Pune; STPI, Pune; UIDAI, Patna; STPI, Patna; STPI, Agartala; NIELIT, Tripura; ETDC, Agartala; STPI, Indore; Nicsi New Delhi; UIDAI Regional Office, New Delhi; STPI, Trivandrum; STPI, Mohali; NIC, Chandigarh; UIDAI, Chandigarh and NIELIT, Chandigarh. Besides, Official Language inspection was done at STPI, Agartala; ETDC, Agartala and NICCSI, New Delhi at the level of Ministry itself.

During the period under report, various important documents like Annual Report, Outcome Budget, various Cabinet Notes, and various Notes for Parliamentary Standing Committee, replies of Parliament Questions,

and Questionnaire based on Demands for Grants, Power Point Presentation for Standing Committee, Follow-up Action Reports, Monthly Reports for the Cabinet and other 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 has 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 period from 01.01.2022 to 14.12.2022, 2377 RTI applications (2186 online and 191 physical) were received in this Ministry. 223 numbers of appeals (208 online and 15 physical) were also received during the period from 01.01.2022 to 14.12.2022. The applications received were related to MeitY and its organisations under it. Aadhaar, Cyber Law, Social Media, Digital Payment, e-Governance, online gaming, data protection and internet websites were the main subjects on which large numbers of RTI applications were received during the period 01.01.2021 to 15.12.2021.

10.3 Public Grievances

Public Grievances Cell in MeitY is headed by Nodal Officer (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) Aadhaar

During the period from 01.01.2022 to 14.12.2022, 8243 grievances were received and out of these, 7938 were disposed of. Detailed information for the period is shown below:

Grievance Source	Brought Forward	Receipt During Period	Total Receipt	Case Disposed During Period	Closing Balance
DARPG	11	244	255	245	10
Local/Internet	154	6439	6593	6342	251
President Secretariat	03	109	112	112	00
Pension	07	37	44	41	03
PMO	67	1172	1239	1198	41
Total	242	8001	8243	7938	305

Pie Chart showing the details of grievances received during the period 01.01.2022 to 14.12.2022.



During the period 01.01.2022 to 14.12.2022, 1623 Grievance Appeals were also received and out of these, 1466 were disposed of.

10.4 Citizens' Charter

The basic objectives of Citizens' Charter are to empower the citizen in relation to public service delivery. It represents the commitment of the organization towards the standard, quality and time frame of service delivery, grievance redress mechanism, transparency and accountability. The Citizens' Charter is written, voluntary declaration by service providers about service standards, choice, accessibility, non-discrimination, transparency and accountability. It should be in accordance with the expectations of citizens. Therefore, it is useful way of defining for the customers the nature of service provision and explicit standards of service delivery. Details on Citizens' Charter are available on MeitY's website, url: <https://www.meity.gov.in/clients-citizens-charter>.

10.5 Information and Documentation Centre (Library)

This Ministry 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 & 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 Organizations. Services are also provided to the retired officials of the Ministry and trainees who undertake projects in the Ministry.

The Information & Documentation Centre possesses approximately 30,170 number of books on various subjects including Electronics, Computer, IT, Computer Languages, Fiction. It 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 & Information Technology (MCIT). Consortium of the Ministry (MCIT Consortium) comprises the users from the National Informatics Centre (NIC), C-DAC, NIELIT, SAMEER, C-MET, STQC Directorate, STPI, CCA ERNET India, C-DOT. The Ministry provides 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.

