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| **Council Working Group on International Internet-related Public Policy IssuesFifteenth meeting - Virtual, 27-28 January 2021** |  |
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|  | **Document CWG-Internet-15/2-E** |
|  | **22 December 2020** |
|  | **English only** |
| Report by the Secretary-General |
| ITU INTERNET ACTIVITIES: RESOLUTIONS 101, 102, 133, 180 and 206 |

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| SummaryThis report summarizes ITU’s activities related to Plenipotentiary Conference (PP) Resolution 101 (Rev. Dubai, 2018), *“Internet Protocol-based networks”*; Resolution 102 (Rev. Dubai, 2018), *“ITU’s role with regard to international public policy issues pertaining to the Internet and the management of Internet resources, including domain names and addresses”*; Resolution 133 (Rev. Dubai, 2018), *“Roles of administrations of Member States in the management of Internationalized (multilingual) domain names”*; Resolution 180 (Rev. Dubai, 2018), *“Facilitating the transition from IPv4 to IPv6”* and Resolution 206 (Dubai, 2018), *“OTTs”*.Action requiredIn line with Resolution 102 (Rev. Dubai, 2018), CWG-Internet is invited to consider and discuss the activities of the Secretary-General and Directors of the Bureaux in relation to the implementation of the resolutions.\_\_\_\_\_\_\_\_\_\_\_\_References*Plenipotentiary Resolutions* [*101*](https://www.itu.int/en/council/Documents/basic-texts/RES-101-E.pdf)*,* [*102*](https://www.itu.int/en/council/Documents/basic-texts/RES-102-E.pdf)*,* [*133*](https://www.itu.int/en/council/Documents/basic-texts/RES-133-E.pdf)*,* [*180*](https://www.itu.int/en/council/Documents/basic-texts/RES-180-E.pdf) *(Rev. Dubai, 2018), Resolution* [*206*](https://www.itu.int/en/council/Documents/basic-texts/RES-206-E.pdf) *(Dubai, 2018); Council Resolutions* [*1305*](http://www.itu.int/md/S09-CL-C-0105) *(2009),* [*1336*](http://www.itu.int/md/S15-CL-C-0113/en) *(mod 2015),* [*1344*](http://www.itu.int/md/S15-CL-C-0112/en) *(mod 2015); WTSA Resolutions* [*47*](https://www.itu.int/pub/T-RES-T.47-2016)*,* [*48*](https://www.itu.int/pub/T-RES-T.48-2016) *(Rev. Dubai, 2012)* [*49*](https://www.itu.int/pub/publications.aspx?lang=en&parent=T-RES-T.49-2016)*,* [*50*](https://www.itu.int/pub/T-RES-T.50-2016)*,* [*52*](https://www.itu.int/pub/T-RES-T.52-2016) *(Rev. Hammamet, 2016),* [*58*](https://www.itu.int/pub/T-RES-T.58-2016)*,* [*60*](https://www.itu.int/pub/T-RES-T.60-2016) *(Rev. Dubai, 2012),* [*64*](https://www.itu.int/pub/T-RES-T.64-2016)*,* [*69*](https://www.itu.int/pub/T-RES-T.69-2016)*,* [*75*](https://www.itu.int/pub/T-RES-T.75-2016) *(Rev. Hammamet, 2016),* [*98*](https://www.itu.int/pub/T-RES-T.98-2016) *(Hammamet, 2016);* [*WTDC-17/Buenos Aires Action Plan Objective 3/Output 3.3*](https://www.itu.int/en/ITU-D/Conferences/WTDC/WTDC17/Documents/WTDC17_FinalReport_en.pdf) *, WTDC Resolutions* [*20, 30 , 63*](https://www.itu.int/en/ITU-D/Conferences/WTDC/WTDC17/Documents/WTDC17_FinalReport_en.pdf) *(Rev. Buenos Aires, 2017), and* [*45*](http://www.itu.int/en/action/internet/Documents/Resolution_45_wtdc14.pdf)  *(Rev. Dubai, 2014); Council Documents* [*C16/33*](http://www.itu.int/md/S16-CL-C-0033/en)*,* [*C17/33*](https://www.itu.int/md/S17-CL-C-0033/en)*,* [*C18/33*](https://www.itu.int/md/S18-CL-C-0033/en) *and* [*C19/33*](https://www.itu.int/md/S19-CL-C-0033/en)*.* |

# 1. Introduction

This report describes ITU’s activities related to the 2018 Plenipotentiary Conference Resolutions 101, 102, 133, 180 and 206 for the reporting period from Council 2020 till date.

# 2. Activities related to Internet Protocol (IP) networks, the development of next-generation networks (NGN) and future Internet, including policy and regulatory challenges

**2.1** All ITU-T Study Groups continue their work in different areas of Internet, IPv4/IPv6-based networks, Internet-of-things, Internet naming and addressing, NGNs and their evolution, future network (FN), cloud computing, QoS, IPTV, and IP-based applications, uncertainty of origin, and international connectivity. More than 270 new/revised ITU-T Recommendations and other texts have been approved from 1 April to 16 December 2020. [Relevant Recommendations](https://www.itu.int/itu-t/workprog/wp_search.aspx?isn_sp=3925&isn_status=-1,2&adf=2020-04-01&adt=2020-12-31&pg_size=100&details=0&field=acdefghijo) can be found under the different ITU-T Study Groups (SG).

## 2.2 ITU-T SG16

**Multimedia**

2.2.1 Video accounts for roughly 80 per cent of all Internet traffic today. The collaborative video work of IEC, ISO, and ITU was completed in July 2020 with the launch of the first edition of the new [ITU-T H.266](https://www.itu.int/rec/T-REC-H.266) [*Versatile Video Coding*](https://news.itu.int/versatile-video-coding-project-starts-strongly/).

2.2.2 Work also continues in improving management, storage and delivery of video over IP networks.

2.2.3 ITU-T SG16 approved the following three Recommendations: [ITU-T H.644.3 *“Functional architecture of multimedia content delivery networks”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14340); [ITU-T H.702 (V2) *“Accessibility profiles for IPTV systems”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14341)*;* and [ITU-T H.704 *“Enhanced UI framework for IPTV terminal device - Gesture control interface”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14343)*.*

**Distributed Ledger Technologies**

2.2.4 On Distributed Ledger Technologies (DLT), the first ITU-T Recommendations were approved (originally developed at the now closed [FG-DLT](https://www.itu.int/en/ITU-T/focusgroups/dlt)) in 2020: [ITU-T F.751.0](https://www.itu.int/rec/T-REC-F.751.0) *"Requirements for distributed ledger systems"*; [ITU-T F.751.1](https://www.itu.int/rec/T-REC-F.751.1) *"Assessment criteria for distributed ledger technologies"*; [ITU-T F.751.2](https://www.itu.int/rec/T-REC-F.751.2) *"Reference framework for distributed ledger technologies"*; [ITU-T X.1400](https://www.itu.int/rec/T-REC-X.1400) *"Terms and definitions for distributed ledger technology";* [ITU-T X.1401](https://www.itu.int/rec/recommendation.asp?lang=en&parent=T-REC-X.1401) *"Security threats of distributed ledger technology”;* [ITU-T X.1402](https://www.itu.int/rec/recommendation.asp?lang=en&parent=T-REC-X.1402) *"Security framework for distributed ledger technology";* [ITU-T X.1403](https://www.itu.int/rec/recommendation.asp?lang=en&parent=T-REC-X.1403) *"Security guidelines for using distributed ledger technology for decentralized identity management";* and [ITU-T X.1404](https://www.itu.int/rec/recommendation.asp?lang=en&parent=T-REC-X.1404) *"Security assurance for distributed ledger technology".*

