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| **Council Working Group on International Internet-related Public Policy IssuesFourteenth meeting - Geneva, 5-6 February 2020** |  |
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|  | **Revision 1 toDocument CWG-Internet-14/2-E** |
|  | **17 January 2020** |
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| Report by the Secretary-General |
| ITU INTERNET ACTIVITIES: RESOLUTIONS 101, 102, 133, 180 and 206 |

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

# 1. Introduction

This report describes ITU’s activities related to the 2018 Plenipotentiary Conference Resolutions 101, 102, 133, 180 and 206 for the reporting period from Council 2019 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 132 new/revised ITU-T Recommendations and other texts have been approved from 17 August 2019 to 17 December 2019. [Relevant recommendations](https://www.itu.int/itu-t/workprog/wp_search.aspx?isn_sp=3925&isn_status=-1,2&adf=2019-08-17&adt=2020-02-05&pg_size=100&details=0&field=acdefghijo) can be found under the different ITU-T Study Groups (SG).

**2.2** Video is expected to account for over 80 per cent of all Internet traffic by 2020. The collaborative video work of IEC, ISO, and ITU continues for the development of the new [*Versatile Video Coding project*](https://news.itu.int/versatile-video-coding-project-starts-strongly/) with over 1000 contributions reviewed and over 300 experts in attendance at the recent meeting of the joint group (JVET) in July and October 2019.

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

2.2.2 ITU-T SG16 approved six Recommendations:

* *ITU-T H.626 (V2) “Architectural requirements for video surveillance system”*: Recommendation ITU-T H.626V2 defines the functional architecture for video surveillance system based on IP networks. This Recommendation defines the model, architecture, entities and reference points of the video surveillance system.
* *ITU-T F.743 (V2) “Requirements and service description for video surveillance”* defines a video surveillance service based on IP networks and provides the service description, a brief system model, service scenarios and requirements for the video surveillance service.
* *ITU-T F.743.10 “Requirements for mobile edge computing enabled content delivery networks”* specifies the general framework, scenarios and requirements of the mobile edge computing (MEC) enabled content delivery network (CDN). It also specified the requirements of the MEC functions on which the CDN edge node is relied.
* *ITU-T H.644.2 “Virtual content delivery network: Network virtualization”* specifies the functional architecture, its related functions and functional blocks that implement content delivery network (CDN) virtualization by utilizing the networking virtualization technologies. Based on the functional architecture and functions, this Recommendation also introduces the various technical solutions of the CDN nodes virtualization utilizing the current network virtualization technologies, such as network function virtualization and software-defined networks.
* *ITU-T H.753 “Scene-based metadata for IPTV services”*: Scene-based metadata (SBM) for IPTV services defines the metadata element and format for content distribution over an IPTV terminal device and describes metadata management functions of SBM, which basically supports IPTV multimedia application frameworks in the Recommendation ITU-T H.760 series.
* *ITU-T H.764 (V2) (revised) “IPTV services enhanced script language”* describes an object-oriented programming language called "Internet protocol television services enhanced script language (IPTV SESL)" as one of multimedia application frameworks for web-based IPTV services. This language is used to perform computations and provide interoperability among multimedia applications within an IPTV terminal device environment.

**2.3** On IMT-2020, ITU-T SG13:

* agreed on *ITU-T Y.Supplement 55 to ITU-T Y.3170-series “Machine learning in future networks including IMT-2020: use cases”* describes the use cases of machine learning in future networks including IMT-2020. For each use case description, along with the benefits of the use case, the most relevant possible requirements related to the use case are provided.
* approved Recommendation *ITU-T Y.2775 “Functional architecture of deep packet inspection for future networks”* which specifies general DPI functional architecture aspects related to future networks, DPI functional architecture for software defined networking, network function virtualization, service function chaining and DPI as a service, network virtualization, and evolving mobile network.

