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| **Council Working Group on International Internet-related Public Policy Issues Seventeenth meeting – 19-20 January 2022** |  |
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|  | **Document CWG-Internet-17/2-E** |
|  | **20 December 2021** |
|  | **English only** |
| Report by the Secretary-General | |
| ITU INTERNET ACTIVITIES: RESOLUTIONS 101, 102, 133, 180 and 206 | |

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| Summary  This 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 required  In 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)*,* [*C19/33*](https://www.itu.int/md/S19-CL-C-0033/en)*,* [*C20/18*](https://www.itu.int/md/S20-CL-C-0018/en)*, and* [*C21/18*](https://www.itu.int/md/S21-CL-C-0018/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 60 new/revised ITU-T Recommendations and other texts have been approved from 10 August 2021 to 14 December 2021. [Relevant Recommendations](https://www.itu.int/itu-t/workprog/wp_search.aspx?isn_sp=3925&isn_status=-1,2&adf=2021-08-10&adt=2021-12-31&pg_size=100&details=0&field=acdefghijo) can be found under the different ITU-T Study Groups (SG).

**2.2 Distributed Ledger Technologies**

2.2.1 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.

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

## 2.3.1 ITU-T SG11 approved the following Recommendations:

* [ITU-T Q.5023 “Protocol for managing intelligent network slicing with AI-assisted analysis in IMT-2020 network”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14767) 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.4068 “Open application program interfaces (APIs) for interoperable testbed federations”](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14765) provides a generic reference model for testbeds federation and describes the elements of this reference model.

## 2.3.2 ITU-T SG13 approved the following Recommendation:

* [ITU-T Y.3077 “Framework for interworking of heterogeneous application domain connected objects through information-centric networking in IMT-2020”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14775) specifies the framework, functions, and procedures for ICN device registration and discovery in distributed directory system functions collocated in gateways of each application domain and interworking of the directory system functions of various application domains by extending the ICN approach.

2.3.3 **ITU-T SG17 consented the following draft Recommendation:**

* ITU-T X.1812 “Security framework based on trust relationship for IMT-2020 ecosystem” (under approval) identifies the stakeholders in the IMT-2020 ecosystem, analyses the trust relationships amongst them, identifies threats and clarifies security responsibilities for each stakeholder, defines the security boundaries between stakeholders, and establishes a security framework based on the trust relationships.

2.3.4 **ITU-T SG20 approved the following Recommendation:**

* [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) provides a functional architecture for UAVs and UAV controllers using IMT-2020 networks and functionalities defined in the application layer, service and application support layer, and security capabilities.

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

## 2.4.1 ITU-T SG3 is studying the roaming aspects of Internet-of-things (IoT) and Machine to Machine (M2M) including any related development and tariff principles.

## 2.4.2 ITU-T SG17 approved the following Recommendation: ITU-T X.1369 “Security requirements for IoT service platform” (under approval) provides the security requirements for IoT service platform. It assesses the security threats and challenges to IoT business service platform and describes security measures that could mitigate the security threats and challenges.

## 2.4.3 ITU-T SG20 approved the following Recommendations:

* [ITU-T Y.4004 “Overview of smart oceans and seas, and requirements for their ICT implementations”](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16409) provides an overview of SO&S, clarifies the high-level requirements of SO&S implementations. In addition, some representative use cases of SO&S are also provided in the appendix.
* [ITU-T Y.4212 “Requirements and capabilities of network connectivity management in the Internet of things”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14814) specifies the requirements and capabilities of network connectivity management in the Internet of Things (IoT).
* [ITU-T Y.4213 “IoT requirements and capability framework for monitoring physical city assets”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14815) identifies specific IoT requirements for monitoring physical city assets in smart cities.
* [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.4477 “Framework of service interworking with device discovery and management in heterogeneous Internet of things environments”](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13709) specifies a framework of service interworking with device discovery and management in heterogeneous Internet of things (IoT) environments.
* [ITU-T Y.4478 “Requirements and functional architecture for smart construction site services”](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=15094) introduces requirements and functional architecture for smart construction site (SCS) services with a concept, its goals and key components.
* [ITU-T Y.4480 “Low power protocol for wide area wireless networks”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14818) describes a protocol for wide area wireless networks, which is optimized for battery-powered end-devices that may be either mobile or mounted at a fixed location.
* [ITU-T Y.4563 “Requirements and functional model to support data interoperability in IoT environments”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14819) specifies requirements and functional model to support data interoperability in IoT environments.
* [ITU-T Y.4809 “Unified IoT Identifiers for Intelligent Transport Systems”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14739) defines field formats for identifying road signs/signals and identifies specific values for identifiers of such signs/signals.
* [ITU-T Y.4810 “Requirements of data security for the heterogeneous IoT devices”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14820): This Recommendation aims to describe requirements of data security for the heterogeneous IoT devices under specific scenarios.
* [ITU-T Y.4811 “Reference framework of converged service for identification and authentication for IoT devices in decentralized environment”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14821) targets to develop a converged identification and authentication service to overcome relevant challenges in decentralized IoT identification and authentication management systems, so as to ensure efficient communication among IoT devices and services in decentralized environment.