2.2.5 The DLT experts also agreed to organize a series of [**DLT *"*meet-ups*"***](https://www.itu.int/en/ITU-T/webinars/Pages/dlt.aspx) (a form of interactive and informal webinars), to discuss topics related to DLT and their standardization. The main goal of this initiative is to increase the collaboration of ITU with global DLT community. Potential participants include DLT technology and service providers, research institutions, United Nations agencies, regulators, and other related professionals.

**2.3** **IMT-2020**

## ITU-T SG13

2.3.1 ITU-T SG13 approved the following fourteen Recommendations: [ITU-T Y.3075 *“Requirements and capabilities of Information Centric Networking routing and forwarding based on control and user plane separation in IMT-2020”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14394); [ITU-T Y.3076 *“Architecture of ICN-enabled Edge Network in IMT-2020”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14395)*;* [*ITU-T Y.3108 “Capability exposure function in the IMT-2020 networks”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14129)*;* [*ITU-T Y.3132 “Mobility management for fixed mobile convergence in IMT-2020 networks”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14130)*;* [*ITU-T Y.3133 “Capability Exposure enhancement for supporting FMC in IMT-2020 networks”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14131)*;* [ITU-T Y.3134 *“IMT-2020 fixed mobile convergence functional requirements for management and orchestration”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14397)*;* [ITU-T Y.3136 *“Session management for fixed mobile convergence in IMT-2020 networks”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14398)*;* [ITU-T Y.3150 (revised) *“High-level technical characteristics of network softwarization for IMT-2020”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14399)*;* [*ITU-T Y.3153 “Network slice orchestration and management for providing network services to 3rd party in the IMT-2020 network”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14132); [ITU-T Y.3154 *“Resource pooling for scalable network slice service management and orchestration in the IMT-2020 network”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14254); [ITU-T Y.3155 *“Enhanced SDN Data Plane for IMT-2020”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14400)*;* [ITU-T Y.3156 *“Framework of network slicing with AI-assisted analysis in IMT-2020 networks”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14401)*;* [*ITU-T Y.3173 “Framework for evaluating intelligence level of future networks including IMT-2020”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14133)*;* [*ITU-T Y.3174 “Framework for data handling to enable machine learning in future networks including IMT-2020”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14134); [ITU-T Y.3175 *“Functional architecture of machine learning based quality of service assurance for the IMT-2020 network”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14255)*;* and [ITU-T Y.3176 *“Machine learning marketplace integration in future networks including IMT-2020”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14402).

2.3.2 ITU-T agreed to the following Supplements: Supplement 59 to Y.3100-series and [ITU-T Y.Suppl.64 *“Awareness on Use Cases and Migration Aspects of IMT-2020”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14383).

**2.4**  **ITU-T SG11**

 ITU-T SG11 approved [Recommendation ITU-T Q.5022 *“Signalling procedure of energy efficient device-to-device communication for IMT-2020 network”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14246) which describes a D2D communication procedure to be used as a part of the IMT-2020 control plane.

**2.5** **Internet-of-things (IoT)**

## ITU-T SG20

2.5.1 ITU-T SG20 approved the following thirteen Recommendations: [*ITU-T Y.4209 “Requirements for interoperation of the smart port with the smart city”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14163); [ITU-T Y.4210 *“Requirements and use cases for universal communication module of mobile IoT devices”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14371); [ITU-T Y.4211 *“Accessibility requirements for smart public transportation services”*](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=14646); [ITU-T Y.4469 *“Reference architecture of spare computational capability exposure of IoT devices for smart home”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14372)*;* [ITU-T Y.4470 *“Reference architecture of artificial intelligence service exposure for smart sustainable cities”*](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14503)*;* [ITU-T Y.4473 *“SensorThings API – Sensing”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14375)*;* [ITU-T Y.4474 *“Functional architecture for IoT services based on Visible Light Communications”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14376)*;* [ITU-T Y.4475 *“Lightweight intelligent software framework for IoT devices”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14377); [ITU-T Y.4558 *“Requirements and functional architecture of smart fire smoke detection service”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14378); [ITU-T Y.4560 *“Blockchain-based data exchange and sharing for supporting Internet of things and smart cities and communities”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14379)*;*  [ITU-T Y.4561 *“Blockchain-based Data Management for supporting Internet of things and smart cities and communities”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14380)*;* [ITU-T Y.4808 *“Digital entity architecture framework to combat counterfeiting in IoT”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14381)*;* and [ITU-T Y.4907 *“Reference architecture of blockchain-based unified KPI data management for smart sustainable cities”*](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14949).

2.5.2 SG20 also consented to two draft Recommendations, and determined three draft Recommendations (under approval):

* **Consented draft Recommendations:** ITU-T Y.4472 *“Open data application programming interface (APIs) for IoT data in smart cities and communities”*; and ITU-T Y.4476 *“OID-based resolution framework for transaction of distributed ledger assigned to IoT resources”*.
* **Determined draft Recommendations:** ITU-T Y.4471 *“Functional architecture of network-based driving assistance for autonomous vehicles”;* ITU-T Y.4559 *“Requirements and functional architecture of base station inspection services using unmanned aerial vehicles”; and* ITU-T Y.4908 *“Performance evaluation frameworks of e-health systems in the IoT”*.

2.5.3 SG20 is progressing 77 draft Recommendations. The complete list of SG20 draft Recommendations is available [here](https://www.itu.int/ITU-T/workprog/wp_search.aspx?sg=20).

2.5.4 SG20 is also progressing 7 Supplements and 2 Technical reports. The complete list of SG20 Supplements and Technical reports is available [here](https://www.itu.int/ITU-T/workprog/wp_search.aspx?sg=20).