2.3.1 SG13 also consented to six draft Recommendations (under approval):

* *ITU-T Y.3108 “Capability exposure function in the IMT-2020 networks”* specifies design principles, architecture and reference points of the capability exposure function (CEF) in the IMT-2020 networks. Exposed capabilities brought by network softwarization and the architecture of IMT-2020 and functionalities that support the capability exposure of IMT-2020 are specified in the Recommendation.
* *ITU-T Y.3132 “Mobility management for fixed mobile convergence in IMT-2020 networks”* presents the scenarios, requirements and design principles of mobility management (MM) for fixed mobile convergence (FMC) in IMT-2020 networks, which supports the network evolution and accommodates convergent services in fixed and mobile networks. This Recommendation presents the mobility management functional architecture for supporting FMC in IMT-2020 networks and information flows of location management, handover control and coordination management in IMT-2020 networks.
* *ITU-T Y.3133 “Capability Exposure enhancement for supporting FMC in IMT-2020 networks”* describes the requirements of the capability exposure for supporting FMC in IMT-2020 networks, then defines the functional architecture, the function entities, the procedures and the high level API descriptions for network capabilities exposure for supporting FMC in IMT-2020 networks. In particular, the enhancement capabilities requirements include: unified authentication, authorization and charging, user’s access type and capability, multi-access edge computing, unified customization of QoS capabilities, FMC network slice control, session management and mobility management, unified user data.
* *ITU-T Y.3153 “Network slice orchestration and management for providing network services to 3rd party in the IMT-2020 network”*: The IMT-2020 network in which embedded a capability exposure functionality enables 3rd party to directly use a customised network slice under certain a restriction in order to efficiently provide optimized solutions for different market scenarios which have diverse their own requirements. Automated processes for orchestration and management is also important from the perspective of efficiency. The objective of this Recommendation is to describe the requirements, architecture, key functionalities and typical procedures of network slice orchestration and management for providing network services to 3rd party in the IMT-2020 network.
* *ITU-T Y.3173 “Framework for evaluating intelligence level of future networks including IMT-2020”* specifies a framework for evaluating intelligence of future networks including IMT-2020. A method for evaluating intelligence level of future networks including IMT-2020 is introduced. An architecture view for evaluating network intelligence level is also described according to the architectural framework specified in ITU-T Y.3172. In addition, the relationship between the framework described in this Recommendation and corresponding work in other standards or industry bodies, as well as the application of the method for evaluating network intelligence level on several representative use cases are also provided.
* *ITU-T Y.3174 “Framework for data handling to enable machine learning in future networks including IMT-2020”*: A framework for data handling to enable machine learning in future networks including IMT-2020 is described in this Recommendation. The requirements for data collection and processing mechanisms in various usage scenarios for machine learning in future networks including IMT-2020 are identified along with the requirements for applying machine learning output in the machine learning underlay network. Based on this, a generic framework for data handling and examples of its realization on specific underlying networks are described.

**2.4** On Internet-of-things, ITU-T SG20 approved two Recommendations:

* *ITU-T Y.4556 “Requirements and functional architecture of smart residential community”*, which presents the key components and specifies requirements and the functional architecture of smart residential community (SRC).
* *ITU-T Y.4904 “Smart sustainable cities maturity model”* which contains a maturity model for smart sustainable cities. This maturity model helps identify the goals, levels and key measures that are recommended for cities to effectively examine their current situation and determine critical capabilities needed to progress toward the long-term goal of becoming SSCs.