2.4.4 SG20 consented the following draft Recommendations:

* ITU-T Y.4123 “Requirements and capability framework of smart shopping mall” (under approval): This Recommendation specifies requirements and capability framework of smart shopping mall.
* ITU-T Y.4562 “Functions and metadata of spatiotemporal information service for smart cities” (under approval): Introduces the concepts of STIS for smart cities, and specifies the functions and metadata of STIS.

2.4.5 SG20 determined the following draft Recommendations:

* ITU-T Y.4214 “Requirements of IoT-based civil engineering infrastructure health monitoring system” (under approval): This Recommendation describes the requirements specific to the IoT-based civil engineering infrastructure health monitoring system for the purpose of maintaining civil engineering infrastructures.
* ITU-T Y.4215 “Use cases, requirements and capabilities of unmanned aircraft systems for the Internet of Things” (under approval): Common and specific requirements and capabilities of UASs for IoT support of the different use cases are described in this Recommendation.

2.4.6 SG20 is progressing 75 draft Recommendations. The complete list of SG20 draft Recommendations is available [here](https://www.itu.int/ITU-T/workprog/wp_search.aspx?sg=20).

2.4.7 SG20 is also progressing 9 Supplements and 4 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).

2.4.8 Further, SG20 started new work on 9 draft ITU-T Recommendations: ITU-TY.dtf-reqts “Requirements for digital twin federation in smart cities and communities”; Y.EMM-Reqts “Requirements for Real-Time Event Monitoring and Integrated Management in Smart City Platforms”; Y.IoT-Vreqs “Requirements and capability framework of the internet of things for vision”; Y.EV-charging “Requirements of smart charging service for electric vehicles”; Y.IoT-SFFS “Requirements and Reference functional model of IoT-based smart forest firefighting system”; Y.IoT-CONV-fr “Convergence framework for enhancement of service intelligence based on Internet of Things”; Y.IoT-MCSI “Metadata for camera sensing information of autonomous mobile IoT devices”; Y.DSDS-reqts “Requirements and reference model of data for smart greenhouse service”; and Y.KPI-Flood “Performance Indicators of ICT based Urban Flood Disaster Prevention and Mitigation Capability”.

2.4.9 SG20 has also started new work on two draft Supplements: ITU-T Y.Sup.DTAfrica “ Digital transformation of cities and communities in Africa”; and ITU-T Y.Sup.DTKPI “Guidance and use case(s) to use Digital technology to visualize the key performance indicators of Recommendation ITU-T Y.4903 "Key performance indicators for smart sustainable cities to assess the achievement of sustainable development goals".

2.4.10 Additionally, SG20 has started new work on two draft new Technical Report ITU-T *YSTR.IoT-CONV* “Overview of IoT Convergence”; and YSTR.SemComm.IoT “Architectural Framework for Semantic Communication Services in IoT and Smart City & Community”.

2.4.11 The standardization of IoT test specifications is accelerating, supported by the increasing collaboration of ITU-T and oneM2M. ITU-T SG20 is also in close collaboration with LoRa Alliance and TMForum.

2.4.12 SG20 established a new [*ITU-T Focus Group on "Artificial Intelligence (AI) and Internet of Things (IoT) for Digital Agriculture"*](https://www.itu.int/en/ITU-T/focusgroups/ai4a/Pages/default.aspx) *(FG-AI4A).* FG-AI4A will explore the potential of emerging technologies including AI and IoT in supporting data acquisition and handling, improving modelling from a growing volume of agricultural and geospatial data, and providing effective communication for interventions related to the optimization of agricultural production processes.

