

ISO 9001 : 2015

TEC

टी ई सी संचारिका NEWSLETTER

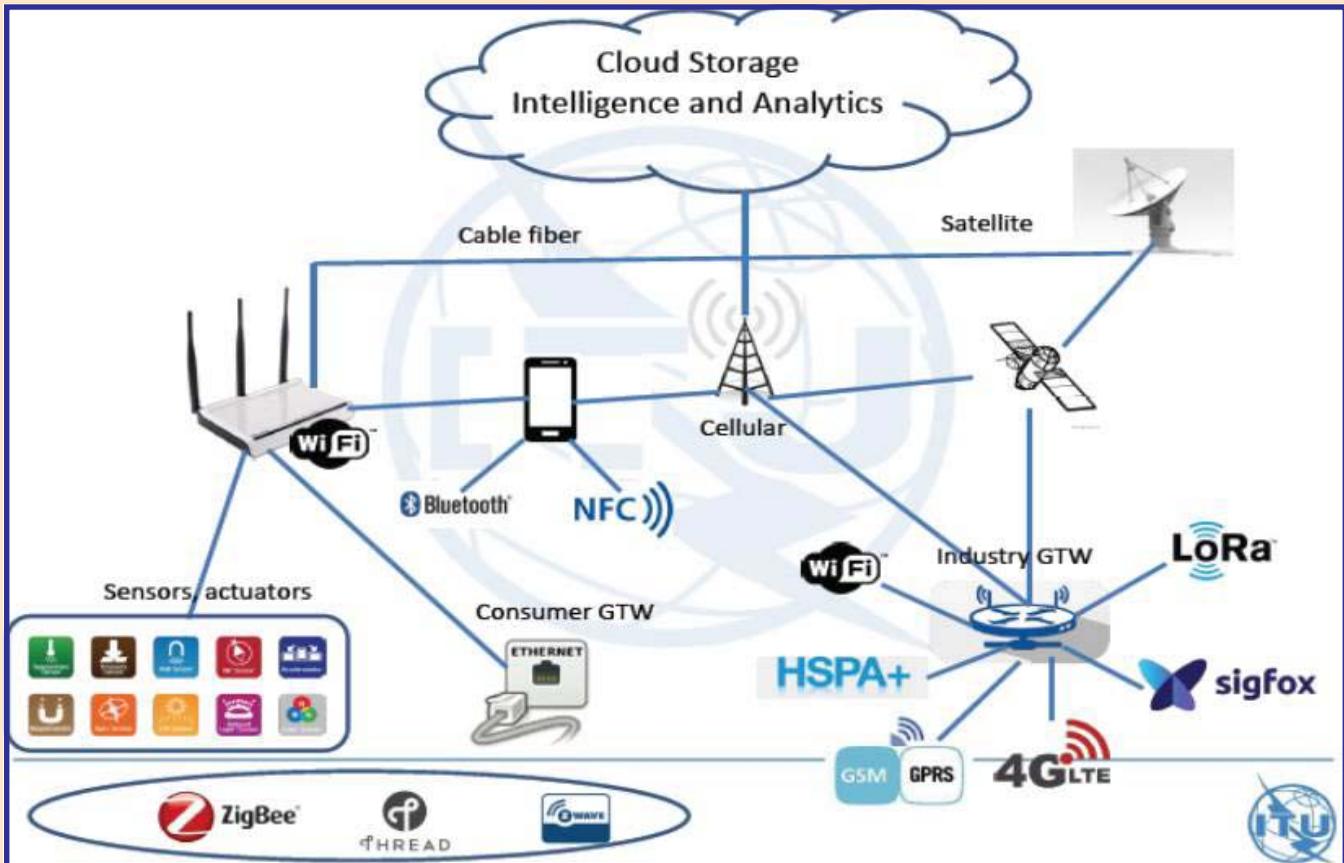


दूरसंचार अभियांत्रिकी केन्द्र

TELECOMMUNICATION ENGINEERING CENTRE

IoT, AI and Big Data

Abstract: There may be around 24.6 billion connected devices across the globe by 2025 as per the projections made by Ericsson Mobility report, June-2020. These connected devices may be in various verticals such as Automotive, Healthcare, Power, Safety & Surveillance, and Village & Agriculture etc. Technology used for creating the domain of connected devices is known as Machine-to-Machine (M2M) Communication / Internet of Things (IoT). IoT will revolutionize and change the way all businesses, governments, and consumers interact with the physical world. This level of disruption will have a significant impact on the world in improving the quality of life. Artificial Intelligence (AI)/ Machine Learning (ML) algorithms are being used in the Big Data analytics to create the intelligence. As per National Digital Communication Policy (NDCP)-2018 released by DoT, eco-system is to be developed in India for connecting 5 billion devices by 2022.



IoT Architecture (Source: ITU)

IoT, AI and Big Data

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1.0 M2M/IoT

1.1 What is M2M Communication?

It refers to the technologies that allow wired / wireless system to communicate with the devices of same ability. M2M uses a device (sensor, meter etc.) to capture an 'event' (motion, meter reading, temperature etc.), which is relayed through a network (wireless, wired or hybrid) to an application (software program), that translates the captured event into meaningful information. The enabling technologies for M2M are sensor networks, RFID, mobile internet, wired & wireless communication network, IPv4 / IPv6, etc.

1.2 Internet of Things (IoT)

International Telecommunication Union (ITU) has defined IoT as "A global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies" [ITU-T Y.2060 (06/ 2012)].

IoT gets benefitted by a number of other technologies such as 5G (faster speed, lower latency, wider coverage and connecting more devices), AI, ML, Big Data, Cloud/ Edge/ Distributed Computing and Blockchain. TEC has already released a Technical Report on Communication Technologies in IoT domain [1].

IoT has a heterogeneous network, with IP and non-IP devices connected either directly or through IP Gateways to an IoT Platform or cloud through different communication technologies. Gateways may also be configured to perform pre-processing of the collected data from thousands of sensors locally before transmitting it to the next stage.

