

Annual Report 2020-21



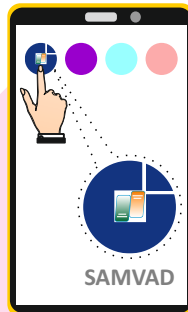
CAP



4G LTE



CDOT Meet



SAMVAD



Prime Minister's Wi-Fi Access Network Interface



Terabit
Router



XGS Mini
OLT



DWDM



Wi-Fi 6

5G

A hand is shown at the bottom, holding a glowing globe. The globe is the central focus, with text inside it. The text is arranged in two sections: 'VISION' at the top and 'MISSION' in the middle. The globe is surrounded by several concentric, semi-transparent pink arcs that radiate outwards, suggesting a signal or a global reach. The background is white, and the overall aesthetic is clean and modern.

VISION

To become the world class telecom technology development centre.

MISSION

To design and develop state-of-the-art technologies, products and solutions.
To meet the telecom needs of India particularly of national importance in strategic sectors and rural areas.

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C-DOT MANAGEMENT

Governing Council

Chairman

Hon'ble Minister of Communications

Vice Chairman

Hon'ble Minister of State for Communications

Members

Chairman, Digital Communications Commission & Secretary (T, DoT)

Chairman, DRDO & Secretary, Department of Defence (R&D)

Secretary, MeitY

Member (In charge - C-DOT), DCC

Member (Finance), DCC

CMD, BSNL

Executive Director, C-DOT

Directors, C-DOT

Steering Committee

Chairman

Chairman, Digital Communications Commission & Secretary (T, DoT)

Vice Chairman

Member (In charge C-DOT), DCC

Members

Chairman & Managing Director, ITI Ltd.

Director (Planning), BSNL

Sr. DDG, Telecom Engineering Centre

DDG (B&PF), Department of Telecommunications

Sr. Director, MeitY

Executive Director, C-DOT

Directors, C-DOT

Project Board

Chairman

Dr. Rajkumar Upadhyay
Executive Director, C-DOT

Members

Dr. Rajesh Sharma
Director-I, C-DOT

Jayant Bhatnagar
Director-II, C-DOT

Overview

Centre for Development of Telematics (C-DOT) , established in 1984 as an autonomous R&D centre of the Department Of Telecommunications, Ministry of Communications, Government of India has been widely known for its monumental role in ushering in the indigenous Telecom revolution in the nation.

With its world class research labs equipped with the state-of-the-art infrastructure and a pool of the brightest engineers from the top institutes of the nation, C-DOT has been strongly committed to fulfilling the overarching objectives of national development through its targeted research initiatives addressing the specific connectivity needs of our diverse country. C-DOT's technologies aim at augmenting the broadband infrastructure of the nation and addressing the typical requirements pertaining to rural, security and strategic applications. C-DOT's diverse product portfolio spanning a wide array of technologies that include switching & routing, optical communication, wireless communication, 4G LTE, 5G, network security, advanced encryption techniques and Post-Quantum Cryptography based solutions, network management, M2M/IOT, AI, and a host of other telecom software applications is a manifestation of its unrelenting desire to capture the unexplored dimensions of the vast Telecom firmament.

C-DOT's passionate zeal to extend the connectivity to every nook and corner of the nation is well corroborated by its indigenously designed exchanges, popularly called RAX and MAX that are still propelling the rural networks with the persistent upgrades to facilitate the provisioning of the latest IP-based services in an economically viable and effective manner.

C-DOT has developed an early warning platform based on ITU's Common Alerting Protocol (CAP) for effective disaster management. The platform has been widely used by National and State Disaster Management authorities for dissemination of alerts and other useful information to the masses on all available media during emergencies like floods, cyclones and Covid pandemic.

C-DOT's indigenous innovations have been instrumental in architecting Digital India. C-DOT's GPON solution is fueling the backbone of BharatNet, the prestigious nationwide optical fibre based network connecting 2.5 lakh Gram Panchayats in the nation

with high-speed broadband. C-DOT's XGS-PON is ideally suited to fulfilling the ever increasing demand of bandwidth emanating from the new dimensions of user applications like Work from Home, IPTV, HD Video Streaming, Online Gaming and host of other cloud-based services. C-DOT's high-capacity DWDM system has been designed to drive the core of Telecom networks in an optimally effective manner.

C-DOT's indigenously designed and developed network elements like Routers, Switches, etc. are a testimony to our prowess in building Next Generation Networks for "Smart Cities" and "Digital India". C-DOT's Wireless Terminals are especially suited to ensure seamless connectivity to the inhospitable and inaccessible terrains of India with a sharp focus on the utilization of green energy in power deficient areas. C-DOT has a wide suite of indigenous Wi-Fi solutions that are slated to play an increasingly pivotal role in the creation of PM-WANI Wi-Fi hotspots across the country.

C-DOT has also been developing indigenous solutions for strengthening communication networks for defence & strategic establishments. C-DOT has been actively involved in various parprojects of national importance that aim to augment the security of our national networks against cyber threats. C-DOT has developed Samvad, a mobile based unified secure chat & call platform and a Video-conferencing solution that are being used by the officers of various Government departments.

C-DOT is a proud member of the global oneM2M initiative and successfully demonstrated the interoperability of its M2M/IoT solutions on the platform. C-DOT has been focused on creating an inter-operable indigenous M2M/IoT ecosystem comprising of start-ups, industry, academia and R&D to boost innovation and growth in this new dimension.

C-DOT, today has emerged as one-stop destination for the latest indigenous telecom technologies and innovative solutions, thus propelling the engines of indigenous manufacturing based on its Transfer of Technology(ToT) Model. C-DOT reiterates its commitment towards catalyzing the indigenous manufacturing for the creation of "Atmanirbhar Bharat".

Accomplishments and Activities

1. Key Project Achievements at a glance

C-DOT is a telecom organization engaged in the research and development of state-of-the-art Telecom R&D activities as well as in the field implementation of its developed technologies. C-DOT is appraised at CMMI (Capability Maturity Model Integration Maturity) Level 5 for its process practices for the 'Development Projects', and has been sustaining this status since 2014.

The progress on major technologies under development, field deployment, etc. is briefly summarized in the section given below:

- COVID-Savdhan application developed to convey SMS messages in local languages. During COVID-19 pandemic situation, the service of "COVID-19 Savdhan" system based on CAP (Common Alerting Protocol) was used by 25 State & Union Territory authorities. Around 3.2 billion SMSs have been sent to the citizens of India.
- C-DOT CQAS (Quarantine Alert System) is being used for ODTS (Oxygen Digital Tracking System), a Govt. of India Project, for tracking real time transportation of Oxygen across the country.
- IVRS (Interactive Voice Response System) of Aarogya Setu App developed and launched for contact tracing with COVID-19 positive person.
- The CAP compliant early warning platform system has been implemented in Tamil Nadu as a Pilot Project and is operational in the state for IMD (Indian Meteorological Department) Chennai, CWC (Central Warehousing Corporation) and Tamil Nadu SDMA (State Disaster Management Authority) for Location based SMS dissemination through all Telecom Operators i.e. Airtel, BSNL, Reliance Jio, Vodafone-Idea.
- PM-WANI (Prime Minister Wi-Fi Access Network Interface)-CR (Central Registry) has been developed and deployed on Cloud infrastructure with basic features to enable Interoperability of PDOA (Public data office aggregator) and APP Providers.
- Development completed for Secure Video Conferencing solution (C-DOT VC Solution). The video conferencing Solution is hosted in BSNL Datacenter and is being used by various Government departments / organizations including India Post, Prasar Bharti, DoT, Indian Navy, Mumbai Police and IITs.
- C-DOT SAMVAD has been deployed in State Police Departments (Delhi, MP, AP) and Government Departments / Organizations like Prasar Bharati, Department of Economic Affairs, DRDO (Defence Research & Development organization), MHA (Ministry of Home Affairs), NSCS (National Security Council Secretariat), CSIR (Council of Scientific and Industrial Research), SPG (Special Protection Group), Income Tax Department on trial basis.
- C-DOT is collaborating with TCS (Tata Consultancy Services) and its other partners (Tata Elxsi, Tejas & Lekha Wireless) to build an all indigenous 4G LTE/IMS (IP Multimedia Subsystem) Core. Interoperability of Core tested successfully with other partner's RAN (Radio Access Network) solution. Demonstration completed successfully as per BSNL EOI (Expression of interest) to various parties.
- CEIR (Central Equipment Identity Register)- Integration of CEIR completed with Delhi Police for tracing of stolen mobiles. ICDR (Indian Counterfeited Device Restriction) has been launched to facilitate mobile device import through checking for cloned/duplicate.
- TSOC (Telecom Security Operation Centre)- TSOC is operational at DOT.
- Design of Lab prototype of QKD (Quantum Key Distribution) completed. Software design for Alice and Bob nodes completed.
- XGS-PON (10 Gbps Symmetrical Passive Optical Network (TDM/TDMA-based) - Field trials commenced for 48-port XGS-PON OLT (Optical Line Termination) in MTNL (Mahanagar Telephone Nigam Limited) network at Lodhi Road, New Delhi.
- Design and development completed for Wi-Fi-6 access points.

- CMC-DR (Centralized Monitoring Centre Disaster Recovery) site at C-DOT Bengaluru successfully tested and commissioned.
- Support for 3GPP (3rd Generation Partnership Project) interworking for NIDD(Non IP Data Delivery) implemented in IN-CCSP (Infrastructure Node - C-DOT Common Service Platform) – oneM2M based IOT (Internet of things) platform.

The progress made in major technology areas, is briefly discussed as follows:

1.1 Security related projects

Centralized Monitoring System (CMS)

- ◆ For lawful interception and monitoring - a National Roll-out Project put into operations. LEMF (Law Enforcement Monitoring Facility) implemented for Assam police, CBDT (Central Board of Direct Taxes)-Kolkata, CBDT – Patna, and Chandigarh UT Police. Support and enhancement continued for CMS program e.g. CLI (command-line interface) based interface for internal debugging, 4G/LTE (Long Term Evolution) online video call interception etc.

CoE (Centre of Excellence) for Lawful Interception

- ◆ **Samvad** - C-DOT SAMVAD has been deployed in State Police Departments (Delhi, MP, AP) and Government Departments / Organizations like Prasar Bharti, Department of Economic Affairs, DRDO, MHA, NSCS, CSIR, SPG, Income Tax Department on trial basis . Order received from IB and Navy.
- ◆ **C-DOT Video Conferencing Solution** - C-DOT Video Conferencing solution developed and tested during COVID-19 lockdown with many useful features like user level bandwidth controls, mute all, sorting on unmuted users, raise hand, moderator display section, buttons, configurable video grid. Pilot trial conducted at Department of Posts, DoT (Department of Telecommunications), TSDSI (Telecommunications Standards Development Society, India) and Mumbai Police. Solution is hosted in BSNL datacenter and is being extensively used by Government Departments/ organizations including India Post, Prasar Bharti, DoT, Indian Navy, Mumbai Police and IITs.
- ◆ **Wayfinder (UN navigational App)** - Successful completion of PoC (Proof-of-Concept) in E-building at UN, Geneva. Signing of NDA (Non-Disclosure Agreement) with the UNOG

(United Nations Office at Geneva) completed. Testing completed for Augmented Reality feature. Android and iOS Apps were tested in E building & one floor of A building. Solution handed over to UN team for testing. Floor plans of A, B, C, S buildings received, formatted and incorporated into the solution.

- ◆ **Face recognition** - Pilot trial conducted at IB (Intelligence Bureau). Functional enhancements as desired by IB completed.
 - ◆ **QSC (Quantum Safe Cryptography)** - C-DOT's GEM (Compact encryption Module) product has been offered to STQC (Standardization Testing and Quality Certification) for Enhanced Assurance Level (EAL) evaluation under Common Criteria Security Testing Framework.
 - ◆ **QKD (Quantum Key Distribution)** - C-DOT initiated activities in the area of Quantum communications by taking up development of QKD and has successfully designed a laboratory prototype of QKD at C-DOT, Delhi. Software design for Alice and Bob nodes completed.
 - ◆ **SDCN (Secure and Dedicated Communication Network)** - Installation and commissioning of SDCN at DRDO sites commenced.
 - ◆ **Internet Lawful Interception Monitoring System (ISP)** - The solution has been implemented at 20 additional ISP gateways (Airtel Noida, Airtel Manesar, Airtel Jammu, Airtel Chennai2, Airtel HiTech Hyderabad, Airtel Uppal Hyderabad, Tata Sky Pune, Tata Sky Jaipur, Tata Sky Chennai, Reliance Jio Noida2, Reliance Jio Delhi2, Reliance Jio Chennai1, Reliance Jio Chennai2, Reliance Jio Mumbai2, TTSL (Tata Tele services Limited) Delhi, TTSL Bengaluru, TCL Bengaluru2, , TTSL Kolkata, TTSL Hyderabad, Vodafone Gurgaon-upgradation), during the year and cumulative total ISP gateway monitoring solutions pan-India installed at 123 locations.
- DOT officers of Security wing have been given due trainings for taking over IMS for PCI (Prime Custodian of Interception) operations as per SOP. The handing-over of IMS LSA-wise to DoT has commenced. ISP Monitoring Sites - 8 sites for Delhi LSA, 8 sites for West Bengal LSA and 10 sites for AP LSA, have been handed over to PCI (DOT). IMS infrastructure access given to 5 central LEAs and 6 regional LEAs.

1.2. Optical technology related projects

- ◆ **DWDM (Dense Wavelength Division Multiplexing)**- Internal Validation of 100G DWDM system completed for linear, ring, Mesh and point-to-point architecture. Acceptance testing of 100G DWDM system in-progress in MTNL. Successful Field Trial of 100G DWDM system in BSNL network at Chennai, Railtel network at KRCL Route and MTNL Network at Delhi.
- ◆ **POTP (Packet optical transport platform)** - Internal Validation of 1.6 Tbps POTP system has been completed with Partial Configuration. Development of GMPLS(Generalized Multi-Protocol Label Switching) -based control plane and EMS (Element Management System) for 1.6T POTP completed. Hardware design for 4T POTP system completed.
- ◆ **TWDM-PON (Time & Wavelength Division Multiplexing- Passive Optical Network)** - Technology Approval Certificate of XGS-PON (10-Gbps Symmetrical Passive Optical Network) received from TEC. Initial Validation of XGS-PON MiniOLT and NGPON (Next Generation Passive Optical Network) has been completed.