2.4.13 SG20 created a new Correspondence Group on Artificial Intelligence of Things (CG-AIoT). The AIoT activities will use the e-mail list [cg-aiot@lists.itu.int](mailto:cg-aiot@lists.itu.int).

**Smart Cities**

2.4.14 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:[Guidelines on tools and mechanisms to finance smart sustainable cities projects](https://www.itu.int/en/publications/Documents/tsb/2021-A-U4SSC-deliverable-Guidelines-on-tools-and-mechanisms-to-finance-SSC-projects/index.html), [Digital solutions for integrated city management and use cases](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-Digital-solutions-for-integrated-city-management-and-use-cases/index.html#p=1), [Compendium of survey results on integrated digital solutions for city platforms around the world](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-Compendium-of-survey-results/index.html#p=1) and [Smart public health emergency management and ICT implementations](file:///C:\Users\Saran\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\97RS0L0D\§%09https:\www.itu.int\en\publications\Documents\tsb\2021-U4SSC-Smart-public-health-emergency-management-and-ICT-implementations\index.html#p=1).

2.4.15 The [6th meeting of the U4SSC Initiative](https://www.itu.int/en/ITU-T/ssc/united/Pages/202112/meeting.aspx) took place on 07 December 2021. During the meeting, a new working group on Reference framework for an integrated management of a smart sustainable city (under the Thematic Group on City Platforms) and a new Thematic Group on Digital Transformation for People Smart Cities have been established.

2.4.16 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”*.

2.4.17 Additionally, the following city snapshots were launched: [Mashhad, Iran (Islamic of)](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Mashhad-Iran/index.html), [Larvik, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Larvik-Norway/index.html#p=1), [Daegu, Korea (Republic of)](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-Daegu-Republic-of-Korea/index.html#p=1). The following county snapshot was launched: [More og Romsdal, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-City-Snapshot-More-og-Romsdal-Norway/index.html#p=1). The following verification reports were launched: [Mashhad, Iran (Islamic of)](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-Verification-Report-Mashhad-Iran/index.html), [Larvik, Norway](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-Verification-Report-Larvik-Norway/index.html#p=1), [Daegu, Korea (Republic of)](https://www.itu.int/en/publications/Documents/tsb/2021-U4SSC-Verification-Report-Daegu-Republic-of-Korea/index.html#p=1).

2.4.18 The first United for Smart Sustainable Cities (U4SSC) Austrian U4SSC Country Hub was approved during the last U4SSC meeting and will be hosted by the Austrian Economics Center in Vienna, Austria. one of the key objectives of this country hub is to promote the work of U4SSC in Austria.

2.4.19 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”, with W3C on Decentralised Identifiers (DIDs) and with LoRa Alliance on Recommendation ITU-T Y.4480. The following are the background and updates on the IEC-ISO-ITU Joint Smart Cities Task Force (J-SCTF) activities:

* The fourth J-SCTF meeting took place virtually on 27 and 29 September 2021.During the discussion on the draft J-SCTF working methods, it was clarified that J-SCTF will formally report to only three governing bodies of three SDOs (IEC SMB, ISO TMB, and ITU TSAG) and will informally exchange with SPCG, as appropriate, to share knowledge, ideas, and experiences. The related informal exchange may take the form of participating in SPCG meetings, or raising questions, or updating on activities, as appropriate, to get useful feedback from SPCG.
* The fifth J-SCTF meeting is planned to take place on 18 & 20 January 2022.

2.4.20 ITU, together with other organizations and UN agencies, is organizing a [series of webinars on "Digital transformation for cities and communities"](https://www.itu.int/en/ITU-T/webinars/Pages/dt4cc.aspx) to increase the collaboration with city stakeholders and it also aims to bring new knowledge which may contribute to ITU-T standardization activities, focusing on topics related to Digital transformation for people oriented cities and communities.

## 2.5 IP Cable

2.5.1 ITU-T SG9 approved the following Recommendation on:

* [ITU-T J.1631 "Functional requirements of E2E network platform for Cloud-VR services"](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14648) describes functional requirements of the end-to-end (E2E) network platform to deliver 360°/Virtual Reality (VR) video services from the video cloud to the terminal devices over integrated broadband cable networks.