10.6 Parliament Matters

1. During the year, 380 number of Parliament Questions in Lok Sabha (21 Starred & 232 Unstarred) and 127 number of Parliament Questions in Rajya Sabha (11 Starred & 116 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, Super Computers, Internet Related Polices, E-Governance at Grass root Level, National Digital Literacy Mission (NDLM) Programme, PMGDISHA, Online Child Sexual Abuse, Wafer Fabrication Facility, Performance of Schemes launched by Government, Semiconductor Money Spent by UIDAI, Circulation of Fake Clips, Vulnerabilities in App used in smartphones, Status of IBPS, MSIPS, UMANG App, Strengthening of internet security and Prevention of Cyber Crime.
2. Department related Parliamentary Standing Committee on Communications and Information Technology (PSC, CIT) have discussed and laid Reports on the Table of Lok Sabha and Rajya Sabha on the following subject:
 - (i) Review of functioning of Unique Identification Authority of India (UIDAI)'
 - (ii) 'Safeguarding citizens' rights and prevention of misuse of social/online news media platforms including special emphasis on women security in the digital space'
 - (iii) Promotion of Electronics/IT Hardware/telecom equipment manufacturing sector under Make in India and measures for reduction of imports
3. (iv) Evidence of the representatives of the Ministry of Electronics and Information Technology on Demands for Grants (2022-23)
(v) Consideration and adoption of four Draft Reports on Demands for Grants (2022-23)
4. The Parliamentary Standing Committee on Communications and Information Technology has selected the following subjects for discussion during the year 2020-2021.
 1. Citizens' data security and privacy
 2. Digital Payment and Online Security measures for data protection
 3. Review of functioning of Unique Identification Authority of India (UIDAI)
 4. Safeguarding citizens' rights and prevention of misuse of social/online news media platforms including special emphasis on women security in the digital space
 5. Promotion of Electronics/IT Hardware/telecom equipment manufacturing sector under Make in India and measures for reduction of imports
 6. Technology initiatives taken by MeitY in the wake of Covid-19 pandemic
 7. Review of cyber security scenario in India
 8. Review of functioning of CSC-SPV
 9. Review of functioning of Information Technology Act, 2000
4. The following Annual Reports of Societies and Notifications of the Ministry of Electronics and Information Technology have been laid on the Table of the House (Lok Sabha and Rajya Sabha:-

ERNET	- 23.03.2022 (Lok Sabha)
NIELIT	- 23.03.2022 (Lok Sabha)
UIDAI	- 23.03.2022 (Lok Sabha)
NICSI	- 23.03.2022 (Lok Sabha) (2017-18, 2018-19, 2019-20 & 2020-21)
Notification	- No. A-12012/13/RR/2016-UIDAI (Aadhaar) (No. 3 of 2021) (Lok Sabha).

Annexure-I

Global Indices [E-Government Development Index (EGDI)]

The E-Government Development Index (EGDI) presents the state of E-Government Development of the United Nations Member States. Ministry of Electronics and Information Technology (MeitY) is the nodal ministry for EGDI. The EGDI is a composite measure of three important dimensions of e-government, namely: online service index, telecommunication infrastructure index and the human capital index.

The Online Service Index (OSI) measures a government's capability and willingness to provide services and communicate with its citizens electronically. Ex: Transactional services: income taxes via national websites – MeitY. The Telecommunication Infrastructure Index (TII) measures the existing infrastructure that is required for citizens to participate in e-government- Department of Telecommunications (DoT). The Human Capital Index (HCI) is used to measure citizens' ability to use e-government services – Department of School Education and Literacy (DoSEL) & Department of Higher Education.

An e-Government Index Monitoring Committee (eGIMC) periodic meetings were held to review the status of sub-indices of e-Government Development Index (EGDI).

Regular updation of data on GIRG dashboard for EGDI and its parameters OSI, TII, HCI and other indices where MeitY is the line ministry. Analysis of EGDI TII and HCI data shared by Line Ministries/Departments was done. And accordingly, Reform Areas and Reform Actions have been identified with timelines.

Other Global Indices:

Apart from this, there are 7 Global Indices wherein MeitY acts as line ministry and shares relevant data with concerned nodal ministries on following indices and further updating on GIRG portal of NITI Aayog:

- Network Readiness Index
- Safe City Index
- Services Trade Restrictiveness Index
- Global Innovation Index
- Rule of Law Index
- Global Competitiveness Index
- Corruption Perceptions Index

GovTech Maturity Index (GTMI):

GovTech Initiative was launched in 2019 by the World Bank Group (WBG) to support the latest generation of digital government reforms. GovTech Maturity Index (GTMI) was introduced in 2021 to measure the key aspects of following four GovTech focus areas in 198 economies. The GTMI is a composite index based on 48 key indicators defined to collect data from 198 economies in four categories: The Core Government Systems Index (CGSI), based on 15 indicators; the Public Service Delivery Index (PSDI), based on 6 composite indicators; the Citizen Engagement Index (CEI), based on 12 indicators; and the GovTech Enablers Index (GTEI), based on 15 indicators.