1.3 IoT applications

IoT technology may be used to create smart infrastructure in various verticals as detailed below:

1. **Automotive:** Vehicle tracking, e-call (911 in USA, 112 in Europe), For emergency call 112 adopted in India, V2V and V2I applications, traffic control, Navigation, Infotainment, Fleet management, asset tracking, manufacturing and logistics.
2. **Utilities / Energy:** Smart metering, Smart grid, Electric line monitoring, Gas / oil / water pipeline monitoring.
3. **Smart City:** Intelligent transport System, Waste management, Smart Street Light system, Electric vehicle charging, Water management, Smart Parking, Intelligent buildings, Safety & Surveillance, Remote health management.
4. **Health care:** Remote monitoring of a patient after surgery (e-health), Remote diagnostics, Medication reminders, Tele-medicine, Wearable health devices, e-ICU.

5. **Agriculture:** Remotely controlled irrigation pump, Crop Management, Pest control, Soil analysis, Livestock management etc.

1.4 IoT interoperability and role of standardization

As the industries are working in silos and on proprietary solutions, there are various issues related to sharing of data across verticals and across platforms. Interoperability is required for the proliferation of the domain (at Device, Network, Platform / application level) as it will bring the economies of scale. On an average, interoperability is necessary to capture 40 percent of the potential value that can be generated by the IoT systems.

2.0 Artificial Intelligence (AI)

Artificial Intelligence (AI) is referred to as the machine intelligence that works and reacts like a human. AI is an engine or a brain that enables analytic and decision making from the data collected by IoT or in other words, we can say that IoT collects the data and AI processes this data in order to make sense of it. We can see these systems working together in personal devices such as fitness tracker, Google home, Amazon Alexa. Important branches of AI are as given below:

2.1. Machine Learning (ML)

Machine learning is basically the science of getting machines to interpret process and analyse the data in order to solve the real world problems. In simple terms, Machine learning is a subset of AI which provides machines the ability to learn automatically & improve from experience without being explicitly programmed to do so. It uses massive amount of structured and unstructured data so that the machine learning model gives accurate results or predictions based on results. It is being used in various places such as spam filters, Facebook auto tagging, and Google search algorithms. It is divided into three types:

- a. **Supervised Learning:** learns from labelled training data, helps you to predict outcomes for unforeseen data.
 - May be used to predict whether an email is spam or not, given the email sender, subject and body.
- b. **Unsupervised Learning:** involves training by using unlabelled data and allowing the model to act on that information without guidance.
 - May be used to solve clustering problems.
- c. **Reinforcement Learning:** allows software agents and machines to automatically determine the ideal behaviour in order to maximize the performance of system.
 - Mainly used in advanced Machine Learning areas such as self-driving cars.

2.2 Deep Learning /Artificial Neural Networks

Deep Learning is the process of implementing neural networks on the high dimensional data to give insights and

form solutions. It is basically the logic behind the face verification algorithm on Facebook, Self-driving cars and voice assistants like Siri, Alexa etc.

Figure below depicts relationship between AI, ML and Deep Learning/ Neural Network-

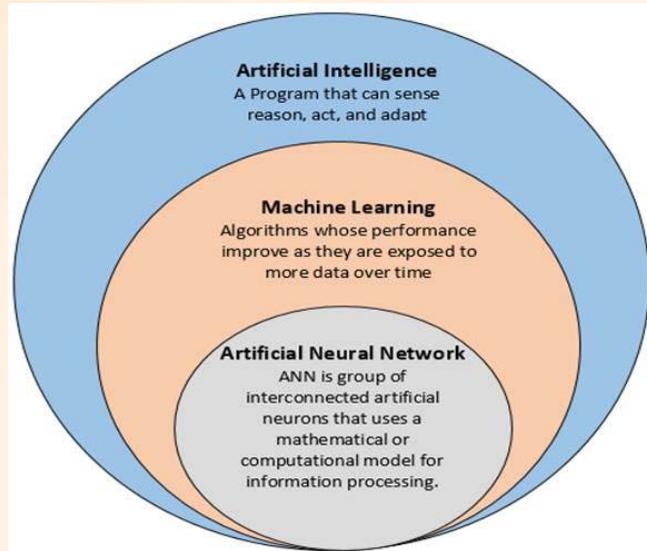


Figure 1: Relationship between AI, ML and Deep Learning/ ANN

2.3 Robotics

Robotics is a branch of Artificial intelligence which focuses on different branches and applications of Robotics. **Eg:** Sofia (Humanoid robot)

2.4 Expert Systems

An Expert System is an EI based computer system that launch and reciprocates decision making ability of human experts. **Eg:** Information management systems in medical field, Fraud detection, Virus detection.

2.5 Fuzzy logic

Fuzzy logic is the computational approach that is based on the principle of degree of truth instead of usual modern logic we used, which is the Boolean logic. **Eg:** Used in medical field to solve complex problems which involves decision-making.

2.6 Natural Language Processing

Natural Language Processing refers to the science of drawing insights from natural human language in order to communicate with machines and business. **Eg:** Amazon (Uses NLP to understand reviews of a customer to improve user experience)

3.0 Big Data

Big data comes from a variety of sources such as sensors, devices, video/audio, networks, log files, transactional

applications, web, and social media. Big Data refers to huge set of data of high order of magnitude (volume), more diverse including structured, semi –structured and unstructured data (variety) and arriving at a faster velocity, which makes it difficult for any organisation to capture, analyse and store the data using traditional databases. Big Data has five characteristics i.e. five 'V's of Big Data namely volume, variety, veracity, velocity and value.

4.0 Inter-relation between IoT, Big Data, AI/ML and Cloud/Edge Computing

Data coming from millions of connected devices, in the form of raw data has no value; therefore, Big Data analytics is used to create intelligence. This intelligence may be used for various activities such as planning, operational activities. Big Data analytics will be using software algorithms based on AI and ML to store analyse and process data. Cloud Computing is a platform over a cloud to store data, software, applications and any storage things over the internet. Some real life examples of Cloud tools are Google Photos, Google drive and Drop box. In critical applications, data is required to be analysed at the edge of a router / mobile network, nearer to the device/sensor network, to avoid any delay. For example, in a running train or self-driving car, if the data is sent to the cloud to create intelligence, there may be delay in taking actions, which may result in disaster, therefore edge computing will play a major role there. Many such scenarios call for AI on edge model, where model training is done on cloud, but inference happens on edge.

