|  |  |
| --- | --- |
| **Council Working Group on International Internet-related Public Policy IssuesSixteenth meeting - Virtual, 23 September 2021** |  |
|  |  |
|  | **Document CWG-Internet-16/2-E** |
|  | **20 August 2021** |
|  | **English only** |
| Report by the Secretary-General |
| ITU INTERNET ACTIVITIES: RESOLUTIONS 101, 102, 133, 180 and 206 |

|  |
| --- |
| 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 2021 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 190 new/revised ITU-T Recommendations and other texts have been approved from 17 December 2020 to 09 August 2021. [Relevant Recommendations](https://www.itu.int/itu-t/workprog/wp_search.aspx?isn_sp=3925&isn_status=-1,2&adf=2020-12-17&adt=2021-08-31&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 continues with updated version to Emmy-award winning Recommendations H.264 and H.265, as well as of specifications supporting the application of video compression technologies (ITU-T H.273 and H-Series Supplement 19).

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

2.2.3 SG16 approved the following [Recommendation TU-T H.644.4 “Architecture for mobile/multi-access edge computing enabled content delivery networks”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14686) that specifies a functional architecture for mobile/multi-access edge computing (MEC) enabled content delivery network (MEC-CDN).

2.2.4 SG16 published [ITU-T Technical Paper HSTP.ACC-UC "Use cases for inclusive media access services"](https://www.itu.int/pub/publications.aspx?lang=en&parent=T-TUT-FSTP-2021-ACC.UC), which describes use cases for multimedia accessible system.

**Digital health technologies**

2.2.5 Digital health progressed with the completion of the [conformance testing specification](https://www.itu.int/pub/publications.aspx?lang=en&parent=T-TUT-EHT-2021-CONFH870) for ITU-T H.870 on safe listening devices, which is a common standard adopted by ITU and WHO in 2018.

2.2.6 Collaboration with WHO continued on a new standard on requirements for accessible telehealth services. The first edition is expected to be completed in the first quarter of 2022.

**2.3 Distributed Ledger Technologies**

2.3.1 ITU-T SG3 started work on two Technical Reports on "Usage of Distributed Ledger Technology (DLT) to handle accounting, policy, regulatory and economic issues in the international telecommunications/ICT domain", and on “Use of distributed ledger technology to improve management of the Universal Service Fund”.

2.3.2 ITU-T SG17 approved Recommendations [ITU-T X.1405 “Security threats and requirements for digital payment services based on distributed ledger technology”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14722), which focuses on payment services use cases and describes a service model, and [ITU-T X.1406 “Security threats to online voting system using distributed ledger technology”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14734), which identifies security threats to online voting system using DLT based on telecommunication/ICT infrastructure, and which proposes a reference model of online voting system using DLT based on telecommunication/ICT infrastructure and analyzes security threats in online voting process described in the models.

2.3.3 ITU-T SG17 continues to work on developing seven draft new Recommendations on DLT security, namely: X.das-mgt “Security threats and requirements for data access and sharing based on distributed ledger technology”, X.sa-dsm “Security architecture of data sharing management based on the distributed ledger technology”, X.sc-dlt “Security controls for distributed ledger technology”, X.srip-dlt “Security requirements for digital integrity proofing based on distributed ledger technology”, X.srscm-dlt “Security Requirements for Smart Contract Management based on the distributed ledger technology”, X.ss-dlt “Security services based on distributed ledger technology”, X.tf-spd-dlt “Technical framework for secure software programme distribution mechanism based on distributed ledger technology” and a draft new Technical Report on “Guidelines for quantum-safe DLT system”.

2.3.4 ITU-T SG20 approved [Recommendation ITU-T Y.4476 “OID-based resolution framework for transaction of distributed ledger assigned to IoT resources”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14578) which specifies a resolution framework for the transactions of a distributed ledger assigned to IoT resources. This Recommendation describes the concepts, functional requirements, architecture and procedures of an OID-based resolution framework by using DLT.

2.3.5 ITU-T SG20, together with other UN agencies and organizations, is organizing a series of webinars on Digital Transformation including on blockchain and Internet of Things.