2.5.5 Further, SG20 started new work on 27 draft ITU-T Recommendations: *ITU-T Y.IoT-CEIHMon-Reqts “*Requirements of IoT-based civil engineering infrastructure health monitoring system”; ITU-T Y.SmartShoppingMall “Requirements and capability framework of smart shopping mall”; ITU-T Y.CS-framework “Service requirements and capability framework of IoT-related crowdsourced systems”; ITU-T Y.DFR-SM “Data format requirements and protocols for remote data collection in smart metering systems”; ITU-T Y.TM.SM-API “IoT Service Management API REST Specification”; ITU-T Y.TM.DM-API “IoT Device Management API REST Specification”; ITU-T Y.RA-PHE “Requirements and reference architecture of smart service for public health emergency”; ITU-T Y.data-MP “Framework for data middle-platform in IoT and smart sustainable cities”; ITU-T Y.Smart-SBS “Requirements and functional architecture of smart sharing bicycle service”; ITU-T Y.RA-FML “Requirements and reference architecture of IoT and smart city & community service based on federated machine learning”; ITU-T Y.smart-PBRS “Requirements and functional architecture of smart power bank rental service”; ITU-T Y.RA-SDL “Requirements and functional architecture of smart door lock service”; ITU-T Y.blockchain-terms “Vocabulary for blockchain for supporting Internet of things and smart cities and communities in data processing and management aspects”; ITU-T Y.IoT-Smartcity-Risk “Reference framework of cybersecurity risk management of IoT ecosystems on smart cities”; ITU-T Y.IoT-SQAF “Sensing quality assessment framework of IoT systems”; ITU-T Y.SSC-NGUM “A Methodology for Next Generation Urban Measurements”; ITU-T Y.dt-smartfirefighting “Requirements and capability framework of digital twin for smart firefighting”; ITU-T Y.AEDS-smarthome “Requirements and capability framework of abnormal event detection system for smart home”; ITU-T Y.IoT-BC-reqts-cap “IoT requirements and capabilities for support of blockchain”; ITU-T Y.ElecMon-Reqts “Requirements of IoT-based electric power infrastructure monitoring system”; ITU-T Y.NCE.arch.EIoT “Functional Architecture Enhancement with Network Capability Exposure to Support Flexible QoS/QoE Requirements from Enterprise IoT Services and Applications”; ITU-T Y.IoT-DSE-arc “Reference architecture of service exposure for decentralized services for IoT applications”; ITU-T Y.IoT-DES-fr “Framework of decentralized service by using DLT and edge computing technologies for IoT devices”; ITU-T Y.AI-DECCS “Functional architecture of AI enabled device-edge-cloud collaborative services for IoT and smart city”; ITU-T Y.IoT-BoT-peer “Capability and functional architecture of peer of blockchain of things”; ITU-T Y.IoT-SQMS “Requirements and functional architecture of IoT sensing quality management service”; and ITU-T Y.CDML-arc “Reference architecture of collaborative decentralized machine learning for intelligent IoT services”.

2.5.6 SG20 has also started new work on two draft Supplements: ITU-T Y.Sup.SmartAgri-usecases “Use cases of IoT based smart agriculture”; and ITU-T Y.Sup-NGUM "Use Cases for Next Generation Urban Measurements".

2.5.7 Additionally, SG20 has started new work on a draft new Technical *Report ITU-T YSTR-IADIoT "Intelligent Anomaly Detection System for IoT"*.

2.5.8 The standardization of IoT test specifications is accelerating, supported by the increasing collaboration of ITU-T and oneM2M.

**Smart Cities**

2.5.9 Under the [United for Smart Sustainable Cities (U4SSC) initiative](https://www.itu.int/en/ITU-T/ssc/united/Pages/default.aspx), the following deliverables were published: [A Guide to Circular Cities and its 8 case studies](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-A-guide-to-circular-cities/index.html); [Accelerating city transformation using frontier technologies](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-Deliverable-Accelerating-city-transformation/index.html) and [Blockchain for smart sustainable cities](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-Blockchain-for-smart-sustainable-cities/index.html)

2.5.10 More than 100 cities worldwide are measuring their progress using *“Key Performance Indicators for Smart Sustainable Cities”* based on ITU standards (ITU-T Y.4903), indicators promoted by the *“United for Smart Sustainable Cities (U4SSC) initiative”*.

2.5.11 Additionally, the following city snapshots were launched: [Trondheim, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-City-Snapshot-Trondheim-Norway/index.html); [Rana, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-City-Snapshot-Rana-Norway/index.html); [Molde, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-City-Snapshot-Molde-Norway/index.html); [Kristiansund, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-City-Snapshot-Kristiansund-Norway/index.html); [Karmoy, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-City-Snapshot-Karmoy-Norway/index.html); [Haugesund, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-City-Snapshot-Haugesund-Norway/index.html); [Bodo, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-City-Snapshot-Bodo-Norway/index.html); [Baerum, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-City-Snapshot-Baerum-Norway/index.html); [Asker, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-City-Snapshot-Asker-Norway/index.html); [Wels, Austria](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-City-Snapshot-Wels-Austria/index.html); [Esperanza, Argentina](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-City-Snapshot-Esperanza-Province-of-Santa-Fe-Argentina/index.html); [Santa Fe, Argentina](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-City-Snapshot-Santa-Fe-Argentina/index.html); and [Gjøvik, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-City-Snapshot-Gjovik-Norway/index.html). The following verification reports were launched: [Trondheim, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-Verification-Report-Trondheim-Norway/index.html); [Rana, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-Verification-Report-Rana-Norway/index.html); [Molde, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-Verification-Report-Molde-Norway/index.html); [Kristiansund, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-Verification-Report-Kristiansund-Norway/index.html); [Karmoy, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-Verification-Report-Karmoy-Norway/index.html); [Haugesund, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-Verification-Report-Haugesund-Norway/index.html); [Bodo, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-Verification-Report-Bodo-Norway/index.html); [Baerum, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-Verification-Report-Baerum-Norway/index.html); [Asker, Norway](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-Verification-Report-Asker-Norway/index.html); [Esperanza, Argentina;](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-Verification-Report-Esperanza-Province-of-Santa-Fe-Argentina/index.html) [Santa Fe, Argentina](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-Verification-Report-Santa-Fe-Argentina/index.html); and [Gjøvik, Norway.](https://www.itu.int/en/publications/Documents/tsb/2020-U4SSC-Verification-Report-Gjovik-Norway/index.html)

2.5.12 In November 2020, Brazil started to implement ITU-T Y.4904 “Smart sustainable cities maturity model”, while Ecuador started to implement ITU-T Y.4904 in December 2020.

2.5.13 SG20 continued coordination on IoT in its ITU-T JCA-IoT and SC&C. SG20 is collaborating with IETF on use of *"ppk"* URI scheme name in ITU-T Y.dec-IoT-arch *“Decentralized IoT communication architecture based on information centric networking and blockchain”*, with oneM2M on draft new *Recommendation ITU-T Y.oneM2M.SEC.SOL "oneM2M Security Solutions"*, and with W3C on Decentralised Identifiers (DIDs). The following are the background and updates on the IEC-ISO-ITU Joint Smart Cities Task Force (J-SCTF) activities:

* The World Smart City Forum was initiated by ITU, ISO, and IEC in 2016 to understand and meet the identified needs of our stakeholders and to discuss good practices that address urban challenges;
* Annual World Smart City Forum was organized by each SDOs and after the third edition in 2018, an effective collaboration channel between ITU, ISO and IEC to share information in the form of a “Joint Task Force for Smart Cities” was envisioned;
* Three SDOs eventually agreed on the ToR for the IEC-ISO-ITU Joint Smart Cities Task Force (J-SCTF) and designated 3 leads and 26 experts for the task force;c
* The kick-off meeting was planned on 3 April 2020 but was moved to 7 October 2020 and took place virtually due to the pandemic;
* The main goal of the kick-off was to inform J-SCTF experts about the scope and objectives of the Task Force (ToR) and talk about potential activities to be launched within this framework;
* It was also themed ‘capturing global learnings from the management of the Covid-19 Pandemic’ highlighting the scale and urgency of the challenge; and
* Second meeting is planned to take place virtually on 24 February 2021 to discuss further topics and working methods.