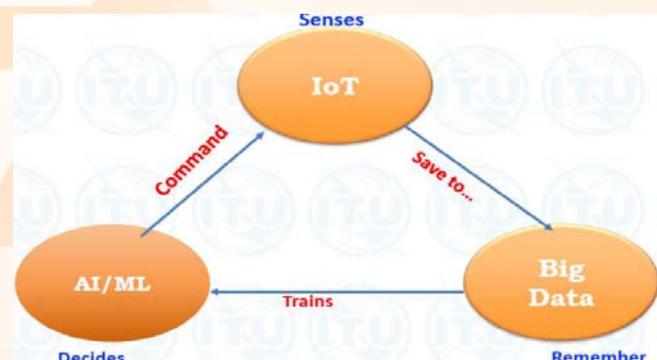


Figure 2: Relation among IoT, Big data and AI/ ML
[Source: ITU]

M/s STMicroelectronics has developed AI based software tool named STM32 Cube. AI, which allows to compress a machine learning model to fit on microcontroller like STM32. It supports popular deep Learning frameworks such as Keras, TensorFlow™ Lite, Caffe, ConvNetJs, and Lasagne. It further reduces resource requirement by supporting 8-bit quantization. It allows to run larger networks by storing weights in external Flash memory and activation buffers in external RAM. Running machine models on microcontrollers opens door for many applications in the field of healthcare

like: activity recognition, fall detection, detection of abnormal heart activity.

5.0 Standardisation activities in IoT and AI domain

Significant work has already been done in the area of IoT standardisation, including its ecosystem, whereas in the field of AI, standardisation is at a nascent stage.

5.1 Standardisation at International level in IoT

a) **ITU-T SG-20:** ITU-T SG-20 is working to create standards on IoT and its applications on Smart cities and communities from 2015. A large number of recommendations have been released in the IoT domain, which are available on ITU-T SG-20 webpage and may be accessed using link https://www.itu.int/ITU-T/recommendations/index_sg.aspx?sg=20. Standards released by Focus Group on Data Processing and Management (FG-DPM) are available on <https://www.itu.int/en/ITU-T/focusgroups/dpm/Pages/default.aspx>.

b) **ISO/ IEC JTC1 SC41:** It is a joint technical committee of ISO and IEC, working on standardization in the area of Internet of Things and related technologies. Few published standards are-

- **ISO/ IEC 21823-1: 2019** Internet of things (IoT)- Interoperability for internet of things systems-Part 1: Framework
- **ISO/ IEC TR 22417:2017** Information technology - Internet of things (IoT) use cases
- **ISO/ IEC 30141:2018** Internet of Things (IoT)- Reference Architecture
- **ISO/ IEC TR 30148:2019** Internet of Things (IoT)- Technical requirements and application of sensor network for wireless gas meters

c) **oneM2M:** oneM2M is a partnership project created in 2012 to develop standards for Common Service layer. oneM2M has published 1st set of specifications in January 2015, 2nd release in March 2016, 3rd release of specification in December 2018 and the work on Release 4 is in progress.

5.2 Standardisation at International level in AI/ML

5.2.1 ISO/IEC: ISO/IEC JTC 1 SC 42 WG-1 has two standard working drafts

- i. WD 22989: Artificial intelligence - Concepts and terminology
- ii. WD 23053: Framework for Artificial Intelligence (AI) Systems Using Machine Learning (ML)

5.2.2 IEEE: AI standards

- i. IEEE 1232-2010: Standard for Artificial Intelligence Exchange and Service Tie to All Test Environments (AI-ESTATE)

- ii. IEEE P2413: Draft Standard for an Architectural Framework for the Internet of Things Working Group

5.2.3 ITU: AI and ML standardisation on-going work

ITU has created a number of focus group to work on AI/ ML as detailed below:

- i. FG-AI4AD : Focus Group on AI for autonomous and assisted driving
- ii. FG-QIT4N : Focus Group on Quantum Technology for Networks
- iii. FG-AI4EE: Focus Group on Environmental Efficiency for Artificial Intelligence and other Emerging technologies.
- iv. FG-AI4H : Focus Group on AI for health. It is the joint group of ITU and WHO.
- v. FG-NET-2030 : Focus Group on Technologies for Network 2030
- vi. FG-ML5G: Focus Group on Machine Learning for Future Network including 5G.

A number of documents have been published by these focus groups, available on their webpage.

5.3 Standardisation work in IoT and AI in India

5.3.1 Telecommunication Engineering Centre (TEC)

TEC formed 12 multi-stake holders Working Groups in the last 3-4 years for study of M2M/ IoT domain. As a result of which, 12 Technical Reports have been released covering verticals, Communication technology, M2M Gateway & Architecture etc. All these reports are available on TEC website (www.tec.gov.in/technical-reports/).

A number of actionable points emerged from these reports. Some of the important points which became the part of policy / standards are 13 digits number scheme for SIM based device/ gateway, embedded SIM, IPv6 for the devices / gateways to be connected directly to PSTN/ PLMN, etc.

In AI field, contributions were submitted from TEC in FG-AI4H meeting, Nov 2019 in NICF and the presentation of related demos from STMicroelectronics and Calligo Technologies (who are members of IoT working groups) were also made.

5.3.2 NITI Aayog

In India, NITI Aayog released a discussion paper on the topic "National Strategy for Artificial Intelligence (AI) for all" in June 2018. In this paper, focus areas for AI intervention, key challenges in adoption of AI in India and way forward to harness the power of AI have been discussed in detail. This paper also gives recommendations in the field of AI, to the Government, for action in the area of Research and Application, Re-skilling and Training, Accelerating adoption of AI and Responsible AI development.

6.0 Use-cases based on IoT and AI / ML

- a. IoT use cases document having the following five IoT use cases submitted by IoT division TEC in ITU-T SG-20 was approved in ITU-T SG-20 meeting, Dec 2018. It was published as ITU-T Recommendation **Y Suppl. 53 (12/2018)**:-
- I. Vehicle emergency call system for automotive road safety
 - II. Digitization and automation of Vehicle Tracking, Safety, Conformance, Registration and Transfer via the application of e-SIM and Digital Identity
 - III. Remote monitoring the health of a patient
 - IV. Connected Smart homes.
 - V. Advanced metering infrastructure (AMI)

Above-mentioned use-cases may be read in detail using link <https://www.itu.int/itu-t/recommendations/rec.aspx?id=13867&lang=en>. These use cases may be implemented in real time to resolve the complexities of concerned verticals and in turn may improve the quality of life.