2.4.1 SG20 also consented to 12 draft Recommendations (under approval):

* *ITU-T Y.4208 “IoT requirements for support of edge computing”*: This Recommendation provides an overview on related challenges faced by the IoT and describes how the IoT supporting edge computing may address these challenges. From the edge computing deployment perspective, service requirements for support of edge computing capabilities in the IoT are identified as well as related functional requirements.
* *ITU-T Y.4209 “Requirements for interoperation of the smart port with the smart city”*, which provides the requirements for Smart Port interoperation with Smart Cities and other smart elements. Additionally, these requirements are the foundation that enables the provision of enhanced smart services by the Smart Port.
* *ITU-T Y.4459 “Digital entity architecture for IoT interoperability”*, This Recommendation defines an architecture framework for information-oriented services that makes use of existing infrastructures, including the Internet infrastructure, to enhance, secure and manage information sharing over a distributed networking environment. This Recommendation can be used with different identification and addressing protocols (e.g. IP and/or non IP based networks).
* *ITU-T Y.4461 “Framework of open data in smart cities”*, which defines a framework of open data in smart cities. It clarifies the concept of open data in smart cities, analyses the benefits of open data in smart cities, identifies the key phases, key roles and activities of open data in smart cities and describes the framework and general requirements of open data in smart cities.
* *ITU-T Y.4462 “Requirements and functional architecture of open IoT identity correlation service”*: Open IoT identity correlation service, or open IoT ICS, is a service to map identities among devices, third party services, and transactions. Recommendation ITU-T Y.IoT-ICS specifies the reference architecture of open IoT ICS which supports Internet of things (IoT) devices to access multiple third party service providers.
* *ITU-T Y.4463 “Framework of delegation service for IoT devices”* is a framework of the delegation service for transferring ownership (i.e., access rights to the IoT devices) among authorized IoT devices. This Recommendation describes overview and types of the delegation service in IoT environment. It also describes the requirements and architectural models of the delegation service.
* *ITU-T Y.4464 “Framework of blockchain of things as decentralized service platform”* introduces a decentralized IoT service platform, blockchain of things (BoT), which is enabled by blockchain-related technologies. This Recommendation analyses the concept, common characteristics and high-level requirements of BoT, and provides common capabilities and functionalities, general procedures, and relevant use cases for BoT.
* *ITU-T Y.4465 “Framework of IoT Services based on Visible Light Communications”* describes a framework of Internet-of-Things (IoT) services based on Visible Light Communications (VLC). After describing the technical overview of VLC and the concepts of IoT services based on VLC, this Recommendation describes requirements and a reference model.
* *ITU-T Y.4466 “Framework of smart greenhouse service”*: A smart greenhouse service enables precision farming with help of IoT devices (such as sensors and actuators) installed in a smart greenhouse. To describe a smart greenhouse service framework, this Recommendation specifies requirements, a reference model, a functional architecture and interfaces for a smart greenhouse service.
* *ITU-T Y.4467 “Minimum set of data structure for automotive emergency response system”*: An automotive emergency response system (AERS) for aftermarket devices defined in Recommendation ITU-T Y.4119 is designed to bring rapid assistance to driver and/or passengers involved in accidents.
* *ITU-T Y.4468 “Minimum set of data transfer protocol for automotive emergency response system”*: This Recommendation specifies an MSD transfer protocol to provide the rules of an MSD transfer operations between an AEDD and an AERC in an AERS.
* *ITU-T Y.4807 “Agility by design for Telecommunications/ICT Systems Security used in the Internet of Things”* addresses possible improvement of security and stability of the Internet of Things by ensuring the supporting Telecommunications/ICT systems and related infrastructure — protocols, standards, etc. — have the flexibility to keep up with advances in telecommunications/ICT security and cryptography. This document intentionally does not provide guidance on specific cryptosystems, standards or algorithms.
* *ITU-T Y.4903/L.1603 (revised) "Key performance indicators for smart sustainable cities to assess the achievement of the Sustainable Development Goals"* which gives general guidance to cities and provides key performance indicators (KPIs) for smart sustainable cities (SSCs) to help cities achieve sustainable development goals (SDGs)..

2.4.2 SG20 is progressing 18 draft Recommendations:

* *ITU-T Y.AM-SC-reqts "IoT technical requirements and framework for monitoring physical city assets";*
* *ITU-T Y.cnce-IoT-arch "Functional architecture of cellular-radio network capability exposure for smart hospital based on Internet of things";*
* *ITU-T Y.IoT-Agility "Agility by design for Telecommunications/ICT Systems Security used in the Internet of Things";*
* *ITU-T Y.IoT-AOS-prot "Protocols of supporting autonomic operations in the Internet of things";*
* *ITU-T Y.IoT-AR "Framework for AR and VR based control in IoT";*
* *ITU-T Y.IoT-BPM-reqts "Specific Requirements of the Internet of Things for Business Process Management";*
* *ITU-T Y.IoT-EC-GW "Capabilities and framework of edge computing-enabled gateway in the IoT";*
* *ITU-T Y.IoT-EH-PFE "Performance evaluation frameworks of e-health systems in the IoT";*
* *ITU-T Y.IoT-ITS-ID "Unified IoT Identifiers for Intelligent Transport Systems";*
* *ITU-T Y.IoT-Lift "Framework of IoT based monitoring and management for Lift";*
* *ITU-T Y.IoT-LISF "Lightweight intelligent software framework for IoT devices";*
* *ITU-T Y.IoT-rf-dlt, "OID-based Resolution framework for transaction of distributed ledger assigned to IoT resources";*
* *ITU-T Y.IoT-sd-arch "Framework of service interworking with device discovery and management in heterogeneous IoT environments";*
* *ITU-T Y.IoT-SLF "Framework and Capabilities for Smart Livestock Farming Based on Internet of Things";*
* *ITU-T Y.IoT-SmartBuild "Common requirements and capabilities of smart buildings from the IoT perspective";*
* *ITU-T Y.IoT-UM-reqts "Requirements and use cases for universal communication module of mobile IoT devices";*
* *ITU-T Y.SCCE-arch "Reference architecture of spare computational capability exposure of IoT devices for smart home";* and
* *ITU-T Y.SCC-reqts "Common requirements and capabilities of smart cities and communities from IoT and ICT perspectives".*