Summary of Important Audit Observations

Sl. No.	Year	No. of Paras/PAC reports on which ATNs have been submitted to PAC after vetting by Audit	Details of the Paras/PAC 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
11.	2012-13	-	Nil	-	Nil
12.	2013-14	-	Nil	-	Nil
13.	2014-15	-	Nil	-	Nil
14.	2015-16	-	Nil	-	Nil
15.	2016-17	-	Nil	-	Nil
16.	2017-18	-	Nil	-	Nil
17.	2018-19	-	Nil	-	Nil
18.	2019-20	-	Nil	-	Nil
19.	2020-21	-	Nil	-	Nil
20.	2021-22	-	Nil	-	Nil

Annexure-III

Ministry of Electronics and Information Technology

Annual Budget 2023-24

Sl. No.	Scheme/Non-Schemes	Budgetary Support (Rupees in crore)
Non-Schemes		
1	MeitY Secretariat	140.00
2	National Informatics Centre	1527.26
3	Regulatory Authorities	373.50
3.1	Standardisation Testing and Quality Certification (STQC)	135.50
3.2	Cyber Security (CERT-In)	225.00
3.3	Controller of Certifying Authorities (CCA)	13.00
4	Assistance to Autonomous & Other Bodies	2068.00
4.1	Centre for Development of Advanced Computing (C-DAC)	270.00
4.2	Society for Applied Microwave Electronics Engineering and Research (SAMEER)	160.00
4.3	Centre for Materials for Electronics Technology (C-MET)	110.00
4.4	Bhaskaracharya National Institute for Space Applications and Geo-Information [BISAG(N)]	44.00
4.5	Semi Conductor Laboratory (SCL)	533.00
4.4	Digital India Corporation (DIC)	11.00
4.5	Unique Identification Authority of India (UIDAI)	940.00
	Sub-Total (Non-Scheme)	6550.26
5	Digital India Programme (Umbrella Scheme)	
5.1	Capacity Building & Skill Development Scheme	537.50
5.2	Electronic Governance (incl. EAP)	555.74
5.3	National Knowledge Network	352.00

Sl. No.	Scheme/Non-Schemes	Budgetary Support (Rupees in crore)
5.4	Promotion of Electronics & IT Hardware Mfg (MSIPS, EDF & Manufacturing Clusters)	700.00
5.5	Production Linked Incentive Scheme	4645.04
5.5.1	Production Linked Incentive for Large Scale Electronics Manufacturing	4499.04
5.5.2	Production Linked Incentive for IT Hardware	146.00
5.6	Modified Programme for Development of Semiconductor and Display Ecosystem in India	3000.00
5.6.1	Modified Scheme for setting up of Compound Semiconductors/Silicon Photonics/ Sensors Fab/Discrete Semiconductors Fab and Semiconductor Assembly, Testing, making and Packaging (ATMP)/Outsourced Semiconductor Assembly and Test (OSAT) facilities in India	1799.92
5.6.2	Modified Scheme for Setting up of Semiconductor febs in India	1000.00
5.6.3	Modified Scheme for setting up of Display Febs in India	0.04
5.6.4	Modernisation of Semi-Conductor Laboratory, Mohali	0.04
5.6.5	Design Linked Incentive Scheme	200.00
5.7	Promotion of IT/ITeS Industries	150.00
5.8	R&D in IT/Electronics/ CCBT	600.00
5.9	Cyber Security Projects (NCCC & Others)	400.00
5.10	Promotion of Digital Payments	1500.00
	Sub-Total (Scheme)	20,085.32
	TOTAL (SCHEME & NON-SCHEME)	26,635.58

Annexure -IV

Employee Structure (As on 01/09/2022)

Group	Permanent/ Temporary	Total No. of employees	SC	% of SC w.r.t. total employees	ST	% of ST w.r.t. total employees	PWDs	% of PWDs w.r.t. total employees
Group A	Permanent							
	(i) Other than lowest rung of Group A	172	26	15.12	10	5.81	5	2.91
	(ii) Lowest rung of Group A	6	0	--	0	--	0	--
	Temporary							
	(i) Other than lowest rung of Group A	0	0	--	0	--	0	--
	(ii) Lowest rung of Group A	0	0	--	0	--	0	--
	Permanent	57	13	22.81	5	8.77	2	3.51
	Temporary	0	0	--	0	--	0	--
Group B (Gazetted)	Permanent	63	15	23.81	4	6.35	1	1.59
	Temporary	10	1	10	0	--	1	10
Group C	Permanent	139	28	20.14	6	4.32	5	3.6
	Temporary	64	6	9.38	5	7.81	5	7.81
	TOTAL	511	89	17.42	30	5.87	19	3.72

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 e-Marketplace
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





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