- b. **Y.SCC- use cases “Use cases on Smart cities and communities”** having total nine smart city use cases, submitted from Japan, Korea, UK and India has been approved / accepted in the ITU-T SG-20 meeting, Dec 2019. Contributions were submitted in this work item by IoT division TEC and presented remotely. This document is published as ITU-T Recommendation **Y Suppl. 56 (12/ 2019)**.

6.1 IoT and AI in healthcare

There are many areas in healthcare where AI can find immediate and widespread use. AI solutions can augment the scarce personnel and lab facilities; help overcome the barriers to access and solve the accessibility problem; through early detection, diagnostic decision making and treatment, cater to a large part of India. Cancer screening and treatment is an area where AI provides tremendous scope for targeted large scale interventions. [2]

6.1.1 Remotely monitoring the health of a patient

As there is a scarcity of doctors in rural areas of India, this IoT use case may be implemented in rural areas to provide health facilities. Remote Patient Monitoring (RPM) is a Telehealth solution that enables monitoring of patients outside of conventional clinical settings (e.g. in the home). Detailed use case may be accessed using link <https://www.itu.int/itu-t/recommendations/rec.aspx?id=13867&lang=en>.

In rural areas in India, even aanganwadi workers may use the wearable devices, mainly working on BLE (Bluetooth Low Energy), and vital parameters may be communicated to the laptop / tablet and stored in the concerned page. Aadhaar may be used as an identifier and data may be transferred to the platform located in the cloud. AI algorithms may be

used to map the data for prediction of outbreak of disease/ facilitation to health care system.

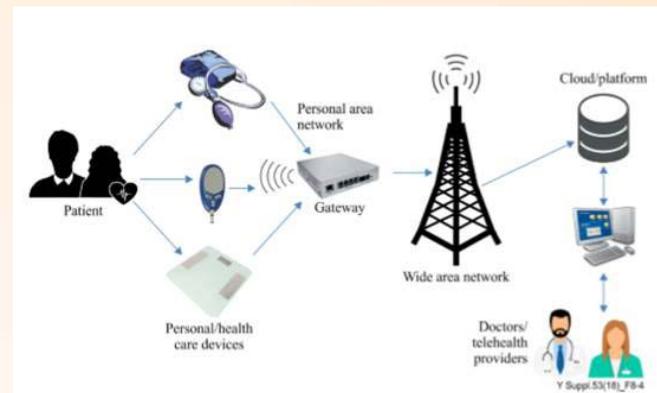


Figure 3: Remote Patient Monitoring concept
[Source: ITU-T Recommendations Y Suppl. 53 (12/2018)]

6.1.2 AI in Diabetic Retinopathy Screening

Diabetic Retinopathy, known as DR or diabetic blindness, is rapidly evolving as a leading cause of blindness globally. Globally, there are nearly 500 million diabetic patients, with 70 million in India alone. M/s Calligo Technologies, a Bangalore based Data Science and Machine Learning Software Company, has developed an innovative solution based on AI for rapid assessment of DR. The Calligo Health Engine uses AI and Edge Analytics to analyse the images the eye fundus and identify presence of DR. It is a simple and cost effective system with quick response time, very useful for addressing the problem in villages, which may not have trained Ophthalmologists and medical facilities, as even a minimally skilled technician or an ASHA worker can operate it. This system helps in early detection of DR, which can help high-risk patients to retain their sight and enable specialists to focus on treatments. This solution is extensible for other eye diseases (Glaucoma, Retinopathy of Premature, Hypertensive Retinopathy, Macular Oedema etc.) and other problems like oral cancer, cervical cancer etc.

6.1.3 AI in detection of COVID-19

M/s Blue dot, a Canadian start-up company designed software-as-a-service to locate, track and predict infectious diseases spread. It uses a platform built around artificial intelligence, machine learning and big data. Much of BlueDot’s predictive ability comes from data it crowd sourced from the worldwide movements of more than four billion travellers on commercial flights every year; human, animal and insect population data; climate data from satellites; and local information from journalists and healthcare workers through online articles etc. It also gathers information from organizations like the Centre for Disease Control and the World Health Organization [3].

6.2 AI in home appliances

Now a days, smartphones are not only used by the users for making a call but to control home appliances also. Various apps are being used to control home appliances (refrigerators, TV, LEDs etc.) ON and OFF via internet connections or via communication technologies like Bluetooth, BLE etc. It is not surprising nowadays many of us use voice recognition in IoT to control the appliances. Voice systems like ALEXA, Siri, Google Assistant uses voice recognition based AI algorithm, speech synthesis, and natural language processing (NLP) to provide service through a particular application.

6.3 IoT and AI in Automotive

6.3.1 Digitization and automation of vehicle tracking, safety, conformance, registration and transfer via the application of e-SIM and digital identity.

The proliferation of the embedded SIM and digital identity have made it possible to resolve certain key issues for the automotive sector relating to compliance, safety, device security, vehicular logistics, vehicle registration, transfer, diagnostics and service. This use case deals with an approach enabling the vehicle registration, identification and traceability using technologies such as the M2M SIM or embedded SIM (embedded universal circuit card (eUICC)) and digital identity (electronic-know your customer (e-KYC)). The use case can substantially reduce time and cost of the vehicle registration / transfer process and in turn may be helpful in reducing theft and crime. This use-case may be implemented in real time. Detailed use-case is available in ITU-T Recommendation Y Suppl.53.

6.3.2 AI creating intelligence in vehicles

Artificial intelligence processes are now synthesizing data in order to learn how best to react and how humans react to driving situations. For automobiles, this includes predicting how other cars will behave, how to gauge weather conditions, understanding road issues and more. Vehicle manufacturers are also looking to Artificial Intelligence to help people avoid human errors that lead to accidents. For example, safety features linked to automatic braking, collision avoidance systems, pedestrian and cyclist alerts, cross-traffic alerts and intelligent cruise controls are some of the other features being powered by Artificial Intelligence [4]. By working as an assistant to a human driver, these artificial intelligence advancements may benefit everyone on the road.

7.0 Challenges faced by AI and IoT

- **Multi-vendor environment**– The larger the multi-vendor environment, the harder it is for IT to account for security by tracking each and every device.