1.3. Switching and Routing Technology

- ◆ **HSRS (High Speed Routing System)** - Software development completed for 100 Gbps Ethernet interface and offered for validation. The performance testing is in-progress. The first prototype has been deployed in 4G test bed and being tested by TCS teams. The PCB design for Compute Node has been completed. The Component procurement is in-progress.
- ◆ LAN (Local Area Network), MAN (Metropolitan Area Network) enterprise and data centre segment – Development and validation completed for 48-port integrated L2/L3 switch. Architecture design and implementation of high capacity ToR (Top of Rack) and spine switches has been completed.
- ◆ Switch and Router Enhancements/Support - EAL (Evaluation Assurance Level)-3 certification (as per International Common Criteria Standards) has been received for C-DOT Stackable Terabit Router (Model: CRAT-100/CRDT-100). EAL-3 certification activities for C-DOT switch (Model: CSX-100) and secure router (Model: CRTR-210) have been started. Integration of secure router EMS with C-DOT NMS (Network Management System) has been

completed. Development of C-DOT EMS for compact router for static routing, NAT (Network Address Translation) and ACL (Access Control List) has been completed. Additional prototypes for compact router have been assembled and tested. Support to ToT partners provided for producing additional units of secure router, Order for supply of additional units to ECIL (Electronics Corporation of India Limited) and DRDO, have been completed.

1.4. Satellite based technology

- ◆ **Satellite hub baseband system** - Field Testing of Carrier grade hub baseband system supplied to DEAL (Defence Electronics Applications Laboratory) ongoing. Testing completed for additional feature like new wideband demodulator, including testing of voice calls and data. Enhancement of SMS demodulator algorithm completed to improve the performance of the system already deployed in the field.
- ◆ **DVB-S2 (Digital Video Broadcasting - Satellite - Second Generation) Hub Baseband System** - Algorithms coding completed for DVB-S2 modulator and tested the video transfer successfully using prototype Hardware. Development in progress for prototype MF-TDMA demodulator for DVB- RCS(Rich Communication Services) channel. Video transfer successfully tested for MPEG (Moving Picture Experts Group) Traffic channel without channel decoder. Algorithm coding in progress for multiple modulation schemes and Channel coders to improve the channel performance of DVB-S2 system. ATCA (Advanced Telecommunications Computing Architecture) form factor hardware under development for Bank of modulators and demodulators. RF card development in-progress.
- ◆ **C-SAT-FI** - Architecture design and development of Content Server and EMS (Element Management System) completed for C-Sat-Fi. Proof-of-Concept (PoC) successfully completed at Harsihtal and Talli Sethi Village of Nainital District of Uttarakhand with BSNL. Technology demonstration at Gokulpur and Birchandanagar village of Udaipur District of Tripura, North East with BBNL/USOF.

1.5. Telecom Services & Applications

- ◆ M2M (Machine to Machine) communication - C-DOT Common Service Platform (CCSP) compliant to oneM2M standards developed and tested with various IoT applications. Support for 3GPP interworking support for NIDD and semantics implemented in IN-CCSP. Study for

development of Service Capability Exposure Function (SCEF), for integrating CCSP into 4G Core Network Solution for Non-IP Data Delivery, on-going.

Design of LoRa (Low-Range) based Smart Street Light application completed. Design and Development of a prototype of LoRa based patient quarantine system completed. Pilot implementation of ANPR (Automatic Number Plate Recognition) based C-DOT Vehicle and Visitor Management Application was completed in C-DOT Campus. Study on-going for development and implementation of NB-IoT application with C-DOT 4G Solution.

Participation in ETSI- Task Force ,for development of TTCN based conformance test suite for oneM2M 2021 Conformance Testing.

1.6. Next Generation Mobile and Wireless Technologies

5G technology development

- ◆ **5G Standalone (SA) Core and data plane analytics** - A prototype 5G SA Core based Test Bed is being setup. DevOps platform for 5G cloud native development of 5G Core is being prepared. Study of architectural options for 5G core and network slicing ongoing.

Discussions held with vendor for Core stack reference implementation. MoU with IITM (Indian Institute of Technology Madras)/CEWiT (Centre of Excellence in Wireless Technology), for participation of C-DOT in the indigenous 5G Testbed project funded by DOT. Under the partnership between IITM/CEWiT, the IIT testbed and SIP (Session Initiation Protocol) call was tested using C-DOT's IMS solution and use cases for trials were also demonstrated.

DevOps, a portmanteau of “development” and “operations”, combination of practices and tools designed to increase an organization's ability to deliver applications and services faster than traditional software development processes, is available.

- ◆ **5G-RAN (Radio Access Network)** - For the RAN base station, hardware architecture of higher capacity baseband unit and Band N78 (3.5GHz) RRH was upgraded to cater to newly available chipsets. For the 5G Use case labs, identified key network equipment required for the lab and use case trials.

4G technology development, customization and trial

- ◆ **4G-CORE** - The development has been completed. Interoperability of Core tested successfully with other partner's RAN solution. Demonstration completed successfully as per BSNL EOI to various parties.
- ◆ **4G-RAN** - Prototype single sector macro eNodeB integrated with C-DOT 4G LTE Core. Band-3 Remote Radio Head (RRH) 20W and Band-40 RRH 20W prototypes completed and under testing.
- ◆ **PM-WANI** - C-DOT has taken up the design and development of Central Registry on 1st of December 2020. The Central Registry (<https://pmwani.cdor.in>) is made operational on 10th January 2021. Total PDOA (45 No.) and APP Provider (23 No.) has signed up on the registry as on 31st March 2021. 8 PDOA and 2 App Providers are provisionally certified as on 31st March 2021. Total 41938 Access Points are deployed as on 31st March 2021. Website has been CERT (Computer Emergency Response Team) certified.
- ◆ **Wi-Fi technology (BBWT)** - Design & development completed for the indigenous Wi-Fi-6 Access Point technology product and cost competitive Wi-Fi-5 Access Point for Bharatnet, Wireless Access Controller (WAC) deployment is in-progress for 6000 access points in CSC / Bharatnet network by ToT Partner, M/s Aggressive EMS. Successful completion of POC testing of C-DOT Wi-Fi LTE Gateway product for M/s. Lab2Market. Access points deployed in JSW(Jindal Steel Works), Bellary with cyber-signaling system for improving the safety and security of railway tracks. PoC done for Wi-Fi5 Access Point with fibre and LTE backhaul along with WILD (Wheel Impact Load Detector) for detecting the condition of railway tracks.

1.7. Next Generation Cloud Projects

- ◆ C-DOT successfully Transformed/ Modernized existing in-house IT infrastructure for supporting next generation cloud native application development / Open Source Technologies, which not only saved huge amount of license fees, but also helped in easy and efficient management of compute /storage/ network resources thus avoiding underutilization of IT resources.

With its cloud technology, C-DOT has acquired capability to host an application on production scale cloud with end-to-end capability and the same was demonstrated in successful hosting of Covid-Savdhan in C-DOT cloud.

1.8. Field Implementation of Major Projects

- ◆ **CAP compliant integrated location based Early warning platform for NDMA (National Disaster Management Authority)** - This System indigenously designed and developed by C-DOT, the Telecom technology centre of Govt. of India under guidance of NDMA and Department of Telecommunication (DoT) supports the country's vision of self-reliant India i.e., "Atmanirbhar Bharat".

The service of the system was extended to Jammu and Kashmir SDMA for dissemination of Weather forecasting to pilgrims of Holy Amarnath Yatra 2018 and to Kerala SDMA for issuing advisories to flood affected people of Kerala during devastating Kerala Flood, 2018 on trial basis. The State of Kerala has used the platform effectively to send out as many as 5.6 million precautionary messages during the Floods and the platform was field tested during Cyclone Gaja in Kerala.

This System has been implemented in Tamil Nadu as a Pilot Project. Presently the system is operational in the State for IMD Chennai, CWC and Tamil Nadu SDMA for Location based SMS dissemination through all Telecom Operators i.e. Airtel, BSNL, Reliance Jio, Vodafone-Idea. Tamil Nadu State Govt. has used this system during Cyclone Nivar and Cyclone Burevi for alerting its citizen about impending disasters on commercial basis.

- ◆ **NMS (Network Management System)** - Mobile application developed and demonstrated as per BharatNet NMS requirements. BharatNet Dashboard and Reports developed based on DoT/BBNL requirements and deployed. Major enhancements on TT and SLA modules for NOFN NMS were implemented and operational.

Unified Network Management System for monitoring State Led NMSs under development and testing. BharatNet NMS integrated with UNMS through BEG (Business Exchange Gateway). State Led NMS's of Gujarat, Maharashtra, Odisha, Chhattisgarh and Telangana also integrated with UNMS through BEG for inventory module.

CSC deployed WiFi/FTTH (Fiber-to-the-home) for providing broadband connectivity to villages of Maharashtra, Bihar, UP, and Punjab. Also integrated through BEG to get bandwidth utilization in villages.

C-DOT participated and won the tender for Managing and

Monitoring of Kolkata Airport Network Devices. CNMS-IP was delivered to customer and is operational at site.

- ◆ **GPON (Gigabit Passive Optical Network) Technology** - New cost effective ONT-23 (Optical Network Termination-23) validated and ToT done to ITI for M/s CSC for deployment as expansion of BharatNet. New cost effective Office OLT under validation. Network stability and testing completed for ONT-17A in GPON network at Indian Cost Guard HQ New Delhi. Bench testing and Environmental testing under TSEC (Technical Specification Evaluation Certificate) Testing of GPON Solution with 8-PON port line card, ONT-17A and ONT-24 manufactured by M/s ITI, has been completed at C-DOT Delhi campus. Bench testing completed for TSEC of GPON Solution with 8-PON port line card, ONT-17A and ONT-24 manufactured by M/s Cyient. TSEC Certificate received.

1.9. DOT projects

- ◆ **TSOC (Telecom Security Operation Centre)** - PoC involving 4 ISP Gateways completed successfully, Detailed Project Report (DPR) on PAN India basis submitted to DoT for approval. TSOC is operational at DOT. Deployment of C-DOT Internet Protocol Flow Information Exchange (IPFIX) probe at 24 ISP Gateways in-progress. Augmenting Big Data Platform at C-DOT TSOC Lab to monitor traffic sampled from 28 ISP Gateways.

- ◆ **CEIR (Central Equipment Identity Register)** - SDRS (Stolen Device Reporting System) has been launched for public use in Maharashtra, Mumbai and Delhi LSAs. Through SDRS, any subscriber can report his/her stolen/lost mobile device through website (<https://www.ceir.gov.in>) or through local police. CEIR is integrated with Delhi Police as well, any mobile device theft reported at Delhi police will automatically be fetched by CEIR and will be blocked. If the stolen mobile is tried to be used by any person, although the mobile will not be used but the tracking information will be captured by CEIR and will be presented to corresponding local police for recovering the stolen mobile.

- ◆ Total lost/stolen devices blocked till 30 June 2021 – 1,11,276; Traced devices - 66,635 (60%); Unblock request – 867; Stolen mobile recovered by Maharashtra (MH) Police – 120, Delhi Police - 6. ICDR (Indian Counterfeited Device Restriction) has been launched to facilitate mobile device import through checking for cloned/duplicate. All mobile devices to be imported from other countries, are to be

imported through ICDR system. Otherwise, customs will not allow the import (as per ICDR SOP). More than 3.30 crores Mobiles have been imported using ICDR system in 2020.

1.10. NSCS projects

C-DOT received approval from NSCS (National Security Council Secretariat) for Research & Development of Post-Quantum Inline 1Gbps data-rate Network Encryptor (PINE) and Quantum-secure smart Video IP Phone (QSSIP).

- ◆ **PINE (Post Quantum Inline Encryptor)** - Hardware and Software Architecture has been updated as per guidance from NSCS Review Committee to incorporate certain features required for security evaluation. Purchase order placed for critical hardware components.
- ◆ **QSSIP (Quantum-secure smart Video IP Phone)** - Development of all software features has been completed on reference board. Hardware development in-progress.

2. Technologies Transferred

- ◆ In support of government's Make in India and Digital National Programs, C-DOT promoted the indigenous technology development and manufacturing eco-system by transferring four new technologies to existing manufacturers, taking the total count of technologies transferred to 103.

3. Business Promotion Activities during FY 2020-21

Participation in Events & Exhibitions

- ◆ C-DOT Video Conferencing solution was officially launched by Shri Ravi Shankar Prasad, Hon'ble Minister of Communications and Shri Sanjay Shamrao Dhotre, Minister of State on 22nd May 2020. The solution was officially inaugurated by holding a Video Conference meeting with 23 Chief Post Masters General (CPMsG) from Department of Posts across India.
- ◆ Shri Sanjay Shamrao Dhotre, Hon'ble Minister of State, for Education, Communications, Electronics & IT, Government of India launched the 'Five Star Villages Scheme' through Department of Posts to ensure universal coverage of flagship postal schemes in rural areas of the country. The scheme seeks to bridge the gaps in public awareness and reach of postal products and services, especially in interior villages.

The whole launch was done through C-DOT VC solution on 10th September 2020 which is already in extensive use in the Department of Posts.

- ◆ C-DOT participated in the virtual India-Africa ICT Expo 2020 event on 1st to 2nd December 2020 and in virtual India Mobile Congress 2020 event from 8th to 10th December 2020. In view of the present situation on account of the adverse impact of COVID-19 pandemic, it was not feasible to organize and participate in the physical fairs/exhibitions and buyer-seller meets. Hence, the need of an hour is to move ahead and shift our focus from participating in physical exhibitions to virtual shows to connect with overseas buyers and build long term business engagements. Product Information and videos of latest C-DOT technologies were made available for access of potential customers.

4. EAL3 Certification for C-DOT Router

The C-DOT Terabit Router (Model: CRAT-100/CRDT-100) has been certified Evaluation Assurance Level (EAL-3) for its security features by Indian Common Criteria Certification Scheme (IC3S). The certificate was formally presented to Executive Director, C-DOT by Secretary, Ministry of Electronics & IT, Government of India on 4th August 2020.

The Common Criteria for Information Technology Security Evaluation (referred to as Common Criteria or CC) is an international standard (ISO/IEC 15408) for computer/IT product security certification. The evaluation of the features of C-DOT Router was done by the Common Criteria Test Laboratory, ERTL (E), STQC, Kolkata.

5. Awards Received

C-DOT's innovative approach and excellence were acknowledged by two prestigious awards conferred :

- ◆ "C-DOT Satellite Wi-Fi (C-Sat-Fi)," an innovative solution developed by the Centre for Development of Telematics (C-DOT), was selected as the SPECIAL MENTION (RUNNERS UP) of the 7th eNabling North East [eNorth East] Award 2019-2020 in the Category – 'Information communication technology for development'. C-DOT was honored "For its effort to provide digital connectivity through its C-Sat-fi technology towards connecting aspirational villages and enabling social impact in e-health, e-education and e-governance services in the State of Tripura" and the award was announced during the final event of the 7th eNorth East Award, held on June 20, 2020.

- ◆ C-DOT received second prize for CSMP-NMS in the R&D Large Category during 45th ELCINA (Electronics Industries Association of India) Awards 2019-20 on 11th December 2020.