2.4.3 SG20 is also progressing draft Supplement *ITU-T Y.Sup-IoT-Eco-Plan "Framework for Internet of things ecosystem master plan"*.

2.4.4 Further, SG20 started new work on 10 draft ITU-T Recommendations, where SG20 is transforming six deliverables contributed by the ITU-T Focus Group on Data Processing and Management into ITU-T Recommendations:

* *ITU-T Y.API4IOT "Open data application programming interface (API) for IoT data in smart cities and communities";*
* *ITU-T Y.Data.Sec.IoT-Dev "Requirements of data security for the heterogeneous IoT devices";*
* *ITU-T Y.DPM-BC-DM"Blockchain-based Data Management for supporting IoT and SC&C";*
* *ITU-T Y.DPM-BC-ES "Blockchain-based data exchange and sharing for supporting IoT and SC&C";*
* *ITU-T Y.DPM-framework "Data processing and management framework for IoT and smart cities and communities";*
* *ITU-T Y.DPM-interop "Requirements and functional model to support data interoperability in IoT environments";*
* *ITU-T Y.DPM-qm "Requirements and functional model to support data quality management in IoT";*
* *ITU-T Y.DPM-ST-API "SensorThings API - Sensing";*
* *ITU-T Y.IoT-CSIADE-fw "Reference framework of converged service for identification and authentication for IoT devices in decentralized environment";*
* *ITU-T Y.IoT-VLC-Arch "Functional architecture for IoT services based on VLC";* and
* *ITU-T Y.SUM "Requirements and Capability Framework of Smart Utility Metering".*

2.4.5 SG20 has also started new work on three draft Supplements:

* *ITU-T Y.Sup.issr “Internet of Things and smart cities and communities standards roadmap”;*
* *ITU-T Y.Sup.Web-DM "Web based data model for IoT and smart city"; and*
* *ITU-T Y.Sup-DPM-OBC "Overview of blockchain for supporting IoT and SC&C in DPM aspects".*

2.4.6 Additionally, SG20 has started new work on a draft new Technical *Report ITU-T YSTR.Feas-DID-IoT "Feasibility of Decentralised Identifiers (DIDs) in IoT"*.

2.4.7 The standardization of Internet of Things (IoT) test specifications is accelerating, supported by the increasing collaboration of ITU-T and oneM2M.

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

During the 9th Green Standards Week held from 1 to 4 October 2019 in Valencia, Spain, the cities of Riyadh (Saudi Arabia), Moscow (Russian Federation), Ålesund (Norway), Valencia (Spain), and Dubai (United Arab Emirates) were awarded for having successfully implemented the U4SSC KPIs.

Additionally, the following city snapshots were launched: Ålesund, Norway; Bizerte, Tunisia; Moscow, Russia; Riyadh, Saudi Arabia; and Pully, Switzerland. The verification report “*Pully under the microscope*” was published. This report summarises the results of the implementation of the U4SSC for SSC KPIs in the city of Pully, Switzerland.

2.4.9 SG20 continued coordination on IoT in its ITU-T JCA-IoT and SC&C. SG20 is collaborating with ANSI, GSMA, IEEE, IEC, ISO, CEN/CENELEC/ETSI, ISO, oneM2M on requirements and capability framework of smart utility metering, and with ETSI MEC, ECC, IIC, oneM2M, and ISO/IEC JTC1 SC41 on consented draft *Recommendation ITU-T on "IoT requirements for support of edge computing"*, with IETF on use of "ppk" URI scheme name in Y.dec-IoT-arch, with oneM2M on draft new *Recommendation ITU-T Y.oneM2M.SEC.SOL "oneM2M Security Solutions"*, and with W3C on Decentralised Identifiers (DIDs).