- **Computing is not that Advanced**- AI techniques such as ML and DL utilize a lot of processing power, require a series of calculations to made very quickly (in microseconds or nanoseconds or slower than that!).
- **Privacy/security/safety** – Privacy/security/safety is always an issue with new technology or concept. AI/ ML systems learn from the data and continuously improve themselves. Due to this systematic learning, these AI/ ML systems may become prone to data breach and identity theft.
- **Ethical and legal issues** – Widespread use of AI raises a number of ethical, moral and legal issues that are yet to be addressed.
- **Trustworthiness**- The problem with AI is that it is like a black box for people. People don't feel comfortable when they don't understand how the decision was made. Hence, somewhere AI has not been able to create trust among people
- Continuous training is required to improve the accuracy of AI systems

8.0 Conclusion

IoT along with Artificial Intelligence/ Machine Learning and big data will play a vital role in creating the smart infrastructure. The combination of IoT and AI / ML algorithms have the capability to take a smart decision, ability to interact with human and also to make human life better. Data analytics also plays a vital role in delivering data to systems in a more understandable and simplified manner. IoT and AI are not just connected device, but also connected intelligence. Challenges related to ethics and trustworthiness in AI are required to be taken into consideration. Standardisation work is already in progress in the field of IoT as well as AI across the globe, but still there is a scope for lot more work to be done.

References

- [1] www.tec.gov.in/technical-reports/
- [2] <https://ai4bharat.org/articles/overview-of-ai-in-indian-healthcare>
- [3] <https://diginomica.com/how-canadian-ai-start-blue-dot-spotted-coronavirus-anyone-else-had-clue>
- [4] <https://www.fusioninformatics.com/blog/how-artificial-intelligence-influence-in-automotive-industry/>

[Contributed by IoT division, TEC]

Telecom News: At a Glance

1. **Aarogya Setu APP:** In first week of Apr-2020, a mobile application was launched which is an important initiative of Govt. of India to help the people and prevent the spread of COVID-19. This app is a bluetooth based COVID-19 tracker which alerts the users if they come in close proximity of an infected person. It also helps to stay informed with latest updates against COVID-19.
2. **Aarogya Setu IVRS:** Shri Ravi Shankar Prasad, Hon'ble Minister of Communications and Shri Edappadi K. Palaniswami, Hon'ble Chief Minister, Tamil Nadu jointly launched Aarogya Setu IVRS for Tamil Nadu on 9 APR, 2020. Feature phone users in Tamil Nadu can give missed call or SMS on 9499912345 & receive call from Aarogya Setu Interactive Voice Response System and get guidance on safety from COVID-19. It helps in identifying persons who are at risk so as to guide for quarantine, isolation and testing. Secretary(T) and AS(T) were also present. This outreach initiative by IIT Madras and DoT is aimed at containing virus spread, detection, tracking & treatment measures.
3. **C-DoT Video Conference Platform:** In COVID-19 pandemic situation, daily commute of the employees has become a challenge. Most of the employees are Working from home and attending meetings on Video Conference Tools. CDoT has also developed an indigenous VC tool and tested in a short span of time with the mandate & support from DoT. On 22 May, 2020, a meeting of CPMG (Chief Post Masters General) was also held on this CDoT VC tool. This meeting was chaired by Shri Ravi Shankar Prasad, Hon'ble Minister of Communications. Shri Sanjay Dhotre, Hon'ble MoSC, Secretary- DoP, DG (Posts), ED, Director CDoT were also present. With this successful pilot run, Hon'ble MoC appreciated the efforts of DoT/C-DOT and shared his vision to make this Make-in-India VC Tool solution as a preferred VC platform across Government Departments.
4. In June-2020, M/s ITI Limited manufactured face shields to fight against evolving coronavirus disease 2019 (COVID-19) pandemic at ITI Bangalore Plant to strengthen the objective of Government of India's Atma Nirbhar Bharat Abhiyan.
5. For the safety of its employees and to prevent spread of COVID-19 in the office, DoT HQ & TEC have installed contact-less hand sanitisers at the office entrances and on all the 14 floors of Sanchar Bhawan.

ISO 9001:2015 Certification of TEC

TEC has transited from ISO 9001:2008 to ISO 9001:2015 in August, 2019 and ISO Certified by External Auditor M/s URS Certification Ltd, Noida, a Certification Body accredited by National Accreditation Board for Certification Bodies (NABCB, QCI). The ISO Certification is valid for three years till 19th Aug, 2022 subject to Surveillance Audit compliance reporting annually. ISO 9001:2015 Certification is issued after evaluation of different management systems and processes within an Organization with greater emphasis on external stakeholders/customers. It ensures that Policies and Objectives are aligned with the strategies of the Organization with risk based thinking, management commitment and emphasizes for proper documentation.

As per requirement of ISO Quality Management System, Internal Audit of different Divisions of TEC, New Delhi was conducted during the period from 9th June to 12th Jun, 2020 followed by Management Review Meeting for ISO on 23rd Jun, 2020 under the Chairmanship of Advisor, TEC. The Divisions have complied with the non-conformities noticed during the previous Internal Auditing held in Nov-Dec, 2019. Now the External Surveillance Audit is scheduled on 22nd Jul, 2020.

Various Presentations by TEC officers

1. DDG(IoT), TEC Sushil Kumar delivered a talk on M2M/ IoT & Smart cities – Technology overview to the executives of Sterlite technologies limited (STL) through virtual meeting on 20th April 2020.
2. DDG (MT), TEC Shri Abhay Shanker Verma delivered a talk on "5G Technology - Introduction and Implementation" in the Webinar organized by Vitti Research Foundation on 26th May, 2020.
3. Dir(FN), TEC Dr. Preeti Banzal made a presentation during online meeting between TEC and CEERI as part of implementation of MoU between both the organizations.
4. Dir(FA) Shri Abdul Kayum gave a presentation on the study paper on "5G transport" in TEC through online platform "Cisco Webex" on 8th May, 2020.
5. ADG(T), TEC Ms. Divya Sharma gave a presentation on the Study paper on 'High Capacity Optical Transport Network' on 21th May, 2020.
6. ADG (FN), TEC Shri Rajmohan Meena gave a presentation during Sub DCC-MF combined e-meeting of FN division, for withdrawal of some old specifications (GR/ IR/ SR) of obsolete telecom products, held on 28th May, 2020.
7. ADG(IoT), TEC Ms. Namrata Singh gave a presentation on the study paper on IoT, AI and Big Data on 20th Jun, 2020.