2.3.6 The DLT experts continue 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) every first Wednesday of a month, 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.

**2.4** **IMT-2020**

## ITU-T SG13

 SG13 approved the following Recommendations:

* [ITU-T Y.3109 “QoS assurance-related requirements and framework for virtual reality delivery using mobile edge computing supported by IMT-2020](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14396)”specifies Quality of Service (QoS) requirements and a framework for virtual reality delivery using mobile edge computing in IMT-2020.
* [ITU-T Y.3113 “Requirements and framework for latency guarantee in large scale networks including IMT-2020 network”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14595) specifies the requirements and the framework for effective and efficient solutions for latency guarantee and the cooperation among heterogeneous QoS domains.
* [**I**TU-T Y.3157 “IMT-2020 network slice configuration”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14597) specifies network slice configuration in order to dynamically create and manage a network slice instance in the IMT-2020 network.

**2.5 ITU-T SG17**

 ITU-T SG17 approved [Recommendation ITU-T X.1811 “Security guidelines for applying quantum-safe algorithms in 5G systems”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14454), which identifies threats raised by quantum computing to International Mobile Telecommunications-2020 (IMT-2020) systems through assessing the security strength of currently used cryptographic algorithms.

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

## ITU-T SG20

2.6.1 ITU-T SG20 approved the following Recommendations:

* [ITU-T Y.4122 “Requirements and capability framework of edge computing-enabled gateway in the IoT”](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=14644): Based on common requirements and capabilities of a gateway for Internet of things applications [ITU-T Y.4101] and IoT requirements for support of edge computing [ITU-T Y.4208], additional capabilities and capability framework of the edge computing-enabled gateway in the IoT are specified. Examples of applicability of the edge computing-enabled gateway in the IoT are also given.
* [ITU-T Y.4211 “Accessibility requirements for smart public transportation services”](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14646) specifies accessibility requirements for smart public transportation services.
* [ITU-T Y.4559 “Requirements and functional architecture of base station inspection services using unmanned aerial vehicles”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14424) describes requirements and functional architecture of base station inspection services (BSI) services using unmanned aerial vehicles (UAVs). It focuses on how to effectively provide inspection services for the base station using BSI-dedicated UAVs (BSI-UAVs).
* [ITU-T Y.4419 “Requirements and Capability Framework of Smart Utility Metering (SUM)”](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=16395) specifies requirements and capabilities for the support for smart utility metering (SUM). Smart Utility Metering (SUM) can provide remote data collection for utility metering, device maintenance in real time and can support a variety of applications.
* [ITU-T Y.4420 “Framework of IoT based monitoring and management for Lift”](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=14966): This Recommendation describes a framework of IoT based monitoring and management for lift with a protocol and data model to solve these problems.
* [ITU-T Y.4471 “Functional architecture of network-based driving assistance for autonomous vehicles”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14423) defines a reference functional architecture of network-based driving assistance (NDA) for autonomous vehicles. For improvement in the driving of autonomous vehicles, coordination between vehicles and infrastructures need to be improved with network technologies to provide the increasing transportation services and application requirements.
* [ITU-T Y.4476 “OID-based resolution framework for transaction of distributed ledger assigned to IoT resources”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14578) specifies a resolution framework for the transactions of a distributed ledger assigned to IoT resources. This Recommendation describes the concepts, functional requirements, architecture and procedures of an OID-based resolution framework by using DLT.
* [**I**TU-T Y.4908 “Performance evaluation frameworks of e-health systems in the IoT”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14425): This Recommendation addresses this need for effective performance evaluation frameworks of e-health systems in the IoT.