**2.5** 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.

2.5.1 Responsible for performance, QoS and QoE, ITU-T Study Group 12 approved the revised *Recommendation on ITU‑T Y.1540 “Internet protocol data communication service - IP packet transfer and availability performance parameters”* which defines parameters that may be used in specifying and assessing the performance of speed, accuracy, dependability and availability of IP packet transfer of regional and international Internet protocol (IP) data communication services. The 2019 Edition of ITU-T Y.1540 recognizes many changes in the design of IP services and in the protocols employed by end-users.

2.5.2 SG12 also consented draft *Recommendation ITU-T Y.1540 Amd.1 “Internet protocol data communication service - IP packet transfer and availability performance parameters - Amendment 1 - Amendment 1: New Annex B – Additional search algorithm for IP-based capacity parameters and methods of measurement”* (under approval). The latest Edition of Recommendation ITU-T Y.1540 incorporates many updates based on the plan to qualify and compare access measurement metrics, methods, models, and tools in a stable and repeatable laboratory environment. Amendment 1 introduces Annex B, which provides a second, more capable search algorithm for the IP capacity method of measurement defined in Annex A.

2.5.3 SG12 further consented draft *Recommendation ITU-T E.475 “Guidelines for Intelligent Network Analytics and Diagnostics”* (under approval) which specifies guidelines for intelligent network analytics and diagnostics for managing and troubleshooting networks. Specifically, this Recommendation describes the design considerations, functional architecture, network anomaly analysis models for network analytics and diagnostics. This Recommendation also presents the concept of Network Health Indicator (NHI) which provides a numerical indication of the network anomaly degree based on Big Data Analytics.

2.5.4 SG12 continues to liaise, collaborate and harmonize its work with the IETF IP performance measurement working group (ippm); ETSI TC STQ; and BBF.

2.5.5 In December 2019, SG12 also gave its consent to a series of standards (*ITU-T P.1204 series*) (under approval) that describe model algorithms for monitoring the video quality for streaming using reliable transport (e.g., HTTP-based adaptive streaming over TCP, QUIC).

**2.6** ITU-T SG11 approved *ITU-T Q.Suppl.71 “Testing methodologies of Internet related performance measurements including e2e bit rate within the fixed and mobile operator’s networks”* which describes the testing procedures of data transmission speed within the fixed and mobile operator’s networks which can be established at the national or international level, providing customers of the existing public telecom networks the possibility to estimate the access related performance.

2.6.1 SG11 also approved *ITU-T Guideline-TEST\_UE/MS “Guideline for general test procedure and specification for measurements of the LTE, 3G/2G user Equipment/mobile stations (UE/MS) for over-the-air performance testing”* which gives an analysis of the work in relevant standardisation organisations (SDOs) and a survey of the requirements, and then describes a common testing methodology for LTE, 3G/2G User Equipment/Mobile Stations (UE/MS) for over-the air (OTA) performance testing.

2.6.2 SG11 consented three draft Recommendations (under approval):

* *ITU-T Q.3055 “Signalling protocol for Heterogeneous IoT gateways”* which describes the signalling protocol for heterogeneous IoT gateways.
* *ITU-T Q.3644 “Requirements for signalling network analyses and optimization in VoLTE”* specifies the requirements for signalling network analyses and optimization in Voice over LTE (VoLTE) in which the signalling network refers to the network entities and the signalling exchange which are related to telecommunications services.
* *ITU-T Q.3056 “Signaling procedures of the probes to be used for remote testing of network parameters”* describes architecture and signaling procedures to be used for remote testing of network parameters utilizing probes.
* *ITU-T Q.3916 “Signalling requirements and architecture for the Internet service quality monitoring system”*. To evaluate Quality of Service, this Recommendation defines the architecture and signalling requirements of the Internet Service Quality Monitoring (SQM) system. Components, interfaces and interactions among components of the SQM system are described in detail in this Recommendation.

2.6.3 SG11 continues developing two work items on IoT testing, which supposed to be finalized in 2020:

* *Q.39\_FW\_Test\_ID\_IoT “The framework of testing of identification systems used in IoT”* which provides a description and test suites of identification procedures used in Internet of Things (IoT);
* *Q.FW\_IoT/Test “Framework for IoT Testing”* which describes conformity, interoperability and benchmarking testing frameworks for IoT.