2.5.2 The following draft Recommendations are under approval:

* ITU-T J.483 “Architecture and Functional Specifications of a radio frequency (RF)/Internet protocol (IP) video switching system" (under approval) defines the Architecture and Functional Specifications of a radio frequency (RF)/Internet protocol (I/IP) video switching system.
* ITU-T J.1111 “Requirements for advanced IP-based digital video convergence service” (under approval): defines the service requirements of IP-based digital video convergence service including IP-based SDV technologies considering the convergence environment.
* ITU-T J.1303 “The specification of cloud-based converged media service to support IP and Broadcast Cable TV - System specification on collaboration between production media cloud and cable service cloud” (under approval) is Part 3 of a multi-part deliverable covering the high-level system architecture for cloud-based converged media service to support IP and Broadcast Cable TV, as identified below:
  + Part 1: Requirements;
  + Part 2: System architecture
  + Part 3: System specification on collaboration between production media cloud and cable service cloud.
* ITU-T J.1304 “Functional requirements for service collaboration between cable television operator and OTT service provider” (under approval) defines functional requirements for a cable television operator to provide an OTT service to cable television customers in conjunction with their cable television services, VOD service, high-speed cable internet and so on by collaboration with an OTT service provider.
* ITU-T J.1401 “Television Content Distribution Platforms: Requirements for Open Access and Signal Quality” (under approval) defines technical requirements for digital television content distribution platforms that consist of national fibre optic lines and local loops that provide Open Access to entities who wish to deliver content to end users, as well as expected signal quality.
* ITU-T J.1612 “The Architecture for Smart Home Gateway” (under approval): Smart home is a kind of home automation system in which a wide range of IoT devices in a home cooperate to provide intelligent controlling and monitoring functions for home users.

2.5.3 SG9 agreed two technical papers:

* ITU-T Technical Paper JSTP-IPVB-ACC “Analysis of the cost and complexity of IPVB technology” (under publication): In this document, the characteristics of IPVB technology are compared and discussed from the aspects of network complexity and construction costs.
* ITU-T Technical Paper JSTP-IPVB-UC “Use cases and service scenario of IP Video Broadcast (IPVB) for CATV Networks” (under publication). In this document, the use cases and service scenario of IPVB technology are introduced and described.

## 2.6 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”; and ITU-T M.rrsp “Requirements for robot-based on-site smart patrol of telecommunication network”. Draft Recommendations ITU-T Q.819 (ex Q.rest) “REST-based management services” and ITU-T X.786 (ex X.rest-ics) "Guidelines for implementation conformance statement proformas associated with REST-based management systems" were Consented on 19 November 2021.

## 2.7 ITU-T SG13

ITU-T SG13 approved the following Recommendations:

* ITU-T Y.3606 "Big data - deep packet inspection mechanism for network big data" (under publication) specifies mechanism of deep packet inspection applied in big data in network context.
* [ITU-T Y.3526 “Cloud computing - Functional requirements of edge cloud management”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14759) provides requirements for edge cloud management.
* [ITU-T Y.3527 “Cloud computing - End-to-end fault and performance management framework of network services in inter-cloud”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14760) provides framework and functional requirements of end-to-end(E2E) fault and performance management of network services (NSs) in inter-cloud.

## 2.8 Security

2.8.1 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.