2.6.2 SG20 also agreed on the following three Supplements:

* [ITU-T Y.Suppl.58 (revised) “Internet of things and smart cities and communities standards roadmap”](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14729) presents the Joint Coordination Activity on Internet of Things and Smart Cities and Communities (JCA-IoT and SC&C) roadmap, which contains a collection of standards and ITU-T Recommendations related to Internet of things (IoT), smart cities and communities (SC&C), network aspects of identification systems, including RFID (NID) and ubiquitous sensor networks (USNs).
* [ITU-T Y.Suppl.68 “Framework for Internet of Things ecosystem Master Plan”](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14731)**:** This Supplement describes a framework to support Member States to define their IoT ecosystem Master Plan, based on vertical domain assessment and identification of technical aspects to support the selected verticals. It also presents some actions to support the Master Plan deployment.
* [ITU-T Y.Suppl.69 “Web based data model for IoT and smart city systems and services”](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14732)**:** Data models play a critical role in data, applications, systems, and businesses across various industries as they provide the definition and format of data to support data, computer systems, and related businesses. Supplement Y.Suppl.68 to ITU-T Y-series Recommendations provides a web-based data model for Internet of things (IoT) and smart cities.

2.6.3 SG20 also determined two draft Recommendations (under approval):

* [ITU-T Y.4421 “Functional architecture for unmanned aerial vehicles and unmanned aerial vehicle controllers using IMT-2020 networks”](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=14653): The motivation of this Recommendation is to solve the issues of civilian UAVs accessing and communicating in IMT-2020 networks using its transmission capabilities.
* [ITU-T Y.4809 “Unified IoT Identifiers for intelligent transport systems”](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=14947) defines field formats for identifying road signs and signals, and identifies specific values for identifiers of such signs and signals.

2.6.4 SG20 is progressing 76 draft Recommendations. The complete list of SG20 draft Recommendations is available [here](https://www.itu.int/ITU-T/workprog/wp_search.aspx?sg=20).

2.6.5 SG20 is also progressing 7 Supplements and 3 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).

2.6.6 Further, SG20 started new work on 9 draft ITU-T Recommendations: *ITU-T Y.DT-interop* “Interoperability framework of digital twin systems in smart cities and communities”; *ITU-T Y.ACC-UI-req* “Accessibility requirements for user interface of smart applications supporting IoT”; *ITU-T Y.dt-ITS* “Requirements and capability framework of digital twin for intelligent transport system”; *ITU-T Y.IIoT-infra-SM-fr* “Requirements and framework of Industrial IoT (IIoT) infrastructure for smart manufacturing”; *ITU-T Y.RMDFS-arch* “Functional architecture of roadside multi-sensor data fusion systems for autonomous vehicles”; *ITU-T Y.energy-data* “Framework of city-level energy data sharing and analytics among buildings”; *ITU-T Y.IoT-SPWE* “Framework of IoT services for safety protection of working environment”; *ITU-T Y.UIM-cs-framework* “Framework of urban infrastructure monitoring based on crowdsourcing”; *ITU-T Y.MM-DSC-SSC* “Maturity model of digital supply chain for smart sustainable cities”.

2.6.7 SG20 has also started new work on two draft Supplements: *ITU-T Y.Sup.DTransf* “Digital transformation in the context of IoT, smart cities and communities”; and *ITU-T Y.Sup.DTw-concept-usecase* “Concept and use cases of a digital twin in smart sustainable cities”.

2.6.8 Additionally, SG20 has started new work on a draft new Technical Report *ITU-T YSTR.P2P-CC* “Current state of P2P crowd charging platforms and corresponding market needs”.

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

**Smart Cities**

2.6.10 Under the [United for Smart Sustainable Cities (U4SSC) initiative](https://www.itu.int/en/ITU-T/ssc/united/Pages/default.aspx), the following deliverable was published: [Simple ways to be smart](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-Simple-ways-to-be-smart/index.html).