**ITU-T** **SG2**

2.5.14 ITU-T SG2 agreed [ITU-T E-Suppl.11 *“Criteria for M2M/IoT-Related Assignments under Recommendation ITU-T E.164.1 and Recommendation ITU-T E.212 Annex A”* defines criteria for assigning E.164 Identification codes and E.212 Mobile Network Codes under shared MCCS for M2M/IoT services.](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14321)

**ITU-T** **SG11**

2.5.15 ITU-T SG11 approved the following four Recommendations which define signalling requirements and test specifications for IoT, as follows: [Recommendation ITU-T Q.3745 *“Protocol for time constraint IoT-based applications over SDN”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14244); [Recommendation ITU-T Q.3055 *“Signalling protocol for Heterogeneous IoT gateways”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14141); [Recommendation Q.4062 “Framework for Internet of things Testing”](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14387); and [Recommendation ITU-T Q.4063 “Framework for testing identification systems used in Internet of things”](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14391).

**ITU-T** **SG17**

2.5.16 SG17 approved six Recommendations on IoT security: [*ITU-T X.1363 “Technical framework of personally identifiable information (PII) handling system in IoT environment”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14087)*;* [*ITU-T X.1364 “Security requirements and framework for narrow band internet of things”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14088)*;* [*ITU-T X.1365 “Security framework for use of identity-based cryptography in support of IoT services over telecom networks”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14089)*;* [ITU-T X.1366 *“Aggregate message authentication schemes for Internet of things (IoT)”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14262)*;* and [ITU-T X.1367 *“Standard format for Internet of things error logs for security incident operations”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14263).

2.5.17 Draft Recommendation ITU-T X.1368 *“Secure software update procedure for IoT devices”* (under approval) specifies: 1) basic models and procedures for securely updating firmware/software (FW/SW) of Internet of things (IoT) devices; and 2) requirements and capabilities for updating IoT FW. A common secure update procedure is specified with general requirements.

## 2.6 QoS and QoE - ITU-T SG12

2.6.1 ITU-T work on performance, quality of service (QoS) and quality of experience (QoE) continues to evolve rapidly, in tune with the advances of the ICT industry.

2.6.2 Responsible for performance, QoS and QoE, ITU-T Study Group 12 approved [Recommendation ITU-T Y.1540 Amd.1 *“Internet protocol data communication service - IP packet transfer and availability performance parameters - Amendment 1 - Amendment 1: New Annex B – Additional search algorithm for IP-based capacity parameters and methods of measurement”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14161).

2.6.3 [ITU-T Y Suppl.60 *“Interpreting Y.1540 Maximum IP-Layer Capacity Measurements”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14285) provides information on interpreting Y.1540 Maximum IP-Layer Capacity Measurements.

2.6.4 The above work is harmonized with the IETF IP performance measurement working group (ippm); ETSI TC STQ; and BBF.

2.6.5 SG12 also approved new [Recommendation ITU-T E.812 “Crowdsourcing approach for the assessment of end-to-end quality of service in fixed and mobile broadband networks”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14272&lang=en).

2.6.6 SG12 agreed [ITU-T TP GSTP-IPTV-QoS *“Technical Paper: Performance metrics for end-to-end IPTV video quality”*](https://www.itu.int/pub/T-TUT-IPTV-2020-QOS).

## 2.7 ITU-T SG11

ITU-T SG11 approved the following Recommendations: [*ITU-T Q.3643 “Signalling architecture of distributed infrastructure ENUM networking for IMS”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14243); [*ITU-T Q.3645 “Protocol at the interface between two distributed ENUM servers for IMS”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14414)*;* [*ITU-T Q.3644 “Requirements for signalling network analyses and optimization in VoLTE”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14143)*;* [*ITU-T Q.3056 “Signaling procedures of the probes to be used for remote testing of network parameters”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14142); [*ITU-T Q.3915 “Set of parameters for virtualized broadband network gateway monitoring”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14416); [*ITU-T Q.3916 “Signalling requirements and architecture for the Internet service quality monitoring system”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14145)*;* [ITU-T Q.3961 *“Parameters for evaluating bottleneck of web-browsing service”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14417)*;* [ITU-T Q.3963 *“The compatibility testing of SDN-based equipment using OpenFlow protocol”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14245)*;*[ITU-T Q.4064 "Interoperability testing requirements for a virtual broadband network gateway"](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14418); [ITU-T Q.3058 “Signalling architecture of orchestration in NGNe”](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14411); [ITU-T Q.3060 “Signalling architecture of the fast deployment emergency telecommunication network to be used in a natural disaster”](https://www.itu.int/ITU-T/recommendations/index_sg.aspx?sg=11); [ITU-T Q.3059 “Signalling requirements for service function discovery”](https://www.itu.int/rec/T-REC-Q.3059-202009-I); [ITU-T Q.3720 “Procedures for vBNG acceleration with programmable acceleration card”](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14415); [ITU-T Q.4100 “Hybrid peer-to-peer communications: Functional architecture”](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14420); [ITU-T X.609.9 “Managed P2P communications: Overlay content management protocol”](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14421); [ITU-T X.609.10 “Managed P2P communications: Signalling requirements for data streaming”](https://www.itu.int/rec/T-REC-X.609.10-202009-I); [ITU-T Q.4066 “Testing procedures of Augmented Reality applications”](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14419); and [ITU-T Q.5052 “Addressing mobile devices with duplicate unique identifier”](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14392).

## 2.8 IP Cable Modems - ITU-T SG9

2.8.1 ITU-T SG9 approved the following three Recommendations on IP cable modems: [ITU-T J.216 (revised) *“Second-generation modular headend architecture in systems for interactive cable television services - IP cable modems”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14276); [ITU-T J.224 (revised) *“Fifth-generation transmission systems for interactive cable television services - IP cable modems”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14277); and [ITU-T J.225 *“Fourth-generation transmission systems for interactive cable television services - IP cable modems”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14278)*.*

2.8.2 The following Recommendation is under approval: ITU-T J.1301 “The specification of cloud-based converged media service to support IP and Broadcast Cable TV – Requirements” (under approval)specifies functional requirements, architecture requirements, interface requirements and security requirements for the cloud-based converged media service to support IP and Broadcast Cable TV.

## 2.9 ITU-T SG15

2.9.1 ITU-T SG15 is responsible for the development of standards for the optical transport network, access network, home network and power utility network infrastructures, systems, equipment, optical fibres and cables. The Recommendations developed by SG15 provide international standards for network infrastructure for Internet Protocol (IP) networks, next-generation networks (NGN) and future Internet. SG15 is developing Recommendations collaborating with various organizations such as IEC, IETF, IEEE, Broadband Forum, MEF, ETSI, 3GPP, OIF and ONF.