6. C-DOT's contribution during Covid-19 Pandemic

- ◆ **COVID-19 Savdhaan** - Covid Savdhan application, developed by C-DOT, enables authorities to reach out to all mobile subscribers in any particular containment zone up to the level of individual mobile tower and convey targeted messages about health, well-being, water supply etc. by means of SMS in local language. The messaging service is available in all regional languages, and so far, more than 26 million messages have been sent out through the platform for Covid-19 related communication till now.
- ◆ **Arogya Setu IVRS** - The government recently launched the Aarogya Setu Interactive Voice Response System (IVRS) developed by C-DOT, to cover feature phone and landline users. Initially only smartphone users were able to use the Arogya Setu application and get updates on whether they have unknowingly come in contact with a COVID-19 positive person and can contract the virus.

The IVRS service is available across India. This is a toll-free service, where a feature phone and landline user will need to give a missed call to the number 1921 and will get a call back requesting for inputs regarding their health. The questions asked are aligned with Aarogya Setu app, and based on the responses given by the person. The person will get an SMS indicating their health status and alerts. The service is now available in 11 regional languages just like the mobile application.

- ◆ **CQAS** - The Department of Telecommunications (DoT) has shared a Standard Operating Procedure (SOP) with all telecom service providers regarding the application called COVID-19 Quarantine Alert System (CQAS) developed by C-DOT.

CQAS collects phone data, including the device's location, on a common secure platform and alerts the local agencies in case of a violation by COVID patients under watch or in isolation.

The CQAS prepares a list of mobile numbers, segregates them on the basis of telecom service providers, and the location data provided by the telecom companies is run on the application to create geo-fencing. The location

information is received periodically over a secure network for the authorised cases with "due protection of the data received". The System triggers e-mails and SMS alerts to an authorised government agency if a person has jumped quarantine or escaped from isolation, based on the person's mobile phone's cell tower location. The "geo-fencing" is accurate by up to 300 m.

Covid-19 announcements were enabled in English/Hindi and regional languages from C-DOT MAX-NG landline and FTTH subscribers.

7. Campus Infrastructure

C-DOT having fully developed and integrated 40 acres of green campus at Mandi Road, New Delhi. C-DOT has achieved self-sufficiency to meet his water demand of 286 KLD through in house 4 Nos of Borewells duly approved by the Central Ground Water Authority. The Rain water harvesting system in the C-DOT Campus is valuable resource for enriching ground water table of this area. C-DOT Campus having Sewerage Treatment Plant (STP) of capacity 125 KLD. No sewage or wastewater is permitted in the external municipal sewerage system and all the treated sewerage is recycled within the Campus for Horticulture purposes.

Under the Swatch Bharat Mission, C-DOT has installed the AAGA community composter as solution for managing the waste at source for all bulk waste generators. This process is completely organic, environmentally friendly as it requires no electricity to operate, there is no mechanical procedure involved. It is very effective to handle the kitchen waste & horticulture residue to convert in compost and using it for Horticulture purpose in the Campus.

The power supplied by BSES directly from the grid of 66 KVA. To achieve eco-friendly campus, 1.157 MWp Roof top solar (Solar RTS) System has been installed at C-DOT Delhi campus in partnership with Central Electronics Limited (CEL). These system are installed for 600 KWp and 557 KWp at C-DOT Delhi and Bangaluru Campuses respectively and operating successfully. C-DOT Delhi campus has 3 no. of DG set each having capacity 1500kVA as a power backup. The DG sets are equipped with acoustic enclosure to minimize noise generation and adequate stack height for proper dispersion.

8. Technology Commercialization

MoUs and Project Agreements

Executable project	Strategic Partner	Purpose
i) C-DOT 4G/LTE/IMS for defense networks ii) Routers for Indian Defense Networks iii) Layer 2/ Layer 3 Ethernet Switches for Indian Defense Networks	Alpha Design Technologies Pvt Ltd (ADTL)	Framework of co-operation between C-DOT and ADTL for the concerned projects
Joint Development of Products & Services as per respective Project Agreements	TATA Consultancy Services Ltd.	Framework of co-operations of the parties in research and development activities relating to the field of telecommunications
Technical Projects in the area of Quantum Optical Communications	Physical Research Laboratory (PRL)	Framework of co-operations of the parties for creation and delivery of innovative Quantum Optical Communications technologies and products

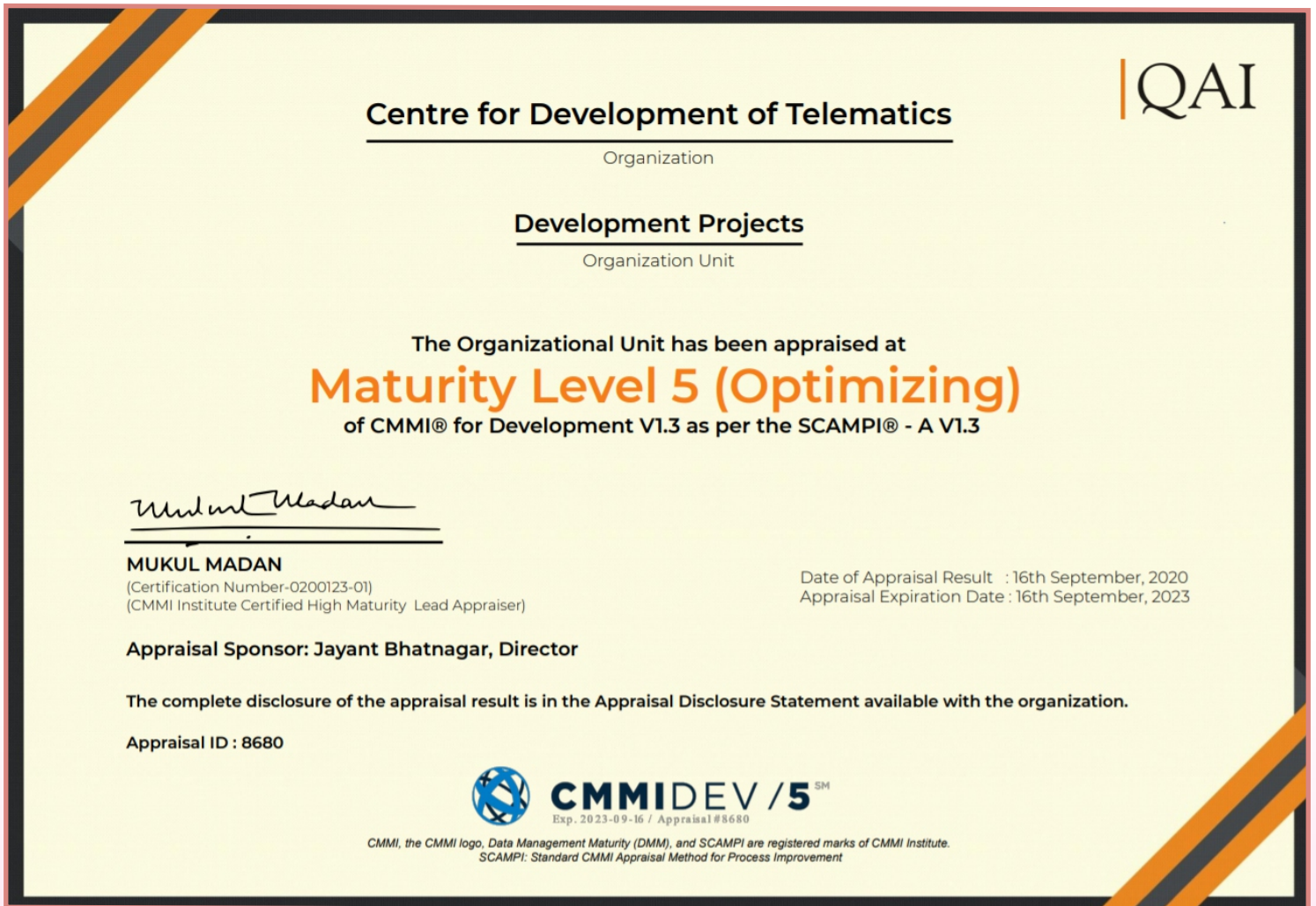
Organizational Processes and Practices

Organizational processes and practices for sustenance of CMMI Maturity Level 5

The organization was successfully appraised for CMMI Maturity Level 5 in 2014, for first time, and after expiry of validity period, successfully re-appraised in 2017, for its processes and practices related to hardware as well as software development projects.

During FY 2020-21, C-DoT has been appraised successfully for sustenance at CMMI Maturity level 5 – with validity till 16.09.2023.

This is third time being successful in-a-row, since May-2014. Prior to this, Spot Checks by external assessor as preparations for a formal appraisal were done. Findings were resolved to have a formal appraisal (SCAMPI-B appraisal in July and final SCAMPI-A appraisal at CMMI level 5 in September 2020).



Intellectual Property Rights

Details of Patents Granted in FY 2020-21

S. N.	Title	Country
1.	Device and Method to Provide Secure Communication in an Internet Protocol (IP) Network (India)	India
2.	A GSM-EDGE transmitter for modulating signal for transmission and a method thereof (India)	India
3.	System and Method for Facilitating Optimization and Analytics of a Managed Network (UK)	UK
4.	A method and an information appliance device for preventing security breach in information appliance device (USA)	USA
5.	GIS based Centralized Fiber Fault Localization System (China)	China
6.	FTTP System for Passive Optical Network for Minimizing Fiber Laying by Utilizing Existing Laid Fiber (India)	India
7.	WI-FI based Early Emergency Alert and Disaster Site Management in India (India)	India

Details of Patents Filed in FY 2020-21

S. N.	Title	Country
1.	System and Method for Secure Content Distribution in a Network	India
2.	Secure Real Time Transmission of Data Signals	India
3.	System and Method for Geo-Targeted Automated Emergency Alerting through Analog Radio Broadcast	India
4.	Apparatus and Method for Adjusting the Phase- Modulator's Modulating Signal Time Reference in a Quantum-Key-Distribution System	India
5.	System and Method for Real-Time Cloning Detection and Blocking of Cloned and Stolen Mobile Devices in a Country's Mobile Network	India



Copyrights Granted in India

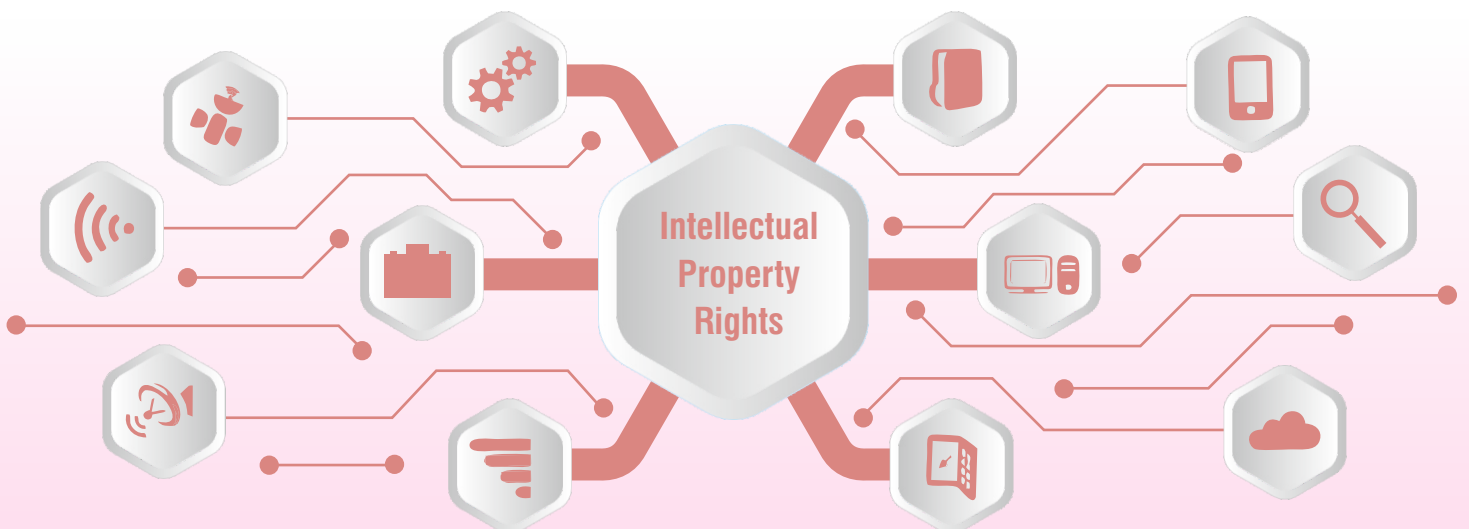
S. N.	Title
1.	North Bound Interface for GPON NMS
2.	Messenger
3.	C-DOT Dashboard and Reports
4.	Real time optimised DVB-S2 forward link transmitter for DVB-RCS Hub system

Copyrights Filed in India

S. N.	Title
1.	High throughput DVB-S2 Modulator Baseband System

Trademarks Granted in India

S. N.	Trademark Name/Logo
1.	Balloon WiFi



Details of Paper Publications

S. N.	Title	Publication / Conference details
1.	Classification of Disaster Related Tweets using Supervised Learning: A Case Study on Cyclonic Storm Fani	4th ICTIS 2020, 24-25 April 2020, Ahmedabad India
2.	Fast Band Power Measurement Technique in Wifi System using Spectrum Analyzer	The International Journal of Applied Power Engineering (IJAPE)
3.	A Pragmatic Industrial Roadmap for shifting the existing Fronthaul from CPRI to 5G Compatible eCPRI	2020 IEEE 3rd 5G World Forum, Bangalore 10-12 September 2020
4.	Reinforcement Learning Based Intelligent Traffic Signal Control using n-step SARSA	IEEE International Conference On Artificial Intelligence & Smart Systems (ICAIS 2021), Coimbatore, 25-27 March 2021
5.	A Review Paper on IoT Communication Protocol	International Journal of Research in Electronics and Computer Engineering (IJRECE) - International Institute of Organized Research (I2OR)

Transfer of Technology

Technology Development and efficient Transfer of Technology results in building an enabling base for manufacturing ecosystem for India. The Transfer of Technology (ToT) philosophy of C-DOT aims at a high rate of success in the technology dissemination process and functions in line with the 'Make in India' and 'Atma Nirbhar Bharat' initiatives of Government of India. It aims at educating the recipients of various technologies not only on the infrastructural requirements and requisite know-how for production, but also at providing the licensed manufacturers with vital details about sources and specifications for the capital equipment and components.