2.6.11 More than 150 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”*.

2.6.12 Additionally, the following city snapshots were launched: [Kristiansand, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Kristiansand-Norway/index.html); [Stavanger, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Stavanger-Norway/index.html); [Aukra, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Aukra-Norway/index.html); [Aure, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Aure-Norway/index.html); [Averøy, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Averoy-Norway/index.html); [Fjord, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Fjord-Norway/index.html); [Gjemnes, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Gjemnes-Norway/index.html); [Hareid, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Hareid-Norway/index.html); [Herøy, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Heroy-Norway/index.html); [Hustadvika, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Hustadvika-Norway/index.html); [Ørsta, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Orsta-Norway/index.html); [Rauma, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Rauma-Norway/index.html); [Sande, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Sande-Norway/index.html); [Smøla, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Smola-Norway/index.html); [Stranda, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Stranda-Norway/index.html); [Sunndal, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Sunndal-Norway/index.html); [Surnadal, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Surnadal-Norway/index.html); [Sykkylven, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Sykkylven-Norway/index.html); [Tingvoll, Norway](file:///C%3A%5CUsers%5Cco%5CDownloads%5CTingvoll%2C%20Norway); [Ulstein, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Ulstein-Norway/index.html); [Vanylven, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Vanylven-Norway/index.html); [Vestnes, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Vestnes-Norway/index.html); and [Volda, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Volda-Norway/index.html). The following verification reports were launched: [Kristiansand, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-Verification-Report-Kristiansand-Norway/index.html); and [Stavanger, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-Verification-Report-Stavanger-Norway/index.html).

2.6.13 The first United for Smart Sustainable Cities (U4SSC) Austrian U4SSC Country Hub will be hosted by the Austrian Economics Center in Vienna, Austria. The main objective of this country hub is to promote the work of U4SSC.

2.6.14 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"*, with TMForum on draft Recommendation *ITU-T Y.TM.DM-API* “IoT Device Management API REST Specification” and *Y.TM.SM-API* “IoT Service Management API REST Specification” 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 second meeting took place virtually on 24 February 2021. During the meeting:
	+ the J-SCTF secretariat has presented a draft working methods which mainly defines the schedule of meetings, reporting, lifetime, and document repository of the J-SCTF;
	+ a draft collaboration platform was also presented to introduce unified platform which is accessible for all members without limit to share documents and information for the task force; and
	+ updates on activities relates to the pandemic were presented by IEC, ISO, and ITU-T since the first J-SCTF meeting in October 2020.
* The International Telecommunication Union (ITU) together with International Electrotechnical Commission (IEC) and International Organization for Standardization (ISO), as part of the IEC-ISO-ITU Joint Smart Cities Task Force (J-SCTF) activities, organized a virtual Forum on “Strengthening IEC, ISO and ITU collaboration for Smart Cities” on 21 June 2021.
* The third meeting of the J-SCTF took place virtually on 29 June 2021.

**Digital Health and Internet of Things (IoT)**

2.6.15 On Digital Health and Internet of Things (IoT), one ITU-T Recommendation was approved by ITU-T SG20:

* [ITU-T Y.4908 “Performance evaluation frameworks of e-health systems in the IoT”](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=13679): This Recommendation includes:
* A classification of e-health services in the IoT
* A non-exhaustive set of non-functional performance evaluation factors applicable to the e-health systems in the IoT
* Performance evaluation frameworks for e-health systems in the IoT

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

 SG11 consented the following draft Recommendations:

* ITU-T Q.5023 “Protocol for managing intelligent network slicing with AI-assisted analysis in IMT-2020 network” which describes architectural concept of intelligent network slicing APIs and management system, reference points among relevant functional elements, signalling flows over each reference point, and message formats with detail information.
* ITU-T Q.4101 (ex. Q.HP2P-recov) “Hybrid P2P communications: Tree and data recovery procedures” which specifies procedures for construction and recovery of a tree-based hybrid overlay network as well as recovery of data lost during reconstruction of the overlay network.
* ITU-T Q.4044 “Test suite for interoperability testing of virtual switch” which provides test suite for interoperability testing of virtual switch and contains test cases specifying the test objective, test procedures and expected results.
* ITU-T Q.4068 “Open APIs for interoperable testbed federations” which provides a generic reference model for testbeds federation and describes the elements of this reference model. This Recommendation contains a technical framework consisting of guidelines, which provides a common reference for developers in order to facilitate the implementation and promotion of interoperability of testbeds.

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

2.8.1 ITU-T SG17 approved [Recommendation ITU-T X.1368 “Secure firmware/software update for Internet of things (IoT) devices”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14445), which specifies basic models and procedures for securely updating firmware or software (FW/SW) of Internet of things (IoT) devices; and requirements and capabilities for updating IoT FW.