2.9.2 Related information is available [here](https://www.itu.int/en/ITU-T/studygroups/2017-2020/15/Pages/default.aspx). In particular, Recommendations and other publications are available [here](https://www.itu.int/en/ITU-T/publications/Pages/default.aspx).

## 2.10 ITU-T SG2

2.10.1 ITU-T SG2 approved [*Recommendation ITU-T M.3041 “Framework of smart operation, management and maintenance”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14181) in which characteristics, scenarios and the functional architecture of SOMM are provided to support service operation, network management, and infrastructure maintenance for both traditional non-SDN/NFV and SDN/NFV aware networks.

2.10.2 SG2 is developing the following draft Recommendations: *ITU-T E.370 (revised) “Service principles when public circuit-switched international telecommunication networks interwork with IP-based networks”; ITU-T E.IoT-NNAI “Internet of Things Naming Numbering Addressing and Identifiers”; ITU-T M.rcsnsm “Requirements for synergy management of cloud and SDN-based network”; ITU-T M.rmacbe “Requirements for management of applications over cloud and broadband ecosystems”; ITU-T M.rrsp “Requirements for robot-based on-site smart patrol of telecommunication network”; ITU-T Q.rest “REST-based management services”;* and *ITU-T X.rest “Guidelines for defining REST-based managed objects and management interfaces”.*

## 2.11 Security - ITU-T SG17

2.11.1 ITU-T SG-17, the lead study group on security and identity management (IdM), continues to be instrumental in the study and standardization of cybersecurity, anti-spam, IdM, PKI infrastructure, information security management, ubiquitous sensors networks, telebiometrics, mobile security, virtualization security towards cloud computing security, personally identifiable information protection and security architecture and application security, together with external Standards Developing Organizations.

2.11.2 On security aspects related to the Internet, SG17 approved the following twenty-one Recommendations: *ITU-T X.1046 “Framework of software-defined security in software-defined networks/network functions virtualization networks”* (under publication), [*ITU-T X.1216 “Requirements for collection and preservation of cybersecurity incident evidence”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14259)*;* [*ITU-T X.1218 “Requirements and guidelines for dynamic malware analysis in a sandbox environment”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14444)*;* [*ITU-T X.1332 “Security guidelines for smart metering service in smart grids”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14086)*;* [*ITU-T X.1148 “Framework of de-identification process for telecommunication service providers”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14249)*;* [*ITU-T X.1149 “Security Framework Of Open Platform For Fintech Services”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14250)*;* [*ITU-T X.1451 “Risk identification to optimize authentication”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14252)*;* [*ITU-T X.1452 “Guidelines for security services provided by operators”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14451)*;* [*ITU-T X.1604 “Security requirements of network as a service (NaaS) in cloud computing”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14093)*;* [*ITU-T X.1605 “Security requirements of public infrastructure as a service (IaaS) in cloud computing”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14094); [*ITU-T X.1606 “Security requirements for communication as a service application environments”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14265);[*ITU-T X.1750 “Guidelines on security of big data as a service for big data service providers”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14266)*;* [*ITU-T X.1751 “Security guidelines on big data lifecycle management for telecommunication operators”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14267); [*Revised ITU-T X.1254 “Entity authentication assurance framework”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14260); [*ITU-T X.1279 “Framework of enhanced authentication using telebiometrics with anti-spoofing detection mechanisms”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14261)*;* [*ITU-T X.510 | ISO/IEC 9594-11 “Information technology - Open Systems Interconnection - The Directory: Protocol specifications for secure operations”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14320)*;* [*ITU-T X.677 “Identification mechanism for unmanned aerial vehicles using object identifiers”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14039); [*ITU-T X.1371 “Security threats to connected vehicles”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14090); [*ITU-T X.1372 “Security guidelines for Vehicle-to-Everything (V2X) communication”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14091)*;* [*ITU-T X.1374 “Security requirements for external interfaces and devices with vehicle access capability”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14446); and [*ITU-T X.1375 “Guidelines for intrusion detection system for in-vehicle networks”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14447).

2.11.3 SG17 determined the following five draft Recommendations (under approval) besides ITU-T X.1368 mentioned in 2.5.17: *Revised ITU-T X.1054 “Information security, cybersecurity and privacy protection - Governance of information security”*; *ITU-T X.1217 “Guidelines for applying threat intelligence in telecommunication network operation”*; *ITU-T X.1811 “Security guidelines for applying quantum-safe algorithms in 5G systems”*; and *ITU-T X.1376 “Security-related misbehaviour detection mechanism using big data for connected vehicles”*.

2.11.4 SG17 started new work on the following fifteen draft Recommendations: *ITU-T X.pet\_auth “Entity authentication service for pet animals using telebiometrics”; ITU-T X.sec-grp-mov “Security guideline for group movement service platform; ITU-T X.smdtsc “Security Measures for Digital Twin System of Smart Cities”; ITU-T X.smsrc “Security Measures for Smart Residential Community Services”; Revised ITU-T X.672 “Information technology – Open systems interconnection – Object identifier resolution system”; ITU-T X.tec-idms* “*Techniques for management and protection of user data in distributed identity systems”; Revised ITU-T X.1250 “Baseline capabilities for enhanced global identity management and interoperability”; ITU-T X.gpwd “Guidelines for securing password and password-less authentication solutions”; ITU-T X.sa-dsm “Security architecture of data sharing management based on DLT”; ITU-T X.ztd-iot “Security methodology for zero-touch massive IoT deployment”; ITU-T X.5Gsec-vs “Security requirements for vertical services supporting ultra-reliable and low latency communication (URLLC) in the 5G non-public networks”; ITU-T X.eVTOL-sec “Security guidelines for electric vertical take-off and landing (eVTOL) vehicle in an urban air mobility environment”; ITU-T X.sec\_QKDN\_intrq “Security requirements for integration of QKDN and secure network infrastructures”; ITU-T X.srscm-dlt “Security Requirements for Smart Contract Management based on DLT”;* and *ITU-T X.5Gsec-ssl “Guidelines for classifying security capabilities in 5G network slice”*

2.11.5 SG17 started new work on the following four technical reports: *TR.sgfdm “Technical Report: FHE-based data collaboration in machine learning”; TR.fssvs “Technical Report: Framework for Security Standardization for Virtualized Services“; TR.cta “Use cases of contact tracing applications to prevent spread of infectious diseases” and TR.qs-dlt “Guidelines for quantum-safe DLT systems”.*

2.11.6 SG17 has a long and successful history of collaboration with other ITU-T SGs and SDOs in developing ITU-T Recommendations on security. SG17 maintains the list of common/twin texts of ITU-T and ISO/IEC JTC 1. Latest achievements of such collaboration include: ITU-T X.1365 (X.ibc-iot) *“Security methodology for using Identity Based Cryptography for IoT services over telecom networks”,*  in collaboration with IETF and ISO/IEC JTC1/SC27/WG2; ITU-T X.510 is a common text developed in collaboration with ISO/IEC JTC1/SC 6; Revised ITU-T X.680-690-series on ASN.1, in collaboration with ISO/IEC JTC1/SC 6; ITU-T X.1400-series on DLT security, in collaboration with ITU-T SG16; ITU-T X.1600-series on cloud computing security, in collaboration with ITU-T SG13; ITU-T X.1700-series on QKDN security, in collaboration with ITU-T SG13; and ITU-T X.1360-series on IoT security, in liaison with ITU-T SG20.