During the FY 2020-2021, C-DOT has signed a total of 4 ToTs covering existing Technologies/Products. Of these 4 ToTs, 3 were signed with private sector manufacturers and 1 ToT Agreement extension with CPSU, KELTRON. Efforts are on with the CPSUs and Private Sector for WiFi, Routers, Switches, V.35 and OTT/STB. As on 31st March, 2021, a total of 103 ToTs are signed for 33 Technologies, with 27 different Licensees. C-DOT, through its ToT, has supported bulk manufacturing for deployment of its Optical Products like GPON, Routers & Layer 2 Switches and WiFi

Products like BBWT, WAP and Mini PDO, through working very closely with the central public sector undertakings like M/s BEL, M/s ITI Ltd and M/s ECIL and with Private sector Aggressive-EMS. For PAN India deployment of GPON and WiFi in BharatNet, C-DOT is closely working with various units of M/s ITI and with private manufacturing partners. These deployments give a positive boost to building BharatNet which provides enabling infrastructure to the Government of India's 'Digital India' initiatives and to connect 6 Lakh villages of India. Efforts are on to include MSMEs and small private sectors to get engaged with C-DOT. ToT together with Marketing, Finance and Legal, is in the process of recovering pending ToT fee and Royalty.

C-DOT technology Manufacturing Partners including CPSUs, and more notably the Licensees from private sector like M/s Cyient Ltd., M/s Aggressive EMS, M/s Keynes Technology, and M/s Surbhi are working closely with C-DOT in reaching out to non-Government segment of business for WiFi based products such as Solar/High Speed Access Broadband Wireless Terminals, WAP, Mini PDO and STB.



C-DOT Technologies / Products	C-DOT Licensees (ToTs Completed as on 31.03.2021)				
	PSUs (Govt.)	PSU Count	Private	Private Count	TOTAL
GPON Damini	BEL BLR, ITI RBL	2	SIS,SMCEL, UTL,VMC,HFCL	5	7
Bhavan Damini	BEL BLR,ITI RBL	2	SIS, VMC,UTL, HFCL	4	6
Daksh Damini	ITI RBL	1	HFCL, Tejas,RHPL ,CYIENT, KAYNES	5	6
Mini OLT 16 Ports			HFCL	1	1
6 slot OLT/Damini	BEL BLR,ITI RBL	2	VMC, UTL, HFCL	3	5
GPON OLT 5X	BEL BLR,ITI RBL	2	VMC, UTL, HFCL, SCTSPL, CYIENT, KAYNES	6	8
Chatur Damini &Titli Damak		--	HFCL , CYIENT,CSC,KAYNES	4	4
Titli Damak	ITI	1	Tejas,VMC	2	3
COLT (Joint Dev.)	--	--	Tejas	1	1
ONT 11			Tejas,CSC ,KAYNES	3	3
ATM	BEL BLR	1			1
MAX-NG	ECIL, IL-KOTA ITI-MKP,BEL-KOT	4	--	--	4
AN RAX	ECIL, IL-KOTA, ITI-BLR,BEL-KOT	4	--	--	4
256 P RAX/SBM (Extn)	KELTRON (2), ITI MKP, IL Kota	4	--	--	4
BBWT Basic	ECIL, ITI-MKP	2	HFCL,SCTSPL,COMINT, Tarangg (MSME)	4	6
BBWT Solar	ITI- MKP	1	COMINT,TARANGG	2	3
BBWT Long Range	ITI-MKP	1	COMINT,TARANGG	2	3
BBWT (SOLAR NEW)	ITI,BEL-KOT	2	Cyient,Elcom,KAYNES, Aggressive	4	6
BBWT (HSAP)	ITI,BEL-KOT	2	Cyient,Elcom,KAYNES, Aggressive	4	6
PDO			RCV LTD., KAYNES	2	2
MINI PDO			RCV	1	1
STBR	BEL BLR,ECIL,ITI BLR	3	HFCL	1	4
CRTR-210	BEL-KOT	1			1
L2 Switch	BEL BLR	1	HFCL	1	2
Enhanced L2 Switch	BEL-KOT	1			1
DRAX/Gyan Setu	ECIL, ITI	2	--	--	2
NGSG Card	BEL BLR	1	--	--	1
GPSU (75W/125W)	ITI-Naini	1	SCTSPL, Tarangg(MSME)	2	3
GPSU(250W)	ITI-Naini	1			1
CGRAN	ITI-MKP	1		--	1
Power Amplifier	-		TPSED	1	1
STB	-	-	Surabhi	1	1
WAP			Aggressive-EMS	1	1

29 Technologies

9 Licensees

43 ToTs

18 Licensees

60 ToTs

103 ToTs
27 Licensees

Knowledge Management

Training at C-DOT

Training is an important cornerstone for the growth and sustenance of an organization. To enhance knowledge and upgrade skills of our employees regular training programmes are conducted across the year. Employees are encouraged to participate in various seminars and conferences. Various internal and external trainings on technical, managerial and soft-skills are arranged for the employees.

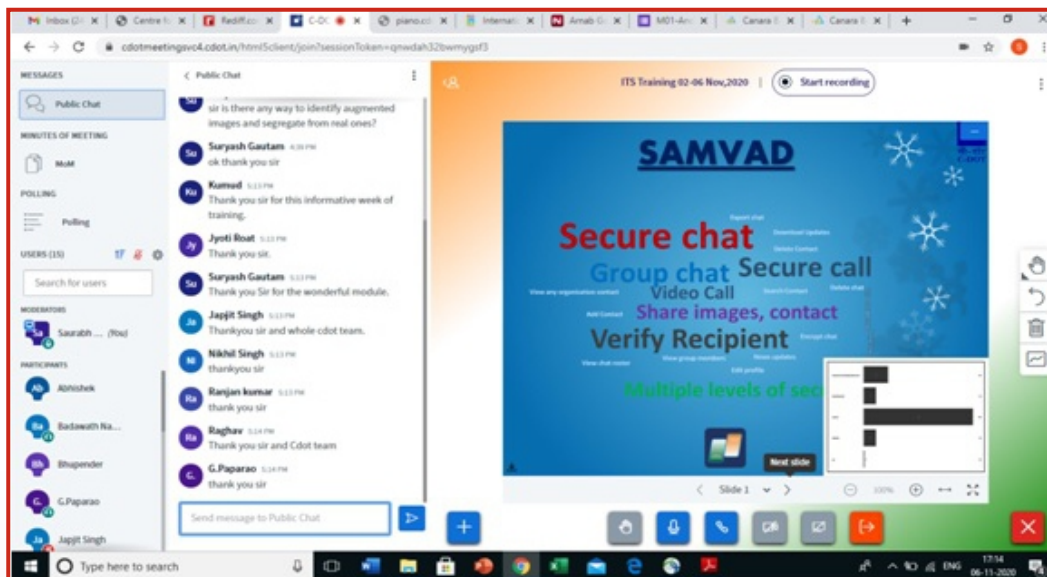
Delhi Office

Under prevailing pandemic situation, following online training activities were undertaken during the FY 20-21.

- Training for “Android Kernel & Platform Development”

- Trainings through Spring people (L&D) Cloud Platform
- Training on Govt e-market place (GeM)
- Lectures on Quantum Key Distribution
- 45-Days Online Program of Attachment for ITS-2018 Batch Officer Trainees
- Sharing of around 100 webinars/events information with employees and good number of staff attended
- Sharing of trainings recordings and courses with staff through C-DOT intranet

5-Days Online Program of Attachment for ITS-2018 OTs



Training Metric for FY 2020-21

S.NO.	Training Details for C-DOT, Delhi	No. of Persons Attended	Total Time in Trainings (in hrs)
1.	1st Quarter of FY	57	505
2.	2nd Quarter of FY	65	1359
3.	3rd Quarter of FY	18	83
4.	4th Quarter of FY	14	184
	TOTAL	154	2131

KMG Delhi circulated regular mails on topics of employee's development and relevant technical articles. Information and updates related to useful telecom webinars and events were also broadcasted within C-DOT on topics like Telecommunications Leading to 5G, Overview of ETSI reference architecture for Augmented Reality solutions, Digital Defence MSME Conclave 2020, Unlocking your attitude during lockdowns, IoT Sensors and Network for Disaster Communication, 5G & Emerging Technologies, Defending with Deception Technology, IMC 2020 Curtain Raiser to name a few.

Bengaluru Office

Continuous efforts are made to enhance the skill sets of C-DOT employees. Hence employees are encouraged to participate in various seminars and conferences. Various internal and external trainings on technical and managerial skills are arranged for the employees.

Various topics on which training during the year 2020-2021 were arranged are Information security, Introduction to Data Science / Machine Learning using Python, Advance course in Machine Learning using Python, public finance and Government accounting, CMMI Dev 2.0 and high maturity concepts.



The trainings conducted this year are

S.NO.	Type of Training for FY 2019-20	No. of Trainings Conducted	Participants Benefitted
1.	Organizational training	2	57
2.	Group specific training	2	4

Knowledge Management Group, Bangalore broadcasted the notifications of webinars conducted by other institutions on various topics such as Modelling Complex System Signal Path for Signal Integrity, 5G New Radio, Research and Stack Implementation Challenges, RF Fundamentals, Quantum Communication: An intuitive introduction, The Era of Programmable Network, Cryptography in IoT, Risk Management using Primavera Image Grafix, Wi-Fi 6 etc., to C-DOT Staff. 81 staff got benefitted.

Knowledge Management Centre

Knowledge Management Centre has been established to provide latest scientific and technical information to support C-DOT research and development activities. It includes a rich collection of more than 20130 technical books, 3449 Hindi books and over 62 periodicals and magazines besides country's 10 leading Newspapers and Newsletters (across locations). For the year 2020 -2021 a total of 46 books were added to the library collections.

C-DOT has also subscribed to IEEE and ACM digital library through MCIT consortia. The IEEE Xplore digital library is a

powerful resource for discovery of and access to scientific and technical content published by the Institute of Electrical and Electronics Engineers (IEEE) and its publishing partners. The ACM Digital Library (DL) is the most comprehensive collection of full-text articles and bibliographic records in existence today covering the fields of computing and information technology. The full-text database includes the complete collection of ACM's publications, including journals, conference proceedings, magazines, newsletters, and multimedia titles.

Corporate Memberships

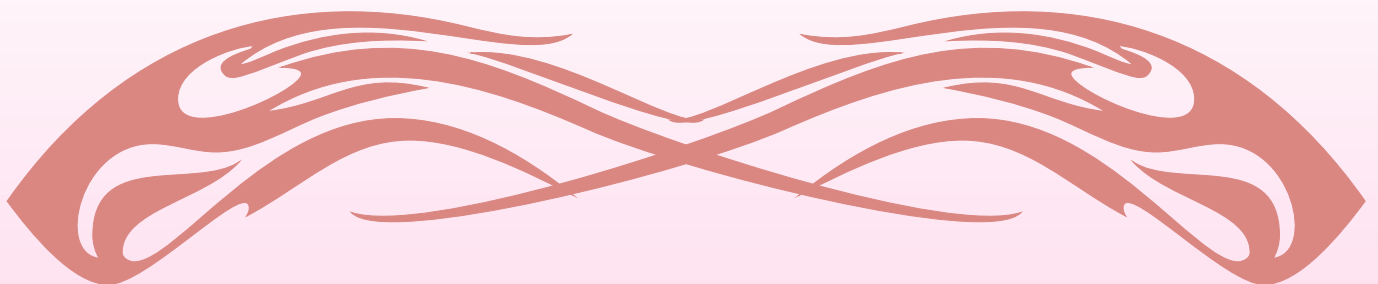
S. N.	Name of the Memberships	Type of Membership
1.	All India Management Association (AIMA)	Institutional Membership since 1994
2.	BroadbandIndia Forum, Internet Protocol Television Society (IPTV)	Corporate Membership since 2015
3.	Asia Pacific Network Information Centre (APNIC)	Associate Membership since 2005
4.	CurrentScience Association	Institutional Membership since 2016
5.	Delhi Management Association (DMA)	Patron Membership since 1996
6.	Electronic Industries Association of India (ELCINA)	Associate Membership since 2010
7.	Electronics & Computer Software Export Promotion Council (ESC)	Associate Membership since 2009
8.	European Telecommunication Standards Institute (ETSI)	Associate Membership since 1999
9.	Fiber To The Home (FTTH) Council	Silver Membership since 2010
10.	3GPP	Individual Membership through TSDSI since 2014
11.	India Electronics & Semiconductor association (IESA)	Corporate Membership since 2013
12.	Institute of Directors (IOD)	Institutional Membership since 2015
13.	Institution of Electronics and Telecommunication Engineers (IETE)	Organizational Membership since 2010
14.	International Telecommunication Union (ITU)	Academia Membership since 2019
15.	National Association of Software and Service (NASSCOM)	Associate Membership since 1996
16.	OneM2M	Individual Membership through TSDSI since 2014
17.	PICMG	Associate Membership since 2015
18.	Telecom Equipment & Services Export Promotion Centre (TEPC)	Corporate Membership since 2015
19.	Telecommunications Standards Development Society, India (TSDSI)	Institutional Membership since 2014
20.	Wireless Broadband Alliance	General Membership since 2016
Library Memberships		
21.	American Centre	Organizational Membership
22.	British Council Library	Access 10 Membership
23.	Delnet (Developing Library Network)	Institutional Membership

Apprenticeship Training

The scheme of Apprenticeship training provides opportunities for practical training to graduate engineers, diploma holders (Technicians) and 10+2 vocational pass outs from about 10,000 industrial establishments/organizations as per the policies and

guidelines laid down by the Central Apprenticeship council (CAC) which is an apex Statutory body constituted under the Apprenticeship Act, 1961. As per these guidelines C-DOT also takes apprentices (graduate, diploma and ITI) on yearly basis.

Category	On roll as on 31-03-20	Period from 01-Apr-2020 to 31-Mar-2021			Strength as on 31-03-21
		Inducted	Resigned	Completed	
Graduate	27	4	5	22	4
Diploma-Technical	0	0	0	0	0
ITI	0	0	0	0	0
Total	27	4	5	22	4



C-DOT's Major Contributions

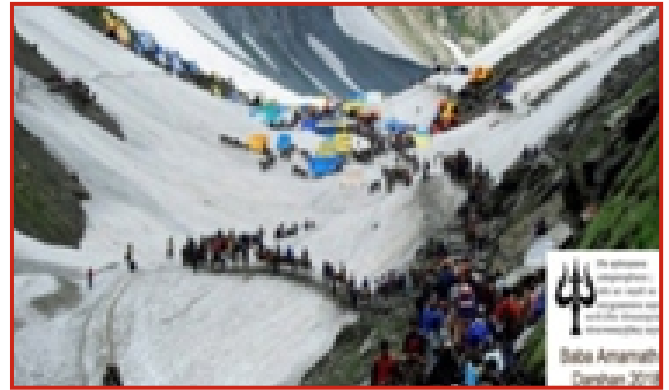
During FY 2020-21

1. CAP Solution

Usage of C-DOT CAP solution during YAAS and Tauktae cyclone

On 24th May and 25th May 2021, the Common Alert Protocol (CAP) of Department of Telecommunications (DoT)/CDoT were extensively used by State Disaster Management Authorities (SDMAs) in West Bengal, Odisha and Andhra Pradesh to disseminate the cyclone alert messages free of cost. A total of more than 6 crore bulk SMS/messages were sent in local languages alerting local residents. Of these 3.87 crore were in West Bengal, 2.43 crore in Odisha and 36.4 lacs in Andhra Pradesh.