Mandatory Testing and Certification of Telecom Equipment (MTCTE)

1. Mandatory Testing and Certification of Telecom Equipment (MTCTE) for 13 telecom equipment, covered under Phase-I was made mandatory w.e.f. 1st Oct, 2019. Details for certification of telecom equipment covered under Phase-I is as below;

Total Companies/firms registered	Total applications registered	Certificates issued during quarter (Apr to Jun-20)	Total certificate issued till Jun-20
61	86	15	82 (36 under GCS and 46 under SCS scheme)

Notification for rollout of phase-II of MTCTE: The following telecom equipment have been taken under MTCTE Certification w.e.f. 1st Oct, 2020:

- (a) Transmission Terminal Equipment (SDH Equipment, Multiplexing Equipment)
- (b) PON family of Broadband Equipment (PON ONT, PON ONU and PON OLT)
- (c) Feedback Device

The date of commencement of acceptance of applications for phase-II is 25-06-2020.

Notification for relaxations/ exemptions in MTCTE procedure: Following relaxation/exemptions have been issued:

- (a) Test results/reports from labs accredited by ILAC signatories shall be acceptable upto 30th Sep, 2020, as a relaxation to MTCTE procedure. Further, this relaxation shall be available for test results/test reports of all Requirements of Essential Requirements except Safety Requirements and EMI/EMC Requirements.
- (b) Requirement of labeling on certified products shall be exempted for the initial period of six months w.e.f. date from which testing and certification prior to sale, import or use of respective telecom equipment in India is made mandatory, as a relaxation to MTCTE procedure.
- (c) Exemption from submission of test reports against few technical parameters (for which test facility is not available in any accredited/designated labs) shall be extended up to 30th Sep, 2020, as a relaxation to MTCTE procedure.

For more information, visit MTCTE website <https://www.mtcte.tec.gov.in>

CABs (Conformity Assessment Bodies)

Till Jun-2020, the total number of TEC designated CABs is 54; facility for Safety testing is available in 42 CABs, facility for EMI/EMC testing is available in 22 CABs, facility for technical parameters testing is available in 06 CABs and facility for SAR testing is available in 03 CABs. Full list of designated labs is available at TEC website <https://www.tec.gov.in/list-of-cabs-designated-by-india/> and at MTCTE website https://www.mtcte.tec.gov.in/designated_Labs.

Workshops conducted

1. A Webinar was conducted on the role of “Telecom Sector during Pandemic and Strategies for Post Lockdown Economic Crisis” on 4th Jun, 2020, moderated by Sh. Prasanth Kumar, DDG(RC), TEC, New Delhi. The inaugural address was delivered by Sh. R M Chaturvedi, the then Advisor, TEC. The webinar was attended by more than 200 participants from DOT/TEC/TRAI/ C-DOT and other stakeholders.

Corona pandemic has pushed the humanity to the new dimension of lifestyle called the New Normal. Telecom sector under overall guidance of DOT has contributed a lot in handling the crisis. The webinar was intended to outline all such efforts in the larger national interest. It is right time to survey emerging opportunities in telecom sector as an enabler of all sectors. The webinar covered presentations and lectures on AI for future Telecom, upcoming Telecom Trends, Big Data Analytics for reporting and tracking bulk migrants and “Savdhan Platform” of C-DOT by Mrs Deepa Tyagi, DDG(FN), TEC, Sh. Robert Ravi, DDG (AP- LSA), Sh. Atul Sinha, DDG, NTIPRIT and Sh. Pankaj Dalela, Group Leader, C-DOT respectively.

2. A webinar on ‘5G Update’ was organized by Radio Division of TEC on 8th Jun, 2020 covering topics on ‘5G deployment in various frequency bands’, ‘WRC-19 key highlights and identification of key IMT bands in WRC-19’, ‘Updates on Release 16 and Release 17 of 3GPP’, ‘Typical examples of 5G use cases’, ‘EMF exposure considerations for 5G-related standards, testing methodologies, SAR and power density measurement for 5G devices.’ Etc. The webinar had speakers from industry as well as TEC and it was attended by around 80 participants from various organizations including DoT, TEC, LSA field units, NTIPRIT, TRAI, Department of Biotechnology etc.

Standardization Guide – A Policy Document for adoption of standards

India is fast moving in the field of intense cross sector use of telecom and related ICT sector namely Smart City, Intelligent Transport System, Agriculture, Disaster Management, Healthcare, Education etc. with the advent of new technologies like 5G, Internet of Things (IOT), Big Data (data analytics), Artificial Intelligence (AI), Machine learning, Cloud computing etc. A lot of telecom and ICT standards are being developed by various domestic/international standardisation organisations which need to be adopted into national standards by including the national requirements in these standards.

Telecommunication Engineering Centre (TEC) under Department of Telecommunications (DOT) is a Standards Setting Organization (SSO). TEC formulates new standards/ specifications (GR/IR/SR/ER) for telecom and related ICT sector in India. TEC has initiated the adoption of standards of domestic/ international standards like TSDSI, oneM2M, 3GPP etc. by incorporating the national requirement (human health, safety, security, environment protection, geographical and climatic conditions etc.) and national priorities. As per the licence conditions of Unified licence, TEC standards should be used by the Telecom Service Providers (TSP) in the telecom networks. In absence of TEC standards, standards of international Standards organizations recognised by TEC can be used as an interim measure. Hence, need was felt to adopt the domestic/international standards as national standards for use in India.

A policy document called 'Standardization Guide' based on ISO/IEC Guide 21-1 [1] has been released by TEC outlining the adoption process and institutional mechanism for adoption of domestic/international telecom standards after approval of Hon'ble Minister of Communications. It has further been notified by TEC vide Office Memorandum No. 2-1/2018/SD/TSDSI/TEC/5 dated 8th May 2020 [2].