2.8.2 SG17 continues to work on developing four draft new Recommendations on IoT security, namely: X.iotsec-4 “Security requirements for IoT devices and gateway”, X.sc-iot “Security controls for Internet of Things (IoT) systems”, X.ssp-iot “Security requirements and framework for IoT service platform” and X.ztd-iot “Security methodology for zero-touch massive IoT deployment”.

## 2.9 ITU-T SG12 (QoS and QoE)

2.9.1 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.

2.9.2 During the reporting period, IP related SG12 work included an [Amendment to Recommendation ITU-T Y.1545.1 “Framework for monitoring the quality of service of IP network services”](https://www.itu.int/rec/T-REC-Y.1545.1-202106-I%21Amd1). SG12 also updated its results on [“Interpreting Y.1540 Maximum IP-Layer Capacity Measurements” (Y Suppl.60)](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14707).

2.9.3 SG12 continues to harmonize work of common interest with the IETF IP performance measurement working group (ippm); ETSI TC STQ; and the Broadband Forum.

## 2.10 ITU-T SG11

An [ITU Workshop on "Protocol Enhancements for IMS to be used in LTE/IMT-2020 Networks and Beyond" took place on](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/2021/0705/Pages/default.aspx) 5 July 2021 which concluded that there is a need to integrate AI/Analytics-based autonomic functions/signalling on IMS. It was also highlighted that virtualized/distributed IMS platform is a reality and its framework especially on 5G-based networks is needed. Also, operators need to assess the performance and scalability of IMS platforms - the AI based benchmarking platforms are needed. More details are available in the key takeaways at: [www.itu.int/go/IMS4-5GB](http://www.itu.int/go/IMS4-5GB).

## 2.11 IP Cable - ITU-T SG9

2.11.1 SG9 approved the following Recommendations on:

* [ITU-T J.481 “Requirements of cable network for RF and IP secondary distribution of television programmes”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14601): This Recommendation defines the requirements and architecture of a cable television system able to provide video services in both RF and IP formats. This Recommendation is expected to support cable operators to continue their current cable television business during the transition to IP and in mixed RF and IP environments.
* [ITU-T J.482 “Requirements of RF/IP switching system”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14602) defines the requirements of a radio frequency (RF)/Internet protocol (I/IP) video switching system.
* [ITU-T J.1301 “The specification of cloud-based converged media service to support IP and Broadcast Cable TV – Requirements”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14585) specifies functional requirements, architecture requirements, interface requirements and security requirements for the cloud-based converged media service to support IP and Broadcast Cable TV.
* [ITU-T J.1302 “The specification of cloud-based converged media service to support IP and Broadcast Cable TV - System Architecture”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14647) defines the system architecture of the cloud-based converged media service to support IP and broadcast cable TV.
* [ITU-T J.1611 “Functional requirements for Smart Home Gateway”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14586) defines the functional requirements for a smart home gateway from both hardware and software point of view to ensure secure interoperability among consumers, businesses and industries by delivering a standardized communications platform and allowing devices to communicate cross operating system, service provider, transport technology or ecosystem.

2.11.2 SG9 consented to draft Recommendation ITU-T J.1631 "Functional requirements of E2E network platform for Cloud-VR services" (under approval), which describes functional requirement of the end-to-end (E2E) network platform to deliver 360°/Virtual Reality (VR) video services from the video cloud to the terminal devices.

## 2.12 ITU-T SG13

 ITU-T SG13 approved [Recommendation ITU-T Y.2623 “Requirements and framework of Industrial Internet networking based on future packet based network evolution”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14612), which provides definitions and requirements of Industrial Internet networking in support of customized, collaborative, service-oriented and intelligent production/services. It also describes a framework of Industrial Internet networking for understanding significant relationships among the entities of factory internal network and factory external network.

## 2.13 ITU-T SG15

2.13.1 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.

2.13.2 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).

**2.14 ITU-T SG2**

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.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”. ITU-T M.rcsnsm “Requirements for synergy management of cloud and SDN-based network” was approved in October 2020* and *ITU-T X.785 (ex X.rest) “Guidelines for defining REST-based managed objects and management interfaces” has received first-stage Consent by ITU-T SG2 experts, and is scheduled for Approval by the of July 2021.*

## 2.15 Security - ITU-T SG17

2.15.1 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.