Earlier, during Tauktae cyclone also, C-DOT CAP solution was extensively used for disseminating alerts in Maharashtra, Gujarat and other states.



2. Contribution during Covid-19

a) Covid-19 Savdhan

Covid Savdhan application enables authorities to reach out to all mobile subscribers in any particular containment zone up to the level of individual mobile tower and convey targeted messages about health, well-being, water supply etc. by means of SMS in

local language. The messaging service is available in all regional languages, and so far, more than 26 million messages have been sent out through the platform for Covid-19 related communication till now.

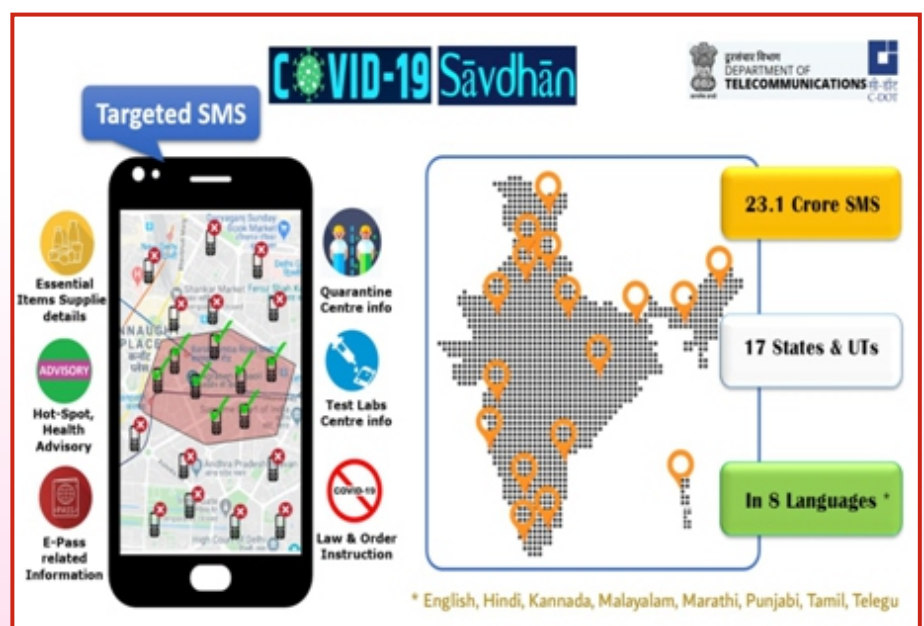
Centre offers apps to help states track Covid-19 quarantine breakers

Covid-19: Officials in several states have acknowledged previously that they use mobile network information to monitor those meant to be under quarantine, but the Centre's pitch to other states that are not using such services at present details how these tools work and the sort of legal authorization behind it.

INDIA Updated: Apr 19, 2020 06:04 IST

Smriti Kak Ramachandran and Amrita Madhukalya
Hindustan Times, New Delhi

A second official who occupies a senior post in the telecom department, said the tools have been developed by C-DOT to help health and disaster management authorities. "Covid Savdhan application, in particular, enables authorities to reach out to all mobile subscribers in any particular containment zone up to the level of individual mobile tower and convey targeted messages about health, well-being, water supply etc by means of SMS in local language," this person added.

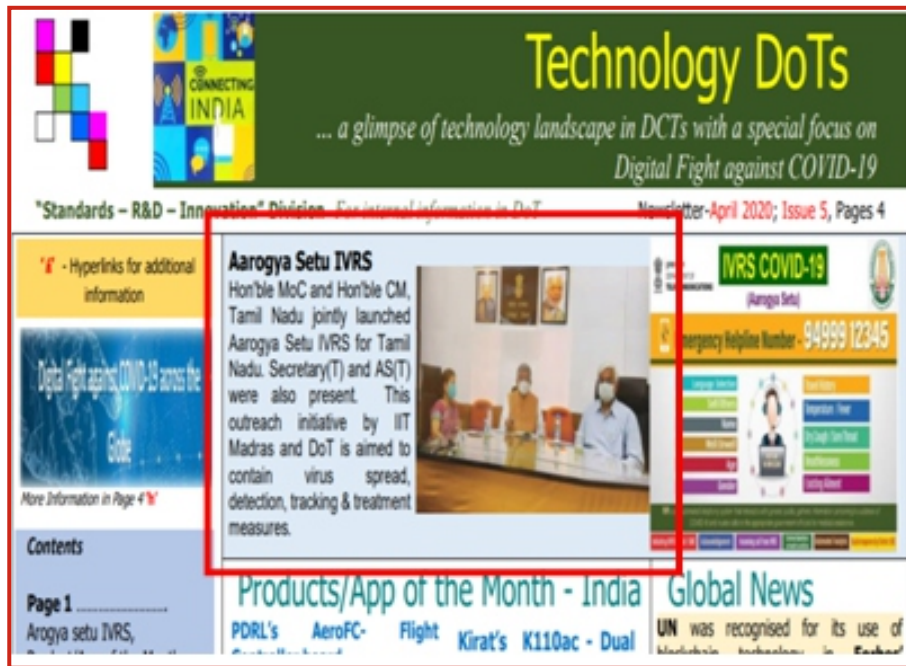


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CQAS collects phone data, including the device's location, on a common secure platform and alerts the local agencies in case of a violation by COVID patients under watch or in isolation.

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the basis of telecom service providers, and the location data provided by the telecom companies is run on the application to create geo-fencing. The location information is received periodically over a secure network for the authorised cases with "due protection of the data received". The System triggers e-mails and SMS alerts to an authorised government agency if a person has jumped quarantine or escaped from isolation, based on the person's mobile phone's cell tower location. The "geo-fencing" is accurate by up to 300 m.

Awards Received

1. 7th eNabling North East [eNorth East] Award 2019-2020

Product: C-Sat-Fi

“C-DOT Satellite Wi-Fi (C-Sat-Fi),” an innovative solution developed by the Centre for Development of Telematics (C-DOT), was selected as the SPECIAL MENTION (RUNNERS UP) of the 7th eNabling North East [eNorth East] Award 2019-2020 in the Category – 'Information communication technology for development'. C-DOT was honored “For its effort to provide digital connectivity through its C-Sat-fi technology towards connecting aspirational villages and enabling social impact in e-health, e-education and e-governance services in the State of Tripura” and the award was announced during the final event of the 7th eNorth East Award, held on June 20, 2020.





SPECIAL MENTION'S CERTIFICATE OF RECOGNITION

This is to certify that the Project titled, “*C-DOT Satellite Wi-Fi (C-Sat-Fi)*,” by The **Centre for Development of Telematics (C-DOT)**, has been selected as the **SPECIAL MENTION (RUNNERS UP)** of the 7th eNabling North East [eNorth East] Award 2019-2020 in the...

CATEGORY: INFORMATION COMMUNICATION TECHNOLOGY FOR DEVELOPMENT

As announced during the final event of the 7th eNorth East Award, held on June 20, 2020 (virtual).

Citation

“For its effort to provide digital connectivity through its C-Sat-fi technology towards connecting aspirational villages and enabling social impact in e-health, e-education and e-governance services in the State of Tripura.”

Wishing a very best for future endeavours!

 Mr. Rajesh Verma Former Secretary, Information Technology Govt. of Sikkim, Hon'ble Jury Member, 7th eNorth East Award, 2019-2020	 Prof Dinabandhu Sahoo Scientific Advisor to Chief Minister of Meghalaya, Hon'ble Jury Member, 7th eNorth East Award, 2019-2020	 Dr. Syed Kazi President: eNorth East Award 7th eNorth East Award, 2019-2020
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2. 45th ELCINA Awards for Outstanding Achievements in “Research & Development” for the year 2019-20

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EVENTS 2020-21

MAY 2020

- ◆ Launch of C-DOT Video Conferencing Tool

SEPTEMBER 2020

- ◆ Launch of 'Five Star Villages Scheme' through C-DOT VC solution

JANUARY 2021

- ◆ Visit by Member Technology in C-DOT Campus Bengaluru

1. Launch of C-DOT Video Conferencing Tool

In line with the push towards greater self-reliance, C-DOT has developed a secure video-conferencing platform for use by the government and other strategic sectors. The need for an indigenous platform was felt during the Covid-19 outbreak, which resulted in a nationwide lockdown. Given the likelihood of the "new normal" in the post-coronavirus era, VCs would be required for the functioning of most government departments.

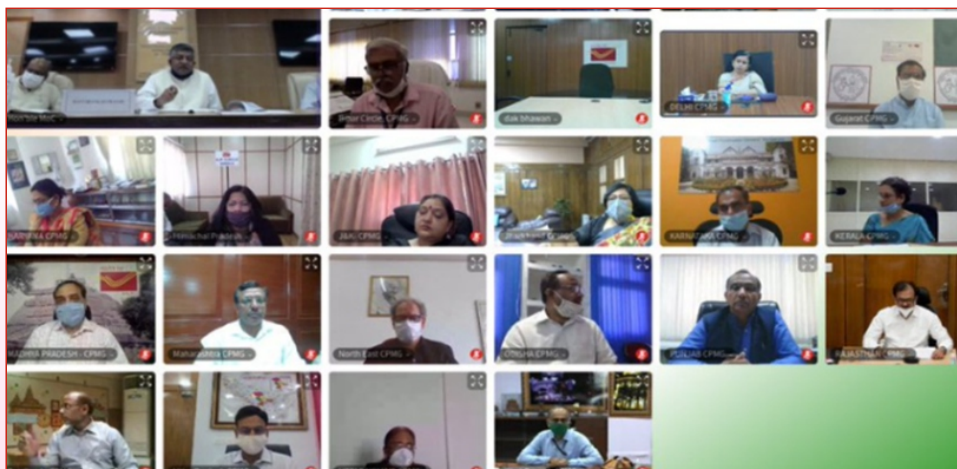
The VC solution was officially launched by Shri Ravi Shankar Prasad, Hon'ble Minister of Communications and Shri Sanjay Shamrao Dhotre, Minister of State on 22nd May 2020. The solution was officially inaugurated by holding a Video Conference meeting with 23 Chief Post Masters General (CPMSG) from Department of Posts across India.



2. Launch of 'Five Star Villages Scheme' through C-DOT VC solution

Shri Sanjay Shamrao Dhotre, Hon'ble Minister of State, for Education, Communications, Electronics & IT, and Government of India launched the 'Five Star Villages Scheme' through Department of Posts to ensure universal coverage of flagship postal schemes in rural areas of the country. The scheme seeks to bridge the gaps in public awareness and reach of postal products and services, especially in interior villages.

The whole launch was done through C-DOT VC solution on 10th September 2020 which is already in extensive use in the Department of Posts.



3. Visit by Member Technology in C-DOT Campus Bengaluru

Shri K Ramchand, Member Technology of Department of Telecom visited C-DOT campus, Bengaluru on 29th January 2021.



HR Initiatives

Women Empowerment

C-DOT's Management has always been sensitive to gender issues and has consistently worked towards creating organizational culture reflecting gender equality. Presently, about 32.3% of staff in C-DOT are women.

Existing Policies

- ◆ All female staff members are allowed to avail up to 180 days maternity leave & up to 90 days leaves subsequent to that (270 days inclusive of 180 days maternity leave). For miscarriage/abortion, leave of a total of 45 days in the entire service span is permissible.
- ◆ Child Care leave is also granted to eligible female staff on their applying for the same, as per rules.
- ◆ C-DOT offers accommodation and transport benefits to all its women employees with different options that maybe availed as per individual needs. This ensures the safety and security of all women employees in the company.
- ◆ Reimbursement for residential telephone expenses is admissible to 100% of the women staff.
- ◆ Career growth opportunities are available to women employees in C-DOT. In the current financial year, of the total employees promoted to higher grades 26% of them were women.
- ◆ In management cadres (Team Leaders, Group Leaders, Technical Experts and Sr. Technical Experts) about 26% are women.
- ◆ As per the directives of Supreme court, C-DOT has a Complaint Committee for its Centres, at Delhi and Bangalore in case of any complaints relating to Sexual Harassment of women staff at work place for fair and justified view of the complaints, if any, and recommend suitable action on the same to the C-DOT Board.

Employee's Welfare

- ◆ For the purpose of coverage for hospitalization expenses, C-DOT has taken a Tailor-made group medi-claim insurance from National Insurance Company Ltd. for Staff members (and their families). The staff in E1 grade and below have a coverage of 3.5 lakhs and above and Staff in E11 grade and above have a coverage of 5 lakhs and above (7.5 Lakhs , 10 Lakhs and 15 Lakhs). The Group Medi-claim policy has been made effective from 01 April 2006.
- ◆ C-DOT has Grievance redressal mechanism for its staff to provide them with an easy & readily accessible machinery for prompt disposal of their day-to-day grievances.

Recruitment of SC/ST and persons with disabilities

- ◆ For recruitment of persons with disabilities and candidates belonging to SC/ST category, C-DOT follows government rules providing for reservation in jobs in C-DOT.
- ◆ C-DOT has a system in place to look after the welfare of persons belonging to these categories and address any problems/ complaints that may come up.
- ◆ **Director Recruitment (2 Post) for Delhi & (1Post) for Bangalore**
- ◆ Recruitment process for the post of Director, Delhi (2 post) was completed in the month of February, 2021. All interviews were conducted in Sanchar Bhavan. Recruitment for the Post of Director, Bangalore has been advertised and under process.

Benefits for persons with disabilities

- ◆ C-DOT follows guidelines issued by Government of India with respect to reservations in jobs for persons with disabilities.

- ◆ The physical handicapped employees are eligible for double the rates of transport allowance.
- ◆ The C-DOT Campus at Delhi has been constructed in such a manner so as to ensure barrier free environment for the persons with disabilities. The main entrance/exit can be approached through a ramp together with stepped entry. Even elevators connecting the various working areas have been installed in way to facilitate persons with disabilities to move around freely from one wing to another.

Review of growth Policy

- ◆ Growth Policy reviewed after studying the current trends and relevance to C-DOT and the present practices. Created a new policy which will supersede all the previous policies on career growth.

Disciplinary Committee

- ◆ Disciplinary Committee formed to address small disciplinary issues to maintain better discipline in office.

Updation of CCL Policy

- ◆ CCL Policy updated as per latest DOPT orders wherein single male parents were included to avail CCL and also salary restrictions in case it exceeds maximum limit.

Re-designation of FSEs as REs

- ◆ Field Support Engineers have to be allocated to field work only due to their designation and are being under utilised as there is less field work. Hence file has been put up for approval to re-designate them as REs to facilitate better utilization of manpower by allocating them to groups having less manpower.

Income limit of Dependents

- ◆ Income limit of dependents has to be raised as per latest DOPT orders. The same has been put up for approval.

Support Staff Recruitment

- ◆ Complete statistics of support staff with regard to attrition, replacement, retirement and the need to recruit support staff was discussed. File yet to be taken up for approval after discussions with the hardware groups.