## 2.12 ITU-T SG3

2.12.1 ITU-T SG3 agreed on [ITU-T D.Suppl.4 *“Supplement 4 to ITU-T D-series Recommendations: ITU-T D.263 – Supplement on Principles for increased adoption and use of mobile financial services (MFSs) through effective consumer protection mechanisms”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14239).

2.12.2 ITU-T SG13 approved the following: [ITU-T Y.2245 *“Service model of the Agriculture Information based Convergence Service”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14389) and [ITU-T Y.Suppl.67 *“Representative use cases and key network requirements for Network 2030”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14386).

## 2.13 ITU-T Focus Groups

2.13.1 ITU-T Focus Groups are formed in response to immediate ICT standardization demands, tasked with establishing the basis for subsequent standardization work in ITU-T Study Groups. These groups are the place to explore new directions in ITU standardization. At present, the following [five ITU-T Focus Groups are active](https://www.itu.int/en/ITU-T/focusgroups/Pages/default.aspx):

* The [*ITU-T Focus Group on Artificial Intelligence for Health (FG AI4H)*](https://www.itu.int/en/ITU-T/focusgroups/ai4h), driven in close collaboration by ITU and WHO, is working towards the establishment of a framework and associated process for the performance benchmarking of ‘AI for Health’ models. The group is currently working on 16 topic areas (*"use cases"*) and is seeking participation of key stakeholders, including health regulators, medical professionals, AI developers, industry and academia.
* The [*ITU-T Focus Group on Vehicular Multimedia (FG VM*](https://www.itu.int/en/ITU-T/focusgroups/vm/Pages/default.aspx)*)* was established by ITU-T SG16 to identify the need for new vehicular multimedia standards based on space and terrestrial networks integration. The study will analyse and identify gaps in the vehicular multimedia standardization landscape and eventually draft technical reports and specifications covering, among others, vehicular multimedia use cases, requirements, applications, interfaces, protocols, architectures, and security, leveraging from previous work done by ITU in this field.
* The [*ITU-T Focus Group on “Environmental Efficiency for AI and other Emerging Technologies”*](https://www.itu.int/en/ITU-T/focusgroups/ai4ee/Pages/default.aspx) (FG-AI4EE) was established to identify the standardization gaps related to the environmental performance of AI and other emerging technologies including automation, augmented reality, virtual reality, extended reality, smart manufacturing, industry 5.0, cloud/edge computing, nanotechnology, 5G, among others. The Focus Group develops technical reports and technical specifications to address the environmental efficiency, as well as water and energy consumption of emerging technologies.
* The [*ITU-T Focus Group on “AI for autonomous and assisted driving”*](https://www.itu.int/en/ITU-T/focusgroups/ai4ad/Pages/default.aspx) (FG-AI4AD) was established in October 2019 to support standardisation activities of AI evaluation in autonomous and assisted driving. To this end, the FG aims to create an open framework for collaboration and sharing of expertise that leads towards international harmonisation on the definition of a universal minimal performance threshold for AI enabled driving functions (such as AI as a Driver), which is essential to building the global public trust required for widespread deployment of AI on our roads.
* **The** [*ITU-T Focus Group on "Quantum Information Technology for Networks" (FG-QIT4N)*](https://www.itu.int/en/ITU-T/focusgroups/qit4n/Pages/default.aspx)was established by TSAG in September 2019 to provide a collaborative platform for pre-standardization aspects of QIT for networks. Its main objectives are to study the evolution and applications of QIT for networks; to focus on terminology and use cases for QIT for networks; to provide necessary technical background information and collaborative conditions to effectively support QIN-related standardization work in ITU-T Study Groups; and to provide an open cooperation platform with ITU-T Study Groups and other SDOs.

**2.14** TSB has not received feedback concerning any reported incidents with regard to [WTSA Resolution 69](https://www.itu.int/net/ITU-T/res69/Default.aspx) on *“Non-discriminatory access and use of Internet resources”* (so far there have been 37 incidents since 2009, see all related [reports](https://www.itu.int/net/ITU-T/res69/secured/notifications.aspx)).

**2.15** ITU-D SG 1 and SG 2 continue their work on the [2018-2021 study period](https://www.itu.int/net4/ITU-D/CDS/sg/index.asp?lg=1&sp=2018) including on IP-related issues such as NGN interconnection, VoIP, cloud services, and strategies, policies, and technologies for the deployment of broadband. The groups are exploring the transition from narrowband to high-speed, high-quality broadband networks (including transition to IMT-2020 networks), taking into account interconnection and interoperability features. New Q1/1 is working on *“Strategies and policies for the deployment of broadband in developing countries”* (merging former Q1/1 and Q2/1). Questions 4/1, 5/1, and 1/2 will continue their work from the previous study period with emphasis on the need to employ ICTs for sustainable social and economic development.

**2.16** ITU-D continues implementing Internet broadband wireless connectivity and developing ICT applications to provide free or low cost digital access for schools and hospitals, and for underserved populations in rural and remote areas in selected countries (Burundi, Burkina Faso, Djibouti, Lesotho, Mali, Rwanda, Eswatini, Antigua and Barbuda, and St. Kitts and Nevis, etc.). A few examples of the results achieved in this area are as follows:

* In Burundi, 437 institutions were connected to Broadband Internet including universities, schools, hospitals, Government agencies and cooperatives;
* In Burkina Faso, schools and hospitals in 10 cities in the country were connected to Broadband Internet;
* In Djibouti, 116 Institutions were connected to Broadband Internet using a 4G Broadband Network Infrastructure including 48 schools, 45 hospitals/clinics and 23 Government institutions/Ministries; and
* In E-swatini, in 2021, in close collaboration with Eswatini Post & Telecommunication Corporation, 18 Sites in Rural areas will be connected to 4G LTE (Huawei solution).

**2.17** ITU-R approved Recommendation ITU-R M.2083-0 *“IMT Vision – Framework and overall objectives of the future development of IMT for 2020 and beyond”*, Resolutions ITU-R 65 *“Principles for the process of future development of IMT for 2020 and beyond”* and ITU-R 66 *“Studies related to wireless systems and applications for the development of the Internet of Things”*, and Report ITU-R M.2440-0 *“The use of the terrestrial component of International Mobile Telecommunications for narrowband and broadband machine-type communications”*.

**2.18** ITU continues its cooperation with the Corporation for National Research Initiatives (CNRI) and the DONA Foundation on the use of the Digital Object Architecture (DOA) – an advanced architecture for information management – in the use of its advanced digital object management features in ITU and interested UN agencies.