2.15.2 On security aspects related to the Internet, SG17 approved (or under approval) the following 11 Recommendations:

* Revised ITU-T X.1054 “Information security, cybersecurity and privacy protection - Governance of information security”;
* [ITU-T X.1060 “Framework for the creation and operation of a Cyber Defence Centre”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14721), which defines Cyber Defence Centre as the entity that plays a central role in an organization to address cybersecurity risks;
* [ITU-T X.1217 “Guidelines for applying threat intelligence in telecommunication network operation”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14443), which specifies guidelines for applying threat intelligence in telecommunication network operation after an overview analysis;
* revised [ITU-T X.1252 “Baseline identity management terms and definitions”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14642), which defines of key terms used in identity management (IdM);
* [ITU-T X.1368 “Secure firmware/software update for Internet of things (IoT) devices”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14445), which specifies basic models and procedures for securely updating firmware or software (FW/SW) of Internet of things (IoT) devices; and requirements and capabilities for updating IoT FW;
* [ITU-T X.1811 “Security guidelines for applying quantum-safe algorithms in 5G systems”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14454), which identifies threats raised by quantum computing to International Mobile Telecommunications-2020 (IMT-2020) systems through assessing the security strength of currently used cryptographic algorithms;
* [ITU-T X.1376 “Security-related misbehaviour detection mechanism using big data for connected vehicles”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14448), which describes a security-related misbehaviour detection mechanism for connected vehicles to help stakeholders to utilize automotive data to improve vehicle security;
* [ITU-T X.1405 “Security threats and requirements for digital payment services based on distributed ledger technology”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14722), which focuses on payment services use cases and describes a service model, and
* [ITU-T X.1406 “Security threats to online voting system using distributed ledger technology”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14734), which identifies security threats to online voting system using DLT based on telecommunication/ICT infrastructure, and which proposes a reference model of online voting system using DLT based on telecommunication/ICT infrastructure and analyzes security threats in online voting process described in the models;

2.15.3 SG17 also consented ITU-T X.1061” Cyber insurance acquisition guideline” and determined ITU-T X.1233 “Guidelines for countering spam over instant messaging”.

2.15.4 SG17 started new work on the following 11 draft ITU-T Recommendations:

* X.5Gsec-message “Security Requirements for 5G Message Service”,
* X.1144rev “eXtensible Access Control Markup Language (XACML) 3.0”,
* X.guide-cdd “Security guidelines for combining de-identified data using trusted third party”,
* X.sg-dtn “Security Guidelines for Digital Twin Network”,
* X.vide “Guideline of visual feature protection and secure sharing mechanisms for de-identification”,
* X.gecds “Guideline on edge computing data security”,
* X.sa-ec “Security architecture of edge cloud”,
* X.sgcnp “Security guidelines for cloud native PaaS”,
* X.1251rev “A framework for user control of digital identity”,
* X.sec-QKDN-AA “Authentication and authorization in QKDN using quantum safe cryptography”,
* and X.sec-QKDN-CM “Security requirements and measures for quantum key distribution networks - control and management” and four new technical reports.

2.15.5 SG17 started new work on the following three technical reports: TR.ibc-cd “Guideline for identity-based cryptosystems used for cross-domain secure communications”, TR.hybsec-qkd “Overview of hybrid security approaches applicable to QKD” and TR.sec-ai “Guidelines for security management of using artificial intelligence technology”.

2.15.6 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: revised ITU-T X.1054 |ISO/IEC 27014 *“Information security, cybersecurity and privacy protection - Governance of information security”* as common text with ISO/IEC JTC1/SC27/WG1, 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 D.1140/X.1261 *“Policy framework including principles for digital identity infrastructure”* in collaboration with ITU-T SG3; 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.