2.6.4 SG11 started new work on draft *Recommendation ITU-T Q.VoLTE-SAO-FP “Framework and protocols for signalling network analyses and optimization in VoLTE”* and draft *Recommendation ITU-T Q.IMT2020-PIAS “Protocol for providing intelligent analysis services in IMT-2020 network”*.

2.6.5 SG11 liaised with IETF SFC on recent SFC related developments in Q4/11: new draft *Recommendation ITU-T Q.SFPtr “Signalling requirements for Service Function Paths Load Balancing Traceroute in SFC”*, with IETF ippm on ITU-T Q.Suppl.71, and with RIPE NCC on ITU-T Q.3916.

2.7 ITU-T SG9 approved *Recommendation ITU-T J.1600 “Premium Cable Network Platform (PCNP) – Framework”* which specifies the framework of the Premium Cable Network Platform (PCNP) for the cable TV and broadband network that exploit the cloud based artificial intelligence and network data to optimize the network and TV services.

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

**2.9** ITU-T SG2 consented to draft *Recommendation ITU-T M.3041 “Framework of smart operation, management and maintenance”* (under approval) which introduces a framework of smart operation, management and maintenance (SOMM). In this Recommendation, characteristics, scenarios and the functional architecture of SOMM are provided to support service operation, network management, and infrastructure maintenance for both traditional non-SDN/NFV and SDN/NFV aware networks.

2.9.1 SG2 is developing draft Recommendations

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

**2.10** 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.

It held one meeting in August-September 2019, and has established [25 new standardization work items](https://www.itu.int/itu-t/workprog/wp_search.aspx?sg=17). SG17 also approved 6 new and 25 revised ITU-T Recommendations on ICT security. SG17’s regional group for Africa and regional group for the Arab Region met jointly in Tunis, Tunisia in April 2019.

Further, SG17 organized a workshop on Fintech Security and a mini workshop on Cybersecurity Challenges in Automated Driving in August 2019 aimed at identifying the way forward for SG17 to undertake related standardization subjects in its future study, including potential new work items.

2.10.1 On security aspects related to the Internet, SG17 approved seven recommendations:

* *ITU-T X.1044 “Security requirements of network virtualization”* analyses security challenges and threats to network virtualization (NV), and specifies security requirements for the physical resources layer, virtual resources layer and logically isolated network partition (LINP) layer in NV.
* *ITU-T X.1045* “*Security service chain architecture for networks and applications*” supports provision of customized dynamic and adaptive security services for networks and applications.
* *ITU-T X.1059 “Implementation guidance for telecommunications organizations on risk management of their assets globally accessible in IP-based networks”* which provides guidance for telecommunications organizations on risk management of their assets globally accessible in IP-based networks, the assets of which are exposed directly to hackers and attackers.
* *ITU-T X.1232 “Technical framework for countering advertising spam in user generated information”* analyses scenarios and characteristics of advertising spam, and specifies a reference framework and process flows to help Internet service providers to counter advertising spam. It specifies a framework for reducing advertising spam, improving the user experience.
* *ITU-T X.1197 Amd.1 “Guidelines on criteria for selecting cryptographic algorithms for IPTV service and content protection - Amendment 1: Revised guidelines on criteria for selecting cryptographic algorithms for IPTV service and content protection”* updates Appendices I and II to reflect the state of the art as of August 2019, including bibliographical references.
* ITU-T X.*1401 “Security threats of distributed ledger technology”* provides a structured and systematic threat analysis method to design, implement, operate a distributed ledger system and to evaluate its security.
* *ITU-T X.1702 “Quantum noise random number generator architecture”* defines a generic functional architecture of a quantum entropy source, a common method to estimate and validate the entropy of a noise source under evaluation, and a common method to specify randomness extractors when they are part of the implemented system.

SG17 agreed one new Supplement to ITU-T X.1254 - Supplement on use cases of entity authentication assurance (EAA) framework.