The main points of the Standardization Guide are as given below:

- i. TEC will adopt the standards after wide public consultation process instead of ratification (ratification doesn't include public consultation).
- ii. For adoption, ISO/IEC-Guide 21 has been used as guiding document.
- iii. The standards should be adopted by TEC as National Standards. National Standards adopted shall be voluntary unless made mandatory by its use, reference or adoption by regulation / Govt. directive.
- iv. TEC shall implement the standard adoption process with the help of institutional frame work which will consist of:

- Telecom Standards Advisory Committee (TSAC)
 - Consultative Committees (CC),
 - Task Force (TF) setup for the purpose
 - Standardization Secretariat
- v. The adoption process will be completed in time bound manner after circulation of the draft.
 - vi. IPR shall not be subject matter of adoption.
 - vii. Telecom Standards Advisory Committee (TSAC) is the apex committee to be headed by DDG (S), TEC and comprising members from TEC, CDOT, TSDSI, Govt. bodies, OEMs, TSPs, Academia, R&D organizations etc. (max 11 members), with following functions:
 - To examine, evaluate and endorse standards
 - To oversee & review the standardization program
 - To strategize and prioritize standardization activities
 - To advise TEC on standardization policies, strategies and best practices
 - To collaborate with other standard formulating bodies
 - viii. Consultative Committee (CC) is the Working Group (WG) constituted under TSAC consisting of the technical experts from TEC, CDOT, TSDSI, Govt. bodies, OEMs, TSPs, Academia, R&D organizations etc. (min 10 members) with Chairman from the concerned TEC division and Vice chairs from the industry/academia and the function of the CC will be to collate, review and include or reject public comments.
 - ix. Standardization Secretariat under Standard-ization division in TEC will scrutinize the proposal for GC approval and national requirement. It will also invite the public comments; then collation it and submit for approval.

The process of adoption for TSDSI transposed oneM2M (Release 2) standards [3] and 3GPP standards (402 nos.) [4] - same as ITU-R M.2012 Rev4; by setting up the institutional mechanism i.e. constitution of Telecom Standards Advisory Committee (TSAC) under the chairmanship of DDG (Standardisation) and Consultative Committee under chairmanship of DDG (IOT) and DDG (Mobile Technologies) TEC respectively is at the last stage of approval. Similarly, the process of adoption of TSDSI Common Public Radio Interface (CPRI) Front haul transport standards into National Standards is underway.

Reference for details:

[1] <https://www.iso.org/standard/39799.html>

[2] <https://www.tec.gov.in/pdf/PMI/Adoption%20policy%2008052020.pdf>

[3] <https://tsdsi.in/onem2m/>

[4] <https://members.tsdsi.in/index.php/s/eraBDmiFN84ynEM>

TEC Contributions submitted to APT Preparatory Group for WTSA-20

Following contributions were submitted to Asia Pacific Telecommunity (APT) for consideration in the 3rd meeting of APT WTSA-20 Preparatory Group scheduled on 13-17 Jul,2020.

- (a) Proposed modifications in the WTSA Resolution 60 : To enhance the standardization work on identification/numbering for emerging networks in ITU-T;
- (b) Proposed modifications in the WTSA Resolution 77 : Enhancing the standardization work in the ITU Telecommunication Standardization Sector for software-defined networking;
- (c) Proposed modifications in the WTSA Resolution 88 : International mobile roaming;
- (d) Proposed modifications in the WTSA Resolution 92 : Enhancing the standardization activities in the ITU Telecommunication Standardization Sector related to non-radio aspects of International Mobile Telecommunications;
- (e) Proposed modifications in the WTSA Resolution 98 : Enhancing the standardization of Internet of things and smart cities and communities for global development;
- (f) Proposal for a new Resolution on Enabling open and shared resources for equitable access to AI/ML via networks.
- (g) Proposed modifications in the WTSA Resolution 96 : ITU Telecommunication Standardization Sector studies for combating counterfeit telecommunication/ information and communication technology devices;
- (h) Proposed modifications in the WTSA Resolution 97 : Combating mobile telecommunication device theft;
- (i) Candidate for Preliminary APT Common Proposal on "A New Resolution For Strengthening ITU-T standardization activities using AI technologies including machine and deep learning"
- (j) Proposal for modification in Candidate draft PACP on Resolution 84 (Hammamet, 2016) - Studies concerning the protection of users of telecommunication/ ICT services

TEC Contributions submitted to ITU-T & other Standardization bodies

1. During the quarter April-June 2020, Working Party 3 of ITU-T Study Group 13 dealing with Q16/13 held 5 interim meetings, wherein a total of 6 contributions were submitted in respect of draft Recommendation ITU-T Y.OBF_Trust: "Open Bootstrap Framework enabling trustworthy networking and services for distributed diverse ecosystems". Further, these contributions were remotely presented in the ITU-T SG 13 interim meetings held on 6 April 2020, 27 April 2020, 18-22 May 2020, 8 June 2020 and 29 June 2020. Bases on these contribution and presentations, the draft Recommendation ITU-T Y.OBF_Trust has been updated.
2. One contribution in respect of draft Recommendation ITU-T Y.e2efapm : "Cloud Computing – End-to-end fault and performance management framework of inter-cloud virtual network services" has also been presented in the NWG-13 meeting held on 11th May, 2020 and has been agreed to be submitted to ITU-T SG- 13 for consideration in July meeting.
3. A Contribution related to Smart services in rural areas has been prepared and finalized in National working group-20, chaired by Mr. Sushil Kumar, DDG(IoT). This contribution has been submitted in ITU-T SG-20 work item Y.SRC "Requirements for deployment of smart services in rural communities" for discussion in the ITU-T SG-20 virtual meeting, 6-16 July 2020.

New Standard on Energy Consumption Rating & Energy Passport

1. A new Standard on 'Energy Consumption Rating & Energy Passport' is being formulated in TEC under directive received from DoT vide letter number (16-06/2011-CS-III, 07.01.2019) and number (20-271/2010 AS-I, Vol-II, 15.05.2019) on the subject "Approach towards Sustainable Telecommunications".
2. The aim of this standard is to delineate the test procedures and measurement methodologies for ECR and Energy Passport for various telecom products, equipment and network or services which will facilitate benchmarking for Green Passport

certification. **Green Passport certification is a step towards achieving broader objective of reduction in carbon emission intensity in telecommunication sector to meet the overall India's target set out in Paris climate agreement 2015.**

3. This standard is intended to help service providers and consumers in comprehensive evaluation of products, equipment and services for energy planning purposes in order to enable them to add energy efficiency to their purchase criteria so as to achieve required reduction in carbon footprint.
4. This Standard is intended to be used by telecommunication network operators, equipment manufacturers, suppliers, and test laboratories as a standard method for determining the energy consumption required to address a specific application.
5. By comparing the ECR reports of multiple equipment that meet a common set of requirements, a telecommunications network operator can select equipment configuration that meets their energy consumption targets.
6. TEC has held several internal discussions within divisions for evolving the standard. TEC is now engaged in wider public consultation with all stakeholders, to move closer towards realization of sustainable telecom.