Succession Planning

- ◆ Discussed this aspect. A process yet to be put in place to ensure better succession planning.

Award/Reward Policy

- ◆ Award/Reward policy has been created to keep the staff motivated. The present policy has to be reviewed. Yet to be taken up.
- ◆ Policy for recruitment on compassionate grounds: Under Process.

Policy for higher studies: To be reviewed.

Policy on internship: shall be taken up.

Apprenticeship Policy: shall be taken up.

Recruitment on Deputation Basis

- ◆ Initiated recruitment on deputation basis for the post of Chief Administration Officer, Bangalore and Manager-HR, Bangalore.

Swachhta Action Plan

Under the initiative of Swachh Bharat Mission, C-DOT's main focus was to prevent the spread of Novel Corona virus. C-DOT had maintained a regular clean and hygiene environment within its campus for the safety of its staff. 70% alcohol based sanitizers were placed in every block to maintain health and hygiene of the

staff. 2 OAK Mist Sanitizer Dispenser Machine were placed in the office premises for the above mentioned purpose. Staff desk were cleaned thrice during the office hours to maintain clean and hygiene environment within the C-DOT Premises.

Promotion of Hindi

Despite the fact that in the year 2020, the deadly Covid-19 wreaked havoc across the globe, the pandemic has set in a new course for development and implementation of Official Language in C-DOT. There has been a unique amalgamation of technology with language and Rajbhasha Ekak has endeavoured to keep many activities online for promotion & implementation of Official Language.

Rajbhasha Ekak is doing all out efforts to ensure implementation and compliance of Official Language Act in C-DOT.

Compliance of Section 3(3) of Official Language Act, 1963

In compliance of section 3(3) of Official Language Act, 1963, all Office Orders, Notifications, Contracts, Agreements, Tender forms, Administrative & other reports were issued bilingually in C-DOT.

Hindi Training

Under Hindi Teaching Scheme of Department of Official Language, Ministry of Home Affairs, officials were nominated from time to time for training in Hindi Language (Praveen).

Meetings of Official Language Implementation Committee

The quarterly meetings of Official Language Implementation Committee to review the progress made in implementation of Official Language were held at regular intervals through Video-conferencing in both Delhi and Bengaluru offices.

Hindi Utsav

The Hindi fortnight at C-DOT is celebrated not just for the sake of organising but as Hindi Utsav every year so that there is no time limit and its enthusiasm can be maintained throughout the year. Various programs and competitions are organized during this period.

The month of September, 2020 was celebrated as Hindi Utsav at C-DOT, Delhi and Bengaluru. Various competitions were organized during the month to motivate C-DOTians to do their day-to-day work in Hindi. This year due to the pandemic and in keeping with the social distancing norms, Hindi Utsav was organized online with great zeal and enthusiasm. To encourage

an increased participation in the Utsav, efforts were done to involve family members of C-DOTians and to make them also a part of movement for promotion of Hindi Language.

Staff members participate in large numbers and enthusiasm every year in all the events organised.

Paramparik Abhivadan: Traditional Indian Greetings

During the Utsav, efforts were made to promote traditional Indian greetings and conversation in Hindi over phone by calling & speaking to around 50 staff members daily. Staff greeting with traditional Indian culture instead of “Hello” were awarded with a token gift.

Rajbhasha Shree Award

The 3 best performers of the year were rewarded with Rajbhasha Shree Award, which carried a cash prize of Rs. 5000 each & a Citation for doing maximum official work in Hindi.

Poster Making

In order to make Hindi Utsav more interesting, online poster competition was organized in C-DOT to enhance creativity and draw attention towards working in Hindi.

Debate Competition

In an effort to connect the children of C-DOTians also with Hindi, online debate competition was organized for children of C-DOT staff members in two categories – Middle level & Senior Level. The winners were awarded with cash prize of Rs. 1000, a special memento and Certificate

Essay Competition

Online essay competition was organized for staff members.

Acting Competition

Hindi Utsav provided a unique opportunity to staff members to bring out their hidden talent for acting in the convenience of their personal stage and send in their entries conveying some social message or bringing alive literary work by sending a video recording of their acting.

Display of posters for promotion of Hindi Language

In pursuance of the directions of Department of Official Language, Ministry of Home Affairs, posters for promotion of Hindi language were designed and displayed at prominent places in C-DOT campus to increase awareness about OL rules and regulations, and also to encourage working in Hindi among staff members.

TOLIC Activities

C-DOT participated in all the meetings, activities & programs conducted & organized under the auspices of TOLIC in Delhi and Bengaluru with full enthusiasm.

C-DOT Delhi office is nominated as a Nodal Office for 10 Central Government offices and has been entrusted with the responsibility of collection and scrutiny of their Progress Reports and prepare a consolidated report to be sent to the TOLIC headquarters.

This year due to the pandemic all the events of TOLIC were conducted ONLINE.

C-DOT Bengaluru staff participated in the various competitions organized as part of Joint Hindi Fortnight Celebrations by various member offices of TOLIC and had been declared winners.

As every year, C-DOT, Bengaluru sponsored and organized online inter-office “Swarachit Kavita Lekhan” competition as part of Joint Hindi Fortnight Celebrations, which saw good participation from other offices.

Special Mention

C-DOT, Bengaluru office despite being in the “C” Region category as defined by Govt. of India. C-DOT, with the collective efforts of all the staff has achieved 100% mark with reference to generation of original correspondence in Hindi, whereas the target fixed for the region is 55% only.

Vigilance Awareness Initiatives



During the year 2020-21 a number of steps were undertaken to carry our vigilance activities, primarily preventive Vigilance, as per the directives of CVC. Practices and procedures mainly related to Operation and Maintenance contracts and Disciplinary proceedings were reviewed and corrective measures were taken. Annual Property Returns along-with intimation for acquiring movable/ immovable property are now filed regularly by the staff of C-DOT. Moreover, now most of the procurement is done either through Central Procurement Portal (CPP) or Government e-Marketplace (GeM). Annual Immovable Property Return weblink has been made available in C-DoT website.

Integrity Pact has been implemented in C-DOT with the appointment of Independent External Monitor (IEM). In C-DOT processing of Vigilance Clearance cases for resignation/ superannuation/ clearance of no dues/ promotions (lateral and vertical) etc. have been made on-line.

Vigilance Awareness Week 2020 was observed successfully in C-DOT (both at Delhi and Bengaluru campus) from 27th Oct. – 2nd

Nov-2020, following due precautions because of Covid pandemic. Integrity pledge was administered by Dr. R K Upadhyay, Executive Director. The keynote address was delivered by Shri Sanjeev Kumar Chadha, CMD, NAFED. Shri Rajiv Verma, OSD, CVC also addressed the officers/staff during the program. Most of the employees of C-DOT have taken integrity e-pledge.





INDEPENDENT AUDITOR'S REPORT

To the Members of the Board of Centre for Development of Telematics (C-DOT)

Opinion

We have audited the accompanying financial statements of Centre for Development of Telematics (C-DOT) a society registered under Societies Registration Act XXI 1860 bearing regn. no S/14839 of 1984 (the society), which comprise the Balance Sheet as at 31st March 2021 and the Income & Expenditure for the year then ended, and notes to the financial statements, including a summary of significant accounting policies

In our opinion, the accompanying financial statements give a true and fair view of the financial position of the society as at March 31, 2021, and of its financial performance for the year then ended in accordance with the Accounting Standards issued by the Institute of Chartered Accountants of India (ICAI).

Basis for Opinion

We conducted our audit in accordance with the Standards on Auditing (SAs) issued by ICAI. Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are independent of the entity in accordance with the ethical requirements that are relevant to our audit of the financial statements, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Emphasis of Matter

We draw attention to:

- Note 4(b)(i) that outstanding dues amounting to Rs.3283.05 lakhs included in Sundry debtors, due from one of the licensees, were to be adjusted by transfer of land and building at Bangalore unit. The status continues from the year 2004-05.
- Note No.4(b)(ii) that Sundry debtors of Rs.15,054.91 lakhs, have remain unconfirmed, and most of dues are from PSU's and Govt. Agencies recovery of which are being under Synergy initiative of ministry , hence considered good.
- Note No 5 that inventory comprises of spares which are intended to be used in in-house research & development.
- Note no 8, that revenue is recognized when it is not unreasonable to expect ultimate collection.

Responsibilities of Management and Those Charged with Governance for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with the aforesaid Accounting Standards, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the society's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the society or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the society's financial reporting process.

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with SAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

**For Hingorani M. & Co.
Chartered Accountants
Firm Reg. No. 006772N**

Sd/-

**CA. Sanjay Kumar Narang
Partner
Membership No. 090943**

UDIN: 21090943AAAAHP2393

Place: New Delhi

Date: September 4, 2021

BALANCE SHEET AS AT MARCH 31, 2021

(in Rupees)

Particulars	Schedule No.	2021	2020
CORPUS/CAPITAL FUND AND LIABILITIES			
Corpus/Capital fund	1	4,18,80,10,721.73	3,29,66,14,526.02
Current liabilities and provisions	2	1,59,39,26,429.82	1,80,90,57,358.95
TOTAL		5,78,19,37,151.55	5,10,56,71,884.97
ASSETS			
Fixed assets	3		
Gross block		6,86,07,83,833.05	6,81,34,06,967.35
Less :- Depreciation		5,94,32,92,010.75	5,74,43,09,525.96
Net block		91,74,91,822.30	1,06,90,97,441.39
Asset in transit	3	-	-
Capital work-in-progress	4	72,46,064.50	72,46,064.50
Investments - long term	5	-	-
Current assets, loans, advances and deposits	6	4,85,71,99,264.75	4,02,93,28,379.08
TOTAL		5,78,19,37,151.55	5,10,56,71,884.97
Significant Accounting Policies	14		
Contingent Liabilities and Notes on Accounts.	15		

Schedules 1-15 form an integral part of the Financial Statements.

As per our report of even date .
For Hingorani M & Co.
Chartered Accountants
Firm Regn. No. 006772N

For and on behalf of
Centre for Development Of Telematics

Sd/-
(Sanjay Kumar Narang)
Partner
Membership No.090943

Sd/-
(G.Mukundan)
Chief Finance Officer

Sd/-
(Dr. Rajkumar Upadhyay)
Executive Director

Place : New Delhi
Date: September 4, 2021
UDIN: 21090943AAAHP2393

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED MARCH 31, 2021

(in Rupees)

Particulars	Schedule No.	2021	2020
INCOME			
Income from TOT, Royalty, TSR/FSR & Publications	7	84,04,55,456.00	89,47,59,583.30
Interest earned	8	5,04,24,345.21	5,28,86,897.94
Other income	9	1,00,53,561.25	2,66,83,886.71
TOTAL (A)		90,09,33,362.46	97,43,30,367.95
EXPENDITURE			
Establishment expenses	10	2,36,48,03,290.69	2,66,33,92,575.47
Operational expenses	11	20,27,46,152.19	53,53,86,421.49
Other administrative expenses	12	32,81,26,517.29	30,01,94,008.61
Depreciation	3	19,90,37,303.09	25,43,84,611.15
TOTAL (B)		3,09,47,13,263.26	3,75,33,57,616.72
Excess of expenditure over income for the year [(B)-(A)]		2,19,37,79,900.80	2,77,90,27,248.77
Add/(Less) :-			
Adjustments pertaining to prior period items (Net)	13	(2,59,76,096.51)	(73,11,672.58)
Extraordinary Expenses		-	-
Balance being excess of expenditure over income		2,16,78,03,804.29	2,77,17,15,576.19
Add :- Excess of expenditure over income of previous years		33,25,83,38,636.10	30,48,66,23,059.91
Balance being deficit carried to Corpus / Capital fund		35,42,61,42,440.39	33,25,83,38,636.10
Significant Accounting Policies	14		
Contingent Liabilities and Notes on Accounts.	15		

Schedules 1-15 form an integral part of the Financial Statements.

As per our report of even date .
For Hingorani M & Co.
Chartered Accountants
Firm Regn. No. 006772N

For and on behalf of
Centre for Development Of Telematics

Sd/-
(Sanjay Kumar Narang)
Partner
Membership No.090943

Sd/-
(G.Mukundan)
Chief Finance Officer

Sd/-
(Dr. Rajkumar Upadhyay)
Executive Director

Place : New Delhi
Date: September 4, 2021
UDIN: 21090943AAAHP2393

SCHEDULE 1- CORPUS/CAPITAL FUND

(Forming part of the Balance Sheet as at March 31, 2021)

(in Rupees)

Particulars	2021		2020	
Grants				
(i) Grants from Department of Electronics & Information Technology (Formerly known as Department of Electronics)	33,52,00,000.00	33,52,00,000.00	33,52,00,000.00	33,52,00,000.00
(ii) Grants from Department of Telecommunication				
Balance at the beginning of the year	36,21,97,53,162.12			33,48,97,53,162.12
Add:- Contributions towards corpus/capital fund during the year	3,05,92,00,000.00	39,27,89,53,162.12	2,73,00,00,000.00	36,21,97,53,162.12
Total Grants (A)		39,61,41,53,162.12		36,55,49,53,162.12
Less :- Balance of net expenditure transferred from the Income and Expenditure account (B)		35,42,61,42,440.39		33,25,83,38,636.10
TOTAL (A-B)		4,18,80,10,721.73		3,29,66,14,526.02



SCHEDULE 2-CURRENT LIABILITIES AND PROVISIONS

(Forming part of the Balance Sheet as at March 31, 2021)

(in Rupees)

Particulars	2021	2020
A. CURRENT LIABILITIES		
1 Sundry Creditors		
a) For Goods	4,21,39,147.03	10,36,36,594.59
b) Others	20,23,01,639.66	30,86,38,566.20
2 Advances received		
- For Funded Projects	46,81,25,341.28	42,67,43,079.51
3 Statutory Liabilities	8,84,38,862.32	6,88,84,772.00
4 Other Current Liabilities	1,47,29,302.53	1,54,29,780.65
Subtotal (A)	81,57,34,292.82	92,33,32,792.95
B. PROVISIONS		
1 Gratuity	-	13,11,19,654.00
2 Earned leave	77,81,92,137.00	75,46,04,912.00
Subtotal (B)	77,81,92,137.00	88,57,24,566.00
TOTAL (A+B)	1,59,39,26,429.82	1,80,90,57,358.95

SCHEDULE 3-FIXED ASSETS

(Forming part of the Balance Sheet as at March 31, 2021)