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

* [ITU-T X.1011 “Guidelines for continuous protection of service access process”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14793): Recommendation ITU-T X.1011 defines a reference framework for keeping continuous protection of the service access process.
* [ITU-T X.1047 “Security requirements and architecture for network slice orchestration and management”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14794) establishes the security requirements and architecture for network slice management and orchestration, as well as the automatic creation of an end-to-end (E2E) network slices with customized security capabilities, to deploy full-scale E2E network slicing for consumers, businesses and government segments.
* [ITU-T X.1080.2 “Biology to machine protocol”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14795) defines a general protocol for the exchange of biometric information from a patient facility to a medical expert facility so that a medical centre could remotely monitor a patient and retrieve information from that patient. This Recommendation is a bio-signal communication protocol between computing devices and biological systems.
* [ITU-T X.1233 “Guidelines for countering spam over instant messaging”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14773) establishes guidelines for instant messaging (IM) service providers (SPs) and users to counter spam over instant messaging (SPIM) and to reduce propagation of SPIM in cyberspace and improve the IM user experience.
* ITU-T X.1234 “Guideline for countering Multimedia Messaging Service (MMS) spam” (under approval): This Recommendation analyses typical scenarios, characteristics and recognition methods of MMS spam, and provides a technical framework, work flows and some key technologies of MMS spam recognition, to help MMS providers and MMS users to counter advertising spam.
* ITU-T X.1235 “Guideline for countering Multimedia Messaging Service (MMS) spam” (under approval): This Recommendation analyses the main measures to spoof a website and recommends technologies to identify spoofed websites, which can be regarded as guidelines for protecting websites from being spoofed for telecommunication organizations.
* ITU-T X.1333 “Security guidelines for use of remote access tools in Internet-connected control systems” (under approval): The Recommendation is intended to give a whole picture to employ Remote access tools (RATs) securely for monitoring, control and maintenance.
* ITU-T X.1369 “Security requirements for IoT service platform” (under approval): This Recommendation assesses the security threats and challenges to IoT service platform and describes security measures that could mitigate the security threats and challenges.
* ITU-T X.1407 “Security requirements for digital integrity proofing service based on distributed ledger technology” (under approval) which specifies security threats and requirements in digital integrity proofing service based on distributed ledger technology (DLT).
* [ITU-T X.1408 “Security threats and requirements for data access and sharing based on distributed ledger technology”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14801) focuses on the solution which is suitable for implementation using private-chain distributed ledger technology where data is accessed and shared less frequently.
* ITU-T X.1453 “Security threats and requirements for video management systems” (under approval): Video management system (VMS) is the core of video surveillance systems used for public safety, traffic monitoring, etc.
* [ITU-T X.1470 “Security guidelines of web-based online customer service”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14803)**:** This Recommendation analyses the security threats of web-based online customer service in three aspects: network security, system security, service security.
* ITU-T X.1643 “Security guidelines for container in cloud computing environment” (under approval)analyses security threats and challenges on container in cloud computing environment, and provides the security guidelines and reference framework for container in cloud.
* [ITU-T X.1712 “Security requirements and designs for quantum key distribution networks - key management”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14805) specifies security threats and security requirements for key management in quantum key distribution networks (QKDNs), and security measures of key management to meet the security requirements.
* ITU-T X.1752 “Security guidelines for big data infrastructure and platform” (under approval) analyses security threats and challenges on big data infrastructure and platform, and provides the security guidelines and reference framework for big data infrastructure and platform.
* [ITU-T X.1770 “Technical guidelines for secure multi-party computation”](https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14266) establishes technical guidelines for multi-party computation (MPC) and provides a technical standard basis for information and communication technology (ICT) stakeholders to use MPC to protect data in data collaboration and big data analysis scenarios.
* ITU-T X.1812 “Security framework based on trust relationship for IMT-2020 ecosystem” (under approval) which identifies the stakeholders for IMT-2020 ecosystem, analyses the trust relationship among them, identifies threats and clarifies security responsibility for each stakeholder, defines the security boundaries between stakeholders, and establishes a security framework based on trust relationship.

2.8.3 SG17 started new work on the following five draft ITU-T Recommendations:

* X.ra-iot *Security risk analysis framework for IoT devices;*
* X.saf-dfs *Security assurance framework for digital financial services;*
* X.oob-sa *Framework for out-of-band server authentication using mobile devices;*
* X.srdidm *Security requirements for decentralized identity management systems using distributed ledger technology;*
* X.idse *Evaluation methodology for in-vehicle intrusion detection system.*

2.8.4 SG17 started new work on XSTP-5GSec-RM *Technical paper: 5G security standardization roadmap* and TR.zt-acp *Technical report: Guideline for zero trust based access control platform in telecommunication network*.

2.8.5 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.510 |ISO/IEC 9594-11 “*Information technology - Open Systems Interconnection - The Directory: Protocol specifications for secure operations”,* ITU-T X.pki-em |ISO/IEC 9594-12 *“Information security, cybersecurity and privacy protection - Public-key infrastructure: Establishment and maintenance”* , ITU-T X.672 | ISO/IEC 29168-1 “*Information technology - Open systems interconnection - Object identifier resolution system”* and Revised ITU-T X.680-690-series on ASN.1 as common text developed in collaboration with ISO/IEC JTC1/SC 6;
* 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 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.

## 2.9 ITU-T Focus Groups

2.9.1 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 [eight 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. FG-AN will lead exploratory ‘pre-standardization’ studies to determine how ITU standards will support the realization and evolution of autonomous networks.

The group is studying autonomous networks based on the key concepts of exploratory evolution, real-time responsive online experimentation, and dynamic adaptation.