**2.19** Several trainings were provided through [ITU Academy](https://academy.itu.int/) and the [ITU Centers of Excellence](https://academy.itu.int/index.php?option=com_content&view=article&id=154&Itemid=588&lang=en) network, covering topics such as *“Training on IPv6 deployment”*, *“Strategic Aspects for Internet Governance and Innovations”*, *“ICT Infrastructure and IoT”*, *“Technologies of Fiber Optics accesses and Next Generation Networks”*, *“Technologies of fourth Generation: LTE and LTE Advanced”*, *“The future of Interface towards 5G”, “The role of ICTs on Smart Sustainable Cities”*, etc.

**2.20** ITU is also supporting the Costa Rican Institute of Electricity (ICE) strengthen its capacity building, including on NGN Networks, through a project called *“Desarrollo del conocimiento en tecnologías, para especialistas del ICE”*.

# 3. IPv6

**3.1** The [ITU-T IPv6 webpage](https://www.itu.int/en/ITU-T/ipv6/Pages/default.aspx) highlights the IPV6 activities within ITU-T.

**3.2** On IPv6 and Internet of Things (IoTs),BDT and MUST (Malaysia University of Science and Technology) continue working towards the establishment of an ITU IPV6/IoT Expertise Centre for supporting Member States in their transition from IPv4 to IPv6 in order to support for IoTs and Industry 4.0. The objective is to give the participants the knowledge and experience in regards to the IoT connectivity and systems based on real IoT business cases. Another key area is the IPv6 over 5G Networks.

**3.3** Trainings/courses are being organized on all forms of IoT connectivity, including information security and privacy. The labs cover the installation, IoT operating systems, security, test, IoT communication systems and IoT vulnerabilities scanning tools. The subjects covered include, but are not limited to: IoT Architecture & Ecosystem, Hardware & Software Platforms, Communication Channels & Protocols, Data Streaming & IoT, IoT Applications in different domains (Agriculture, Medical, Meteorology), IoT Security Overview, Challenges to Secure IoT Deployments, Baseline Policies for IoT Security and IoT Endpoint Security Guidelines.

**3.4** BDT has organized the following trainings on “*Certified IoT Connectivity & Security for Professionals”*:

* This training was organized in Hanoi, Vietnam from 14 to 18 October 2019 at the PTIT (Ministry of Information and Communications, Posts and Telecommunications Institute of Technology). In the hands-on sessions, participants performed connectivity and simulated security scenarios in a lab environment to have a closer look at how such attacks happen under actual conditions.
* This training was also organized in Malang Indonesia from 9 to 13 December 2019 and was hosted by the Brawijaya University. Attended by 30 participants, the training explained the IoT connectivity & security challenges and other important issues on IoTs ecosystems and business models. Participants are now able to start and contribute to the development of National IoT Policy and Plans at the national level and train other participants. The participants recommended ITU / BDT:
* to also consider more Open Source based IoT connectivity & security systems;
* to include trainings on Linux/Unix systems;
* when the group of participants is large (i.e. 30 and above), to use more equipment for the training and labs.
* Another training took place in India at IIT Madras Research Park, Chennai, India from 16 to 20 December 2019 in close collaboration with ERNET India (National Research and Education Network established in 1998 as an autonomous scientific society under the Ministry of Electronics & Information Technology (MeitY), Government of India). 23 participants attended the workshop. It covered the basic and intermediate levels of IoT ecosystems including IoT security challenges, the IoT devices, applications and services. The target audience was IoT solution Designers, IoT Developers, IoT Implementers, IT Managers, IT Auditors and anyone who is ready to master the steps required and qualifications to implement IoT systems at the national level.
* In Morocco, a face to face training on “Certified IoT Security Professional” took place from 3-7 February 2020 at the Faculté des Sciences et Techniques de Mohammedia (FSTM)/ Université Hassan II. More than 40 professors and professionals have participated.
* Due to Covid-19, several other online training courses were organised for 25 participants at a time to allow them to have a good connectivity quality of services and to be able to work on lab exercises remotely:
	+ Certified IPv6 Fundamentals in English : 27-30 July 2020
	+ Certified Industry 4.0 (Introduction & Intermediate) in English : 20-23 July 2020
	+ Certified Industry 4.0 (Fundamental) in English 12-15 October 2020
	+ Certified IPv6 Fundamentals in Arabic 19-22 October 2020
	+ Certified IPv6 Fundamentals in English took place from 16-20 November 2020 and from 30 November-4 December 2020
	+ Certified IPv6 Fundamentals in Arabic from 6-12 December 2020 and from 13-17 December 2020

 The lesson learned from these online courses is that for many young engineers, it is a very good opportunity to have such professional trainings. For each training with 25 available spots, more than 100 candidates had registered online. The number of sessions have been increased for this reason.

**3.5** BDT is also providing technical assistance on IPv6 to Montenegro, working closely with the Ministry of Economy, the Ministry of Public Administration and the University of Montenegro. The proposed responsibilities of the parties are as follows:

* The Ministry of Economy will establish a national body to coordinate activities regarding the transition to IPv6. The members of the national body will be representatives of Ministry of Economy, Ministry of Public Administration, University of Montenegro and Agency of Electronic Communications and Postal Services;
* The task is to establish a laboratory within AMUCG data centre, necessary for the IPv6 transition testing;
* To implement e-services accessible by IPv6 within the Ministry of Public Administration;
* To collaborate with telecom operators on their IPv6 plans in 2021 and implementation of related IPv6 activities; and
* To prepare and implement together the *“IPv6 project for public institutions in Montenegro“.*

**3.6** Other similar workshops on IoT Ecosystems and/or IPv6 over 5G Networks including IPv6 to support Industry 4.0 are planned for Argentina, Morocco, Senegal, Sri Lanka, Thailand, Malaysia and Vietnam etc.

**3.7** BDT is also working on the creation of an Information and Training Center on IP Telephony (technical, policy, economic and capacity building aspect) for the CIS region.

**3.8** BDT continues to provide assistance to countries on the implementation of IPv6 policies and IPv6 test bed as requested by Member States, e.g.: In the Africa region, assistance was provided in setting up of an Internet protocol version 6 (IPv6) testbed in Côte d’Ivoire and Uganda, to be used as sub-regional test beds for IPv4 to IPv6 migration in Western and Eastern Africa, respectively; in Zimbabwe to be used as a sub-regional testbed for IPv4 to IPv6 migration in Southern Africa; and in Cameroon, to be used as a sub-regional testbed for IPv4 to IPv6 migration in Central Africa. An IPv6 test bed installation is ongoing in Sierra Leone. A Feasibility study has been conducted on IPv6 test beds improvement and a master plan is under development to facilitate African countries to adopt IPv6.

**3.9** BDT is also focusing on a special program to train the trainers on “IPv6 Over 5G Networks” in order to assist developing countries to implement their 5G mobile and/or fixed networks. The workshops cover both theory and practical trainings and are recommended for 5G Mobile Technical Officers, IoT Designers, IoT Developers, IoT Implementers, IT Managers, IT Auditors and anyone who is ready to master the steps required to implement IPv6 over 5G Networks.