Particulars	Gross Block				Depreciation			Net Block	
	As at 01.04.2020	Additions	Adj./ Write-off	As at 31.03.2021	For the year	Adj./ Write-off	As at 31.03.2021	As at 31.03.2021	As at 31.03.2020
(A) Fixed Assets									
Land -Free Hold	12,00,00,000.00	-	-	12,00,00,000.00	-	-	-	12,00,00,000.00	12,00,00,000.00
Building-Office	57,01,80,967.65	-	-	57,01,80,967.65	1,18,08,243.11		46,39,06,779.66	10,62,74,187.99	11,80,82,431.10
Building-Residential	2,36,27,434.00	-	-	2,36,27,434.00	3,48,737.35		1,70,01,424.42	66,26,009.58	69,74,746.93
R & D Equipment	2,24,21,88,675.94	66,03,287.16	(3,000.00)	2,24,87,88,963.10	6,29,95,251.85	(450.00)	1,89,18,53,395.63	35,69,35,567.47	41,33,30,082.16
R & D Computers	2,99,36,58,854.71	4,00,97,758.27	(54,670.61)	3,03,37,01,942.37	10,13,94,177.04	(54,368.30)	2,88,16,43,730.94	15,20,58,211.43	21,33,54,932.51
Office Equipments & Appliances	39,06,51,222.82	3,16,241.28		39,09,67,464.10	78,42,329.01		34,66,47,357.42	4,43,20,106.68	5,18,46,194.41
Furniture & Fixtures	41,33,58,015.85	3,57,601.60		41,37,15,617.45	1,45,88,916.73		28,24,37,878.30	13,12,77,739.15	14,55,09,054.28
Library Books	5,97,41,796.38	59,648.00		5,98,01,444.38	59,648.00		5,98,01,444.38	-	-
Total	6,81,34,06,967.35	4,74,34,536.31	(57,670.61)	6,86,07,83,833.05	19,90,37,303.09	(54,818.30)	5,94,32,92,010.75	91,74,91,822.30	1,06,90,97,441.39
Previous year's total	6,71,41,97,598.41	9,97,27,134.94	(5,17,766.00)	6,81,34,06,967.35	25,43,84,611.15	(2,00,704.93)	5,74,43,09,525.96	1,06,90,97,441.39	1,22,40,71,978.67
(B) Assets in Transit									



SCHEDULE 4-CAPITAL WORK IN PROGRESS

(Forming part of the Balance Sheet as at March 31, 2021)

(in Rupees)

Particulars	As at 01.04.2020	Additions	Trf. to fixed assets	As at 31.03.2021
Campus - Delhi				
Campus - Residential Complex	72,46,064.50	-	-	72,46,064.50
Total	72,46,064.50	-	-	72,46,064.50
Previous Year Balance	62,52,840.00	9,93,224.50	-	72,46,064.50

SCHEDULE 5-INVESTMENTS-LONG TERM

(Forming part of the Balance Sheet as at March 31, 2021)

(in Rupees)

Particulars	Number of fully paid equity shares	Face value per share	2021	2020
UNQUOTED (AT COST)				
JOINT VENTURE COMPANY				
C-DOT ALCATEL LUCENT RESEARCH CENTRE PVT LTD (CARC)	5,20,00,000	10	52,00,00,000.00	52,00,00,000.00
Less:- Provision for bad & doubtful investments			52,00,00,000.00	52,00,00,000.00
TOTAL			-	-

SCHEDULE 6-CURRENT ASSETS, LOANS, ADVANCES AND DEPOSITS

(Forming part of the Balance Sheet as at March 31, 2021)

(in Rupees)

Particulars	2021	2020
A. CURRENT ASSETS		
1 Inventories (as taken, valued and certified by the Management)		
a) Stores and spares	64,41,08,633.25	70,09,32,090.51
b) Inventory in transit	16,73,883.27	3,27,303.42
	64,57,82,516.52	70,12,59,393.93
Less: Disposable stores & spares	0.00	8,53,89,440.00
	64,57,82,516.52	61,58,69,953.93
2 Sundry debtors		
a) Debts outstanding for a period exceeding six months	1,27,10,23,736.97	1,58,40,91,551.70
b) Others	25,34,05,236.00	32,97,44,313.08
	1,52,44,28,972.97	1,91,38,35,864.78
Less:- Provision for bad & doubtful debts	1,89,37,915.00	1,89,37,915.00
	1,50,54,91,057.97	1,89,48,97,949.78
3 Bank Balances		
a) With Scheduled banks		
On Current Accounts	5,05,64,572.29	1,21,01,316.29
On Deposit Accounts	1,82,71,56,951.00	76,45,00,000.00
On Savings Accounts	50,40,63,097.62	20,00,71,030.48
	2,38,17,84,620.91	97,66,72,346.77
Total (A)	4,53,30,58,195.40	3,48,74,40,250.48
B. LOANS & ADVANCES		
1 Loans		
a) Staff	38,36,008.00	46,55,792.00
b) CARC Pvt Ltd	18,45,78,500.00	18,45,78,500.00
	18,84,14,508.00	18,92,34,292.00
Less:- Provision for Bad & doubtful Loans -CARC (P) Ltd	18,45,78,500.00	18,45,78,500.00
	38,36,008.00	46,55,792.00
2 Advances and other Amounts Recoverable in Cash or in Kind or for value to be received		
a) Contractors & Suppliers	5,91,13,197.39	8,21,04,768.08
b) Employees	1,03,49,672.24	19,49,546.15
c) Prepaid expenses	1,16,70,179.01	1,56,17,135.10
	8,11,33,048.64	9,96,71,449.33
3 Interest Accrued		
a) Staff Loan	4,35,829.34	5,25,872.00
b) On Bank Deposits	1,12,16,721.47	61,19,254.79
c) CARC Loan	5,98,58,060.00	5,98,58,060.00
	7,15,10,610.81	6,65,03,186.79
Less:- Provision for Bad & doubtful debts	5,98,58,060.00	6,65,03,186.79
	1,16,52,550.81	6,65,03,186.79
4 Claims Receivable	3,91,38,838.94	28,38,84,668.31
Less:- Provision for Bad & doubtful Claims Receivable	-	19,78,41,104.35
	3,91,38,838.94	8,60,43,563.96
5 Tax deducted at source	10,93,91,508.20	19,45,29,659.86
6 Input Tax Credit	6,95,15,341.76	8,05,31,424.66
Total (B)	31,46,67,296.35	53,19,35,076.60
C. DEPOSITS		
1 Office Building	40,500.00	40,500.00
2 Others	94,33,273.00	93,94,713.00
3 EMD	0.00	5,17,839.00
Total (C)	94,73,773.00	99,53,052.00
TOTAL (A+B+C)	4,85,71,99,264.75	4,02,93,28,379.08

SCHEDULE 7-INCOME FROM TOT, ROYALTY, TSR/FSR & PUBLICATIONS

(Forming part of the Income & Expenditure Account for the year ended March 31, 2021)

(in Rupees)

Particulars	2021	2020
1) Income from Royalty	35,07,027.00	-
2) Income from Transfer of Technology (TOT)	34,50,000.00	93,00,000.00
3) Technology/Field support receipts (TSR/FSR)	83,34,69,429.00	88,53,70,582.30
4) Income from Publications	29,000.00	89,001.00
TOTAL	84,04,55,456.00	89,47,59,583.30

SCHEDULE 8-INTEREST EARNED

(Forming part of the Income & Expenditure Account for the year ended March 31, 2021)

(in Rupees)

Particulars	2021	2020
1) On term deposits with Scheduled Banks	3,36,27,868.01	3,62,19,682.03
2) On savings accounts with Scheduled Banks	26,88,076.66	41,73,899.39
3) On loans to employees	4,19,284.34	6,89,877.52
4) Others	1,36,89,116.20	1,18,03,439.00
TOTAL	5,04,24,345.21	5,28,86,897.94

SCHEDULE 9-OTHER INCOME

(Forming part of the Income & Expenditure Account for the year ended March 31, 2021)

(in Rupees)

Particulars	2021	2020
1) Income from rent	-	72,11,900.00
2) Gain due to foreign exchange translation	10,90,955.08	2,92,987.80
3) Miscellaneous income	89,62,606.17	1,91,77,513.91
4) Profit on sale/disposal of assets	-	1,485.00
TOTAL	1,00,53,561.25	2,66,83,886.71

SCHEDULE 10-ESTABLISHMENT EXPENSES

(Forming part of the Income & Expenditure Account for the year ended March 31, 2021)

(in Rupees)

Particulars	2021	2020
a) Salaries and wages	1,94,35,78,688.00	2,09,86,87,857.00
b) Contributions to provident fund	17,11,30,068.00	17,05,65,689.00
c) Contributions to other fund	1,24,17,016.00	1,26,95,557.00
d) Gratuity provided for employees	-	13,11,19,654.00
e) Staff welfare expenses	23,62,13,762.69	24,72,83,176.12
f) Recruitment and training expenses	14,63,756.00	30,40,642.35
TOTAL	2,36,48,03,290.69	2,66,33,92,575.47

SCHEDULE 11-OPERATIONAL EXPENSES

(Forming part of the Income & Expenditure Account for the year ended March 31, 2021)

(in Rupees)

Particulars	2021	2020
a) R&D components & consumables	7,15,16,672.17	16,81,77,838.83
b) Freight & forwarding charges	34,66,552.95	87,25,204.73
c) Liquidated Damages Expenses	1,33,000.00	1,13,90,656.00
d) Repair & maintenance - R&D/office equipments	5,34,48,117.46	8,15,66,115.29
e) Design, development & technology support expenses	5,91,26,738.61	10,93,18,264.00
f) Technical, Apprentice & Consultancy expenses	1,32,70,021.00	6,81,21,502.64
g) Testing charges	17,85,050.00	26,97,400.00
h) Disposable Stores & Spares	-	8,53,89,440.00
TOTAL	20,27,46,152.19	53,53,86,421.49

SCHEDULE 12-OTHER ADMINISTRATIVE EXPENSES

(Forming part of the Income & Expenditure Account for the year ended March 31, 2021)

(in Rupees)

Particulars	2021		2020	
a) Travelling and conveyance expenses		52,74,407.21		3,18,66,397.47
b) Vehicle hire charges		14,96,844.36		22,74,285.06
c) Rent, rates & taxes		59,18,506.00		77,61,401.50
d) Interest/ penalty paid		3,12,345.94		2,01,264.19
e) Electricity & water charges		9,59,79,047.63		10,68,80,510.17
f) Repair & maintenance - Others		8,78,18,599.44		8,47,40,832.07
g) Newspaper , periodicals & journals		74,80,237.79		71,71,765.16
h) Insurance charges		17,52,574.37		14,62,545.39
l) Printing, stationery, photocopy & admin consumables		1,00,55,027.36		96,46,734.17
j) Postage, telephone and communication charges		1,47,00,052.16		92,50,449.44
k) Exhibition, advertisement & publicity expenses		12,60,439.50		77,55,891.62
l) Conference/ seminar/ membership fees		46,48,403.76		66,95,588.46
m) Legal, professional fees & honorarium		1,32,93,952.91		1,37,51,672.43
n) Patent fees		40,21,448.00		58,31,145.00
o) Remuneration to auditors				
Audit fees	4,00,000.00		4,00,000.00	
Out of pocket expenses	40,500.00	4,40,500.00	64,570.00	4,64,570.00
p) Hospitality/ entertainment expenses		18,713.96		10,645.00
q) Bank charges		3,88,908.05		10,01,326.97
r) Loss due to foreign exchange translation		5,04,438.91		34,24,224.51
s) Miscellaneous expenses		1,46,975.94		2,760.00
t) Bad & doubtful debts		7,26,15,094.00		-
TOTAL		32,81,26,517.29		30,01,94,008.61



SCHEDULE 13-ADJUSTMENTS PERTAINING TO PRIOR PERIOD ITEMS (NET)

(Forming part of the Income & Expenditure Account for the year ended March 31, 2021)

(in Rupees)

Particulars	2021		2020	
	Debit	Credit	Debit	Credit
INCOME				
Income from TOT, Royalty, TSR/FSR & Publications	65,13,600.00	-	47,32,000.00	-
Interest earned	-	-	-	-
Other income	-	3,000.00	-	5,89,039.49
EXPENDITURE				
Establishment expenses	-	6,97,088.49	1,94,522.00	-
Operational expenses	-	3,59,10,382.25	-	1,70,30,142.74
Other administrative expenses	41,21,224.23	-	55,80,207.58	-
Depreciation	-	450.00	-	1,99,219.93
TOTAL	1,06,34,824.23	3,66,10,920.74	1,05,06,729.58	1,78,18,402.16
NET TOTAL	(2,59,76,096.51)		(73,11,672.58)	

SCHEDULE 14:-SIGNIFICANT ACCOUNTING POLICIES

(Forming part of the financial statements for the year ended March 31, 2021)

1. Accounting Method

- a) The financial statements are prepared on accrual basis of accounting under historical cost convention in accordance with generally accepted accounting principles and standards in India and provisions of the Societies Registration Act, 1860.

2. Use of estimates

- a) Preparation of financial statements require estimates and assumptions to be made that effect the reported amount of assets and liabilities on the date of financial statement and the reported amount of revenues and expenses during the reporting period. Differences between actual results and estimates are recognized in the period in which the results are known/materialized.

3. Fixed Assets

- a) Fixed Assets are stated at cost less accumulated depreciation and any impairment in value. Cost of fixed assets comprises the purchase price and any directly attributable cost of bringing the asset to its working condition for its intended use.
- b) Asset, the individual cost of each of which is Rs 5,000 or less is also capitalized and depreciated in the year of acquisition itself at 100% value reduced by one rupee.
- c) Library books are capitalized irrespective of the individual values thereof.
- d) Subsequent expenditure related to an item of fixed asset is added to its book value only if it increases the future benefits from the existing asset beyond its previously assessed standard of performance.
- e) The Management conducts physical verification of fixed assets at the year end and its reconciliation with financial records. Such exercise is undertaken, taking into account the nature /size of activities of the Centre.

4. Depreciation

- a) The provisions of Appendix I to the Income Tax Rules, 1962(The Rules), as amended from time to time, are applied with the exceptions indicated below

- i. Assets put to use anytime during the year are depreciated at the full rate prescribed by the Rules.
- ii. Library books purchased during the year are depreciated fully in the same year.
- iii. Assets, which are sold or discarded or lost or disposed off during the year, do not suffer depreciation for that year.

5. Inventory Valuation

- a) Stores and Spares (including machinery spares) are valued at cost. The cost is calculated on weighted average method. Cost comprises expenditure incurred in the normal course of business in bringing such inventories to its location. Such costs are measured at five percent of the value towards freight, forwarding and customs duty charges, wherever applicable. Further,
 - i. Stores and spares lying in stock are intended to be used in in-house Research & Development.
 - ii. Sale of spares is not intended, in general. However, obsolete spares are scrapped and sold with the approval of the competent authority.
 - iii. The spares are acquired at different times for a particular project as they may be needed till the complete obsolescence of the entire technology used for the project.
 - iv. Since, the stores and spares are not intended to be traded, valuation of the same at Net Realisable Value is not considered practical as the same would be contrary to their nature and the valuation, therefore, is done as stated above.
- b) Obsolete, slow moving and defective inventories are identified at the time of physical verification of inventories and, wherever necessary, provision is made for such inventories.