Activities in 'National Telecommunications Institute for Policy Research, Innovations & Training Institute'

1. NTIPRIT conducted various training activities ensuring proper compliance of various guidelines issued by MHA, DoPT and local authorities time to time due to the situation of COVID-19 pandemic. During the period, NTIPRIT took initiatives in conceptualizing and implementing a project on Bulk Migrant Tracking System (BMTS) to facilitate and help the State Governments for containing the spread of the Covid-19 Corona virus. This system provides the list of mobile numbers of migrants from different States / Metros of the country reaching to a particular state, along with their approximate

current location area. This information was helpful for the State Governments. In reaching out to probable Corona carriers migrated to different districts of the states during Lock down period.

2. During the quarter, NTIPRIT conducted various online training programs/ webinars for the serving officers of Department of Telecommunications.
3. Induction Trainings of the following batches of Officer Trainees of ITS/ BWS and JTO Probationers were carried out in Online Mode / Field Attachment, during the period:
 - BWS-2017 batch (2 Officers)
 - ITS-2018 batch (15 Officers)
 - JTO-2016 batch (1 Officer)
 - JTO-2018 batch (10 Officers)

The Induction Training of JTO 2018 batch was completed on 12.06.2020 by NTIPRIT and the Officers have been posted to various units of DoT.

4. Following Online Sessions (Webinars) were conducted by NTIPRIT during the period:
 - Introduction to Blockchain Technology [20 Participants]
 - Policy Research: An Overview [20 Participants]
 - Prevention of Corruption Act [40 Participants]
 - Disaster Management Technologies [34 Participants]
 - Policy Research: An Overview (2nd Batch) [44 Participants]
 - Internet of Things: An Introduction [40 Participants]
 - Application of Big Data Analytics in Telecom [66 Participants]
 - 5G Introduction: Standardization and Technical Requirements [56 Participants]
 - Introduction to Blockchain [59 Participants]
 - 5G Architecture and Features [53 Participants]
 - NGN Concept [21 Participants]
 - Digital Health: Telecom Perspective [26 Participants]
 - Happiness and Competency [31 Participants]
 - Right to Information Act [30 Participants]
 - PMRTS [10 Participants]

Important Activities of TEC during APR 20 to JUN 20

TEC Functions

- Developing the Standards for telecom and related ICT sector
- Formulation of Technical Specifications (GRs/ERs/IRs/SRs/ TSTPs)
- Mandatory Testing & Certification of Telecom Eqpt (MTCTE)
- Designation of Conformance Assessment Bodies(CAB)
- Contribute in the standardization process of international organisations, viz. ITU, APT, WRC, etc.
- Responsibilities of National Working Groups corresponding to various Study Groups of ITU-T.
- Ratification/adoption of TSDSI/international standards as National Standards
- Provide technical support to DoT & other Govt. Organizations
- Technical support to DoT for Public Procurement (Preference to Make in India) order 2017-Notification for telecom products, services or works.
- Technology approval for prototype of a telecom product developed by C-DoT, academic institutions & research organisations.
- WTO-TBT Enquiry Point to answer all reasonable inquiries from other members and interested parties concerning standards, technical regulations and conformity assessment procedures related to telecom sector
- Testing and Certification of telecom equipment [Issuing Type Approvals, Interface Approvals, Certificate of Approvals, Service Approvals]. For the purpose of testing, four Regional Telecom Engineering Centres (RTECs) have been established which are located at New Delhi, Bangalore, Mumbai, and Kolkata. For more information, visit TEC website www.tec.gov.in.

New/revised document released during the quarter APR-Jun 2020:

- New standard on Ethernet Traffic Analyser 1/10/100GE (Hand Held Model) [by T division]
- Revised Standard on Stabilised light source [by T division]
- Revised GR on Micro duct for indoor & outdoor applications [by FA division]
- Revised GR IR for Point of Sales (PoS) Terminal with Wireless/ Wire-line Interfaces [by FN division]

Study Paper/Technical Paper issued for:

- High Capacity Optical Transport Network [by T division]
- Trustworthy Artificial Intelligence (AI) [by FN division]

Meeting/Seminar/Workshop attended by TEC officials:

- First meeting of BIS committee [Communication Services Sectional Committee (SSD 08)] was chaired by DDG (FN), TEC Ms. Deepa Tyagi, which witnessed participation from DOT, TEC, TRAI, BIS, Prasar Bharati, COAI, TEMA and other industry players. Dir (FN), TEC also participated in the meeting. The scope of the committee is Standardization in the field of communication services provided by professional individuals or organizations to other organizations or common people through physical or electronic means for transfer of information through voice, data, text, sound and/or image including Landline/ Mobile Phone, Internet/OTT (Over - The -Top) services.
- DDG(IoT), TEC Shri Sushil Kumar participated as head of Indian delegation in ISO/IEC JTC1 SC41 virtual meeting, 24-29 May, 2020. Contribution finalized in BIS National committee on IoT and related technologies (LITD 27) on "Underwater Network Management System (U-NMS) interworking" was presented and discussed. Several LITD 27 members including Ms. Namrata Singh, ADG(IoT) TEC participated in this conference.
- DDG(IoT), TEC along with Dir(IoT) and ADG(IoT) participated in the TSDSI SGSS TP virtual meeting, 17-18 Jun, 2020. He raised the issue, why TSDSI has not taken up the transposition of oneM2M Rel3 while it is available in the recommendations of Consultative committee as well as TSAC of TEC.
- Participation in ITU-T Study Group-5 online meeting in May-2020 held at Geneva, Participation in ITU-R WP-5D meeting in Jun-20.
- Participation in the APT WTSa preparatory Group meetings.
- Participation in Rapporteur group e-meetings held for Q12/11 of ITU-T SG-11 in APR-2020 and Jun-2020.
- High level committee meeting at DOT HQ for Submarine cable
- Meetings of Safe City Project of Delhi Police
- e-meeting of the validation Committee for the validation of SAMVAD app developed by C-DoT held on 28.05.2020.

Other Important Activities in TEC

- NWG-20 meeting held on 17th June 20 in TEC.
- Provided inputs and comments on cabinet Note received from DPIIT regarding paper on "Suggestions on preparing for Economic 'Self Reliance' in a post Covid-19 Geopolitical Landscape"
- TEC inputs on India's Third Biennial update Report to the UNFCC was prepared and sent to DoT HQ in May, 2020.

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Suggestions/feedback are welcome, if any, for further improvement.

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