The key issues to be addressed through this program are: 5G Introduction (Overall Architecture, Services, Applications and Use Cases etc.), IPv6 Address Allocation Schemes for 5G Networks (Infrastructure Addressing, IPv6 Routing for 5G Transport, IPv6 Routing Tables etc.), Hands-On (IPv6 address assignment and Connectivity Lab including the monitor IPv6 traffic over the 5G network), IPv6 Transition Strategies for 5G Networks (including IPv6 3GPP Standards for 5G), IPv6 Built-in IPSec over 5G, Hands-On: IPv6 IPsec over 5G Network Lab (including setting-up the IPv6 IPSec over the 5G network using IPv6 mobile devices and monitoring the IPv6 traffic over 5G network using network monitoring software), and Case Studies

**3.10** Through the ITU Academy, a training course on Internet and IPv6 Infrastructure Security continues to be provided in the Asia-Pacific region by the Centre of Excellence ALTTC, in partnership with MDES (Thailand) and APNIC.

**3.11** In the Arab region, a project on human capacity building in relation to IPv6 was implemented under the framework cooperation agreement signed between the UAE’s Telecommunications Regulatory Authority (TRA) and ITU.

**3.12** The [final report](https://www.itu.int/pub/D-STG-SG01.01.1-2017) in response to ITU-D SG 1 [Question 1/1](https://www.itu.int/net4/ITU-D/CDS/sg/rgqlist.asp?lg=1&sp=2014&rgq=D14-SG01-RGQ01.1&stg=1) is available and explores through case studies the experiences of countries in transitioning from IPv4 to IPv6 to enable IoT, M2M, Internet of Everything (IoE), and other future technologies. An essential Guide has been developed also in order to assist developing countries to implement IPv6 over 5G Networks.

# 4. Internet-related public policy issues including the management of domain names and addresses

**4.1** Due to COVID-19, the [Council Working Group on international Internet-related public policy issues (CWG-Internet)](https://www.itu.int/en/council/cwg-internet/Pages/default.aspx) did not hold a meeting during the CWG cluster in September 2020. The deadline for the [Online Open Consultation on the topic of Expanding Internet Connectivity](https://www.itu.int/en/council/cwg-internet/Pages/consultation-sep2020.aspx) was also extended until 15 December 2020. The fifteenth meeting of the CWG-Internet will now be held on 27-28 January 2020 with the virtual Open Consultation meeting being held on 25 January 2020.

**4.2** ITU participated in the 15th IGF meeting, held virtually from 2-6 and 9-17 November 2020. The ITU SG was invited to speak at the opening ceremony of IGF on 9 November 2020. ITU also organized the annual EQUALs in Tech Awards and co-organized an Open Forum on Implementation of WSIS Action Lines for SDGs and WSIS Forum 2021 (co-organized by the WSIS Action Line Facilitators) at this IGF meeting.

**4.3** ITU continues to follow the issue of protecting intergovernmental organization (IGO) names and acronyms in any new gTLDs, as part of the IGO coalition composed of approximately 35 IGOs including OECD, UN, UPU, WHO, WIPO, and the World Bank.

**4.4** BDT continues to develop capacities in the field of Internet governance for ITU membership. Several training and capacity building activities were implemented in 2020, including through the Centres of Excellence programme. Due to the Covid-10 pandemic, most of these trainings were delivered online via the [ITU Academy platform](https://academy.itu.int/index.php/), such as the trainings on “*Applications of satellite based IoT networks*", “*Digital Government and Smart City for Resilience*", “*Cybersecurity Policy & Strategy*”, “*Mobile broadband Internet, 5G and future services*" and so on**.**

# 5. ENUM

**5.1** [Updated Information on ENUM](http://www.itu.int/ITU-T/inr/enum/) is being maintained by ITU-T. This includes information on approved ENUM Delegations and on ENUM trials.

**5.2** ITU-T SG2 is continuing work on a new draft Recommendation ITU-T E.ENUMINF *“Differentiating between ENUM and Infrastructure ENUM”*.

**5.3** ITU-T SG11 approved [Recommendation ITU-T Q.3643 *“Signalling architecture of distributed infrastructure ENUM networking for IMS”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14243) and [Recommendation ITU-T Q.3645 *“Protocol at interface between two distributed ENUM servers for IMS”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14414).

# 6. International Internet Connectivity (IIC)/Internet Exchange Points (IXPs)

**6.1** BDT continues to provide assistance to countries in the creation of national IXPs, and on achieving efficient and cost-effective regional Internet connectivity by, for example, developing model interconnection as a basis for formulating National and Regional IXPs, as in the case of Guatemala; and supporting strengthening capabilities of the national IXPs (Montenegro) and the National Internet Exchange in Timor Leste.

**6.2** BDT is assisting to establish SIXP (Samoa IXP) to enable local ISPs to connect directly together and exchange domestic traffic, typically with settlement-free peering, thereby reducing and/or saving cost on international transit while reducing latency (by avoiding local traffic to be carried internationally). The objective is also to attract more content providers, along with business, academic, and government users, and thereby become the centre of a vibrant Internet ecosystem in the country. This IXP initiative is anticipated to help also achieve Government’s objective of improving the affordability of broadband services in Samoa.

**6.2** In the Africa region, BDT is providing assistance to support the implementation of One Network Area roaming in West Africa and supporting the setting up of national and regional Internet Exchange points to support high speed and high quality broadband connectivity and access. Another sub-regional IXP is under consideration with Djibouti Telecom using their New Data Center and optical cables.

**6.3** BDT has also developed an [ICT-data mapping platform](https://www.itu.int/itu-d/tnd-map-public/) to take stock of IXPs locations, national backbone connectivity (optical cables, microwave links and satellite earth stations) as well as of other key metrics of the ICT sector. This is a result of collaboration between ITU, UN ESCAP, TeleGeography and ITU Member States.

# 7. OTT

**7.1** Under ITU-D Q3/1, work continues on *“Emerging technologies, including cloud computing, m-services and OTTs: Challenges and opportunities, economic and policy impact for developing countries”*.

**7.2** ITU-T SG2 is progressing two new work items on OTTs: TR.OTTnumber *“Current use of E.164 numbers as identifiers for OTTs”* and E.sup.OTTnum *“Guidance on the use of E.164 numbers as identifiers for OTTs”*. ITU-T SG2 is also progressing a draft Recommendation ITU-T E.dit *“Deemed impermissible traffic”*, and a draft Recommendation ITU-T E.ACP *“Alternative calling procedures”*.

**7.3** ITU-T SG3 approved [Recommendation ITU-T D.1101 *“Enabling environment for voluntary commercial arrangements between telecommunications network operators and OTT providers”*](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14269) which addresses the measures for strengthening the commercial cooperation between over the top (OTT) providers and telecom operators. Given that network operators and OTTs are part of the international telecommunication/ICT ecosystem, this Recommendation encourages relevant stakeholders to work towards an enabling regulatory environment that supports and encourages the development of innovative business models in line with the advancement of technology and innovations, which are changing faster than ever.

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