6. Investments

- a) Current investments are valued at lower of cost and fair market value.

- b) Long Term Investments, including in Joint Ventures, are carried at cost. Wherever necessary, provision is made to recognize decline, other than temporary, in valuation of Long Term Investments.

7. Accounting for Grants-In-Aid

- a) Grants-in-aid received from the Government are treated as towards "Corpus / Capital Funds".
- b) The Grants-in-aid are treated as accrued when sanction memos are issued by the Administrative Ministry.

8. Revenue Recognition

- a) In respect of projects undertaken by the Centre for Telecom Operators and other agencies, the income in relation to these, are accounted for as income, only upon completion of the milestones related to project. Where the milestones/acceptances are not completed, the balances available in the Project account are shown under current liabilities in the balance sheet.
- b) Revenue is recognized to the extent that it is possible to estimate/ascertain that the economic benefits will accrue to the Centre and the revenue can be realistically measured. When the Centre is unable to assess the ultimate collection with reasonable certainty, revenue recognition is postponed and is recognized as and when the revenue collection is reasonably certain.
- c) Expenses is accrued as and when it is incurred and recorded in the financial statements of the periods to which they relate.

9. Foreign Currency Transaction

- a) Foreign currency transactions are accounted at the exchange rate prevailing on the date of transaction and the difference between the date of transaction and payment / receipt /accrual are accounted for as income or expenditure, as the case may be.
- b) Monetary Current Assets and current liabilities denominated in foreign currency are translated at the exchange rate as prevailing at the year end and the resultant gain / loss is adjusted to revenue account.

Advances paid to foreign suppliers for materials/services are treated as non-monetary assets and consequently are reported using the exchange rate at the date of transaction.

- c) Contingent liabilities denominated in foreign currency are translated at the exchange rate as prevailing at the year end.

10. Retirement and other employee benefits

- a) Provident Fund contributions are in the nature of defined contribution scheme. The Centre accounts for the monthly contributions towards Provident Fund which is mainly administered through duly constituted and approved Exempted Trust.
- b) The Centre operates defined benefit plan for Gratuity to its employees. The costs of providing benefits under this plan are measured on the basis of actuarial valuation at the end of each year using projected unit credit method.
- c) Provisions for compensated absences are accounted for based on actuarial valuation using the projected unit credit method at the year end.

11. Adjustments pertaining to earlier years

Adjustments necessitated during the current year pertaining to one or more previous years are treated as prior period items only when the value in each such case exceeds Rs 5000/-.

12. Provisions and Contingent Liabilities

- a) The Centre creates provision when there is a present obligation as a result of an obligating event that probably requires an outflow of resources and a reliable estimate can be made of the amount of outflow.
- b) A disclosure for a contingent liability is made when there is a possible obligation or a present obligation that may, but probably will not, require an outflow of resources. Where there is a possible obligation or a present obligation in respect of which the likelihood of outflow of resources is remote, as per the view of the Management, no provision or disclosure is made.

SCHEDULE 15:-NOTES ON ACCOUNTS

(Forming part of financial statements for the year ended March 31, 2021)

PART –A: Balance Sheet

1. Fixed Assets

Fixed assets include land at New Delhi measuring 40 acres (same as previous year) which was acquired in 1993 from Government of India. This land has been considered free hold, however, formal conveyancing has not been done in favour of the Centre.

2. Capital work-in-progress

- a. It represents cumulative expenditure, incurred since the financial year 2008-09, on proposed housing facility within the C-dot Campus at New Delhi, amounting to Rs. 72.46 lakhs as at 31.03.2021 (Previous year- Rs.72.46 lakhs).
- b. This expenditure under this head will be capitalized appropriately under “Fixed Assets”, upon completion of the housing facility.

3. Investments in C-DOT Alcatel Lucent Research Centre (CARC) Private Limited

- a. C-DOT Alcatel Lucent Research Centre (CARC) Private Limited is a joint venture company engaged in Research & Development in the field of telecommunications. The Centre's equity participation in the joint venture is Rs.5200 lakhs.
- b. The net worth of the said company is fully eroded as the company has accumulated losses. Hence, a provision against the said investment was made under the head “Provision for Bad and Doubtful Investments” amounting to Rs. 5200 lakhs in previous years. Centre, being one of the promoters of the company, is awaiting the directive of the Government on the prospects of the company.

4. Current Assets, Loans, Advances and Deposits

- a. Inventory: -
 - i. Components which are lying in stock for more than 3 years are Nil as at 31.03.2021 (Previous year Rs. 853.89 lakhs).
 - ii. The value of components, which were purchased in past years, issued to the indentors and treated as consumed in the accounts of the year of issue, but part

of which were returned to the stores during the current year by the indenting groups- Rs. 234.95 Lakhs (Previous year- Rs.197.27 lakhs).

- b. Sundry Debtors amounting to Rs. 15244.29 Lakhs as at 31.03.2021 (Previous year Rs.19138.36 lakhs) includes:-

- i. TOT, Royalty & Technology support dues amounting to Rs.3283.05 lakhs as at 31.03.2021 (Previous year- Rs.3187.87 lakhs) from one of the licensees is met by the value of land and building at Bangalore belonging to that licensee which was taken over by the Centre in the year 2005.

Awaiting decision of the Nodal Ministry regarding valuation and transfer of ownership of Land and Building at Bangalore from the particular licensee, the amount is yet to be settled.

- ii. Dues for technology/field support/other services rendered to Telecom companies amounts to Rs. 8232.09 lakhs as at 31.03.2021 (Previous year- Rs.10429.14 lakhs). Letters for obtaining confirmation of the amount recoverable are sent to the respective parties. However, in majority of the cases the confirmations are not received back. Most of the recoverable amounts are due from Public sector undertakings and Government organizations. The dues have been taken up for realization during the synergy initiative by Nodal ministry. Pending finalization of such proceedings the management considers the said dues as good for recovery.

- iii. Provision for Bad & doubtful debts amounting to Rs. 189.38 lakhs (Previous year- Rs. 189.38 lakhs) towards TOT & Royalty dues of M/s PCL has been retained due to ongoing arbitration proceedings.

- c. Loan to C-DOT Alcatel Lucent Research Centre (CARC) Private Limited:-

The aggregate of loans given to C-DOT Alcatel Lucent Research Centre (CARC) Private Limited in previous years amounts to Rs. 1845.79 lakhs. The said company has accumulated losses and its net worth has fully eroded. Hence, a provision against the said loan was made under the head “Provision for Bad and Doubtful

Loan” amounting to Rs.1845.79 lakhs in the previous years. Aggregate of loans after providing for bad and doubtful loans as at 31.03.2021 is Nil (Previous year- Nil).

d. Interest Accrued on loan to CARC Private Limited:-

Interest accrued on loan given to C-DOT Alcatel Lucent Research Centre (CARC) Private Limited as at 31-03-2021 is Rs.598.58 lakhs (same as previous year). From the Financial Year 2011-12, the said company defaulted in paying the interest. The said company has accumulated losses and its net worth has fully eroded. Hence, a provision against the said interest was made under the head “Provision for Bad and Doubtful Debts” amounting to Rs.598.58 lakhs in the current year. Aggregate of interest accrued after providing for bad and doubtful debts as at 31.03.2021 is Nil (Previous year- Rs.598.58 lakhs).

e. Tax Deducted at Source:-

Tax deducted at source receivable pertaining to various years, amount to Rs.1093.91 lakhs as at 31.03.2021 (Previous year- Rs.1945.30 lakhs) is considered good for recovery.

5. Contingent Liability

On account of pending legal cases, the amount outstanding is Rs.861.61 lakhs as at 31.03.2021 (Previous year- Rs.284.77 lakhs).

6. Capital Commitments

Capital commitments as at 31.03.2021 amounts to Rs.941.64 lakhs (Previous year Rs.22.55 lakhs).

PART – B: Income & Expenditure Account

a. Employees' Benefits

i. Gratuity

Net expenditure recognized in the Income & Expenditure account towards Gratuity, using the Actuarial valuation method, based on existing pay and allowances is Nil (Previous year- Rs.1311.20 lakhs). The Gratuity Trust, which is managed by a separate Board of Trustees

comprising of employees of the Centre, is responsible to discharge the liability on this account.

ii. Earned Leave (EL)

As per Rules of the Centre, Earned Leave is encashable by serving employees as well as by those leaving the services, either on superannuation or otherwise. Net expenditure recognized in Income & Expenditure account towards leave liability, based on existing pay and allowances, estimated using actuarial valuation method is Rs.232.94 lakhs (Previous year- Rs.1557.60 lakhs). Accumulated provision as at 31.03.2021 is Rs.7781.92 lakhs (Previous year- Rs. 7546.05 lakhs).

b. Consumption of Components:

i. As per the practice followed consistently, value of consumption is arrived at by reducing the value of closing stock from the aggregate of the values of opening stock and the purchases made during the year.

ii. Accordingly, the value of components consumed during the current year was Rs. 715.17 Lakhs (Previous year- Rs. 1681.78 Lakhs).

c. Foreign Exchange Fluctuations:

i. The net result out of gains & losses due to fluctuations in Foreign Exchange on account of various transactions during the current year is a gain of Rs. 5.86 Lakhs (Previous year loss- Rs. 31.31 Lakhs).

ii. The gains and losses on account of foreign exchange fluctuations are disclosed in Schedule 9 and 12 respectively.

d. Adjustments Pertaining to earlier years (Net)

It includes income of Rs. (-) 65.11 lakhs (Previous year Rs. (-) 41.43 lakhs) and expenditure of Rs. (-) 324.87 lakhs (Previous year Rs. (-) 114.55 lakhs).

PART – C: General

Previous year's figures have been regrouped or rearranged, wherever necessary, to make them comparable.

Sd/-
G. Mukundan
Chief Finance Officer

Sd/-
Dr. Rajkumar Upadhyay
Executive Director

Acronyms

4G	: 4th Generation (wireless communication technology)	M2M	: Machine-to-Machine
5G	: 5th Generation (wireless communication technology)	MAN	: Metropolitan Area Network
ADN	: Application Dedicated Node	MAX-NG	: Main Automatic Exchange - Next Generation
ANURAG	: Advanced Numerical Research and Analysis Group	MAX	: Main Automatic Exchange
ASN	: Application Service Node	MHA	: Ministry of Home Affairs
AT	: Acceptance Testing	MN	: Middle Node
BBWT	: Broadband Wireless Terminal	MPLS	: Multi-Protocol Label Switching
BSS	: Base Station Subsystem	NCR	: National Capital Region
C-GEMS	: C-DOT GPON EMS Simulator	NDMA	: National Disaster Management Authority
CAS	: Conditional Access System	NFV	: Network Function Virtualisation
CDR	: Call Detail Record	NIC	: National Informatics Centre
CGRAN	: C-DOT GSM Radio Access Network	NOC	: Network Operation Centre
CiSTB	: C-DOT interoperable Set-Top Box	NOFN	: National Optical Fibre Network
CMMI	: Capability Maturity Model-Integrated, Shared GSM Radio Access Network	OCN	: Optical Core Network
CPE	: Customer Premises Equipment	OSI	: Open Source Intelligence
CSC	: Common Service Centre	OTN	: Optical Transport Network
CSF	: Common Service Functions	PCB	: Printed Circuit Board
DEAL	: Defence Electronics Applications Laboratory	PCI	: Prime Custodian of Interception
DoT	: Department of Telecommunications	PCT	: Patent Cooperation Treaty
DR	: Disaster Recovery	PDO	: Public Data Office
DTH	: Direct-To-Home	PMH	: Prime Minister's House
ECSCF	: Emergency Call Session Control Function	PMO	: Prime Minister's Office
EMS	: Element Management System	PSAP	: Public Safety Answering Point
eNodeB	: Evolved Node B	PSU	: Public Sector Undertaking
EPC	: Evolved Packet Core	PQC	: Post Quantum Cryptography
FPGA	: Field Programmable Gate Array	RAX	: Rural Automatic Exchange as Access Network
FTTH	: Fibre-To-The-Home	RF	: Radio Frequency
GIS	: Geographic Information System	SDN	: Software Defined Networking
GPSU	: Green Power Supply Unit	STB	: Set-Top Box
ICT	: Information and Communication Technology	STBR	: Stackable Terabit Router
IEEE	: Institute of Electrical and Electronics Engineers	Tbps	: Terabits per second
IIT	: Indian Institute of Technology	TCIL	: Telecommunications Consultants India Limited
IM	: Intelligence Manager	TDMA	: Time Division Multiple Access
IMCL	: IndusInd Media & Communications Ltd	TEC	: Telecommunication Engineering Centre
IMS	: Internet Protocol (based) Multimedia Subsystem	ToR	: Top-of-Rack
IN	: Infrastructure Node	TRAI	: Telecom Regulatory Authority of India
IRI	: Interception-Related Information	VAS	: Value-Added Service
ITI	: Indian Telephone Industries	VOIP	: Voice over Internet Protocol
LAN	: Local Area Network	WDAN	: Wavelength-based Distribution and Aggregation Network
LEA	: Log and Event Manager	WiDHWAN	: Wireless Data Connectivity at Home using Wireline Access Network
LEMF	: Law Enforcement Monitoring Function	WiFi	: Wireless Fidelity
LSA	: Licensed Service Area	XGPN	: 10 Gbps Passive Optical Network (TDM/TDMA-based)
LTE-A	: Long Term Evolution - Advanced		
LTE	: Long Term Evolution (of universal terrestrial radio access network)		

Our Bankers

Canara Bank

C-DOT Campus, Mehrauli
New Delhi-110 030

Canara Bank

Corporate Finance Branch
6, Sarojini House, Bhagwan Dass Road
New Delhi-110 001

Canara Bank

Electronics City, Phase-1
Hosur Road, Bengaluru-560 100

Central Bank of India

Sona Towers, 71/1, Millers Road
Bengaluru-560 052

Our Offices

C-DOT

C-DOT Campus
Mehrauli, New Delhi-110 030

C-DOT

Electronics City, Phase-I
Hosur Road, Bengaluru-560 100

C-DOT

Field Support Centre, P-108
Ground Floor, Lake Town, Block -A
Kolkata-700 089

Our Statutory Auditors

Hingorani M. & Co.

Chartered Accountants
35, Netaji Subhash Marg, Darya Ganj
New Delhi -110 002



सी-डॉट
C-DOT

Centre for Development of Telematics

Corporate Office:
C-DOT Campus, Mehrauli,
New Delhi - 110 030, India
Phone: +91 11 2680 2856
Fax: +91 11 2680 3338

C-DOT Campus, Electronics City,
Phase-I, Hosur Road,
Bengaluru - 560 100, India
Phone: +91 80 2511 9001
Fax: +91 80 2511 9601



Website: www.cdote.in

 Email: cdotweb@cdote.in

 [CDOT_India](https://twitter.com/CDOT_India)