* 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. FG-QIT4N has finished its works and submitted its deliverables to TSAG.
* The [*ITU-T Focus Group on "Artificial Intelligence (AI) and Internet of Things (IoT) for Digital Agriculture"*](https://www.itu.int/en/ITU-T/focusgroups/ai4a/Pages/default.aspx) *(FG-AI4A)* was established to address the challenges within the agricultural sector, examine existing standardization gaps, and conduct the preparatory work for best practices related to the use of AI and IoT for optimization of agricultural production processes.

**2.10** 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)).

**2.11** ITU-D SG 1 and SG 2 continue their work 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.

**2.12** BDT 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. The projects in Burundi, Burkina Faso, Djibouti, Rwanda, Eswatini, Antigua and Barbuda, and St. Kitts and Nevis have been implemented successfully. 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).

**2.13** 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”*.

**2.14** 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.

**2.15** 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.

**2.16** 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) are now working independently 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.

BDT is planning to organize a “Certified IPv6 and IoT Training for South Africa” from 28 February to 4 March 2022. This training program is designed to provide foundational information on IoT and IPv6 technology and expose the participants to technical knowhow on how to start the IPv6 implementation. It will be co-hosted by the University of Cape Town/ Department of Electrical Engineering and other local professional voluntary associations, such as IEEE South Africa and South African Institute of Electrical Engineers (SAIEE), and the Council for Scientific and Industrial Research (CSIR).

**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** The 16th [Council Working Group on international Internet-related public policy issues (CWG-Internet)](https://www.itu.int/en/council/cwg-internet/Pages/default.aspx) [held a virtual meeting on 23 September 2021](https://www.itu.int/md/S21-RCLINTPOL16-C-0008/en) and agreed on the following topic for the next Online Open Consultation (October – December 2021):

[*The Environmental Impacts and Benefits of the Internet*](https://www.itu.int/en/council/cwg-internet/Pages/consultation-oct2021.aspx)

1. *What effects does the Internet have on the environment and vice-versa?*
2. *How can we improve the impact the Internet has on the environment and take advantage of its potential to help address climate-related issues?*
3. *What role should stakeholders play in shaping the environmental impacts and benefits of the Internet?*
4. *What are the policy, regulatory and other relevant matters associated with the environmental impacts and benefits of the Internet?*

[The Virtual Meeting – Physical Online Open Consultation (February 2021 – September 2021)](https://www.itu.int/md/S21-OPCWGINT9-C-0003/en) for the topic [*The role of the Internet and international Internet-related public policy in mitigating the impact of COVID-19 and possible future pandemics*](https://www.itu.int/en/council/cwg-internet/Pages/consultation-feb2021.aspx) took place on 20 September 2021, with over 150 registered participants and more than 75 in attendance.

**4.2** ITU participated in the 16th IGF meeting, held in Katowice, Poland from 6-10 December 2021. ITU participated in the opening ceremony of IGF on 7 December 2021 and in other High-Level Track sessions. 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 2022 (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 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 Recommendations ITU-T E.A-ENUM, "Principles and procedures for the administration of E.164 country codes for registration into the Domain Name System" and ITU-T E.ENUMINF *“Differentiating between ENUM and Infrastructure ENUM”*.

**5.3** In November 2021 ITU-T SG2 sent a Liaison Statement ([SG2-LS232](https://www.itu.int/net/itu-t/ls/ls.aspx?isn=28017)) to RIPE NCC on ENUM and Interim procedures for Geographic Country Codes, seeking clarification on the purpose of the RIPE Database as a provisioning tool for the ENUM Tier 0 registry, and whether this has any effect on the Interim procedures for the delegation of Geographical Country Codes (updated in February 2019). The Liaison Statement seeks an update on the status of e164.arpa delegations, and reiterates that ITU-T SG2 does not agree to the deletion of any delegation from e164.arpa without the explicit agreement of the Member State concerned, communicated according to the Interim procedures for Geographic Country Codes.

# 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.OTTnum *“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.  
SG3 is considering the matter of digital OTT taxation such as in other international organizations, and continues collaborating with ITU-T SG2 on the definition of OTT bypass.

**7.4** ITU-T SG9 has finalized draft Recommendation ITU-T J.1304 “Functional requirements for service collaboration between cable television operator and OTT service provider” (under approval), which defines functional requirements for a cable television operator to provide an OTT service to cable television customers in conjunction with their cable television services, VOD service, high-speed cable internet and so on by collaboration with an OTT service provider.

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