## 2.16 ITU-T Focus Groups

2.16.1 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 [seven ITU-T Focus Groups are active](https://www.itu.int/en/ITU-T/focusgroups/Pages/default.aspx):

* The [*ITU-T Focus Group on AI for Natural Disaster Management (FG-AI4NDM)*](https://www.itu.int/en/ITU-T/focusgroups/ai4ndm/Pages/default.aspx) was established to explore the potential of AI in supporting data collection and handling, improving modelling across spatiotemporal scales, extracting complex patterns and gaining insights from a growing streams of geospatial data, to enhance the preparedness for (and response to) natural disasters.
* The [*ITU-T Focus Group on Autonomous Networks (FG-AN)*](https://www.itu.int/en/ITU-T/focusgroups/an/Pages/default.aspx)was established to support standardisation activities of autonomous networks.
* 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 [*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 [*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 [*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 to support standardisation activities of AI evaluation in autonomous and assisted driving.
* **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 to provide a collaborative platform for pre-standardization aspects of QIT for networks.

**2.17** 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)).

**2.18** 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.

**2.19** 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 Eswatini, in 2021, in close collaboration with Eswatini Post & Telecommunication Corporation, 18 Sites in Rural areas will be connected to 4G LTE (Huawei solution).

**2.20** 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”*.

**2.21** 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.

**2.22** 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 *“*AI for Good: Technology, Strategy and Policy Development*”*, “Future Broadband: Ultra-broadband Internet, Clouds, IoT and Artificial Intelligence”, *“*Strategic Aspects for Internet Governance and Innovations”, “Emerging Technology for the Last Mile Connectivity”, “Technologies of fourth Generation: LTE*”*, *“*Fifth Generation (5G) Implementation: Practices and Case Studies*”, “*Conformity and Interoperability relating to Industrial Internet”, *“*Developing IoT, Big Data and Blockchain solutions for Smart sustainable cities*”*, etc.

**2.23** 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** Due to Covid-19, several 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:

* + National Workshop on IPv6 Policy, Strategy and Implementation for Montenegro 20-21 April 2021.
	+ “ITU Certified IPv6 and IoT Workshop for Montenegro” held from 10 to 14 May 2021
	+ ITU Virtual Training on IPv6 Over 5G Networks for the Philippines Virtual from 17 to 21 May 2021

As of August 2021, a total of 200 Engineers and Professionals have been trained and certified on IoT Systems; from IPv4 to IPv6, Industry 4.0; IPv6 over 5G in partnership with MUST.

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 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 establishment of a laboratory within AMUCG data centre, necessary for the IPv6 transition testing, is currently ongoing;
* 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** 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.

**3.11** 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** 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.

ITU will continue to actively participate in the 16th IGF, to be hosted by the Government of Poland in Katowice from 6 to 10 December 2021.

**4.2** 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.

**4.3** BDT continues to develop capacities in the field of Internet governance for ITU membership. Several training and capacity building activities were implemented in 2021, including through the Centres of Excellence programme. Due to the Covid-10 pandemic, all 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*", “Blockchain, AI & SDN: “Opportunities, Challenges and Solutions for Smart Cities “,“Government innovation using digital technologies in the post COVID 19 era", “Cybersecurity Foundation”, “*Security and QoS in Internet Network*" , “Technical, business and regulatory aspects of 5G network” 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”*.

# 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. Assistance on IXP is also being provided to Mongolia. Technical assistance on Quality of Service (QoS) and Quality of Experience (QoE) is being provided to Barbados in order to monitor the Internet Traffic quality, metrics and the costs from the ISPs as well.

**6.3** 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.

**6.4** 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 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 has finalized draft Recommendation ITU-T D.1102 “Customer redress and consumer protection mechanisms for OTTs” (under approval), which proposes possible customer redress and consumer protection mechanisms related to the provision and consumption of OTTs. ITU-T SG3 also continues to progress on work items related to OTTs under Question 9/3: D.50Supp\_OTT “*Supplement on* *OTTs in the context of International Internet Connectivity (IIC)*”, TR\_OTTbypass “*Technical Report on OTT bypass*” as well as a draft Recommendation ITU-T D.OTTBypass “*OTTBypass*”. The regional group in Africa of SG3 has approved a regional draft Recommendation ITU-T D.608R “OTT Voice Bypass” (under publication) that widely recognises OTT voice bypass now as a form of traffic bypass and a growing source of losses for international inbound voice revenues. The regional Recommendation focuses on national and regional collaboration between member states and operators to deal with the OTT voice bypass issue.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_