2.10.2 SG17 determined five draft Recommendations (under approval):

* *ITU-T X.1363 “Technical framework of personally identifiable information (PII) handling system in IoT environment”*: Recommendation ITU-T X.iotsec-3 specifies the technical framework for a PII handling system for the IoT environment with multiple service providers to fulfill these functions.
* *ITU-T X.1364 “Security requirements and framework for narrow band internet of things”*: This Recommendation aims to analyze the potential deployment scheme and typical application scenarios of Narrow Band Internet of Things (NB-IoT) as well as the security threats and requirements specific to the NB-IoT deployment and thus establishes the security framework for the operator to safeguard these new technology applications.
* *ITU-T X.1365 “Security framework for use of identity-based cryptography in support of IoT services over telecom networks”*: This Recommendation provides a security methodology for the use of Identity-based cryptography (IBC) public key technology in support of IoT services over telecommunications networks including mechanisms of identity management, key management architecture, key management operations and authentication.
* *ITU-T X.1604 “Security requirements of network as a service (NaaS) in cloud computing”* analyses the security threats and challenges and the security requirements of network as a service (NaaS) in cloud computing. It specifies the security requirements of three aspects, ranging from NaaS application, NaaS platform and NaaS connectivity which are based on corresponding cloud capability types.
* *ITU-T X.1605 “Security requirements of public infrastructure as a service (IaaS) in cloud computing”*: This Recommendation aims to document the security requirements of public Infrastructure as a service (IaaS). This will be helpful for IaaS providers to improve the overall security level throughout the planning, building and operating stages of IaaS platform.

2.10.3 SG17 started new work on three draft Recommendations:

* *ITU-T X.5Gsec-netec “Security capabilities of network layer for 5G edge computing”;*
* *ITU-T X.nssa-cc “Requirements of network security situational awareness platform for cloud computing”;*
* *ITU-T X.sgmc “Security guidelines for multi-cloud”; and*
* *ITU-T X.sg-rat “Security guidelines for the use of remote access tools in Internet-connected control system”.*

2.10.4 SG17 started new work on a technical report:

* *TR.BaaS-sec “Technical Report - Guideline on blockchain as a service (BaaS) security”*.

2.10.5 SG17 is collaborating with IETF and ISO/IEC JTC1/SC27/WG2 on *work item X.ibc-iot “Security methodology for using Identity Based Cryptography for IoT services over telecom networks*”.

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

* The [*ITU-T Focus Group on Machine Learning for Future Networks including 5G (FG ML5G)*](https://www.itu.int/en/ITU-T/focusgroups/ml5g/Pages/default.aspx) will propose standardization strategies to assist machine learning in contributing to the efficiency of emerging 5G systems. The group is defining the requirements of machine learning as they relate to interfaces, protocols, algorithms, data formats and network architectures.
* The [*ITU-T Focus Group on Technologies for Network 2030 (FG NET-2030)*](https://www.itu.int/en/ITU-T/focusgroups/net2030/Pages/default.aspx) had six meetings in the reporting period. It examines how emerging technologies can enhance network capabilities to meet the demands of 5G systems and future innovations. The group is studying new media, services and architectures to identify communication needs and use cases for the year 2030 and beyond. In focus are emerging technologies and applications including augmented and virtual reality and holograms, and the group aims also respond to increasing user demands for time-sensitive applications (telemedicine, automated factory).
* The [*ITU-T Focus Group on Artificial Intelligence for Health (FG AI4H)*](https://www.itu.int/en/ITU-T/focusgroups/ai4h), driven in close collaboration by ITU and WHO, is working towards the establishment of a framework and associated process for the performance benchmarking of ‘AI for Health’ models. The group is currently working on 16 topic areas ("use cases") and is seeking participation of key stakeholders, including health regulators, medical professionals, AI developers, industry and academia.
* The [*ITU-T Focus Group on Vehicular Multimedia (FG VM*](https://www.itu.int/en/ITU-T/focusgroups/vm/Pages/default.aspx)*)* was established by ITU-T SG16 to identify the need for new vehicular multimedia standards based on space and terrestrial networks integration. The study will analyse and identify gaps in the vehicular multimedia standardization landscape and eventually draft technical reports and specifications covering, among others, vehicular multimedia use cases, requirements, applications, interfaces, protocols, architectures, and security, leveraging from previous work done by ITU in this field.
* The [*ITU-T Focus Group on “Environmental Efficiency for AI and other Emerging Technologies”*](https://www.itu.int/en/ITU-T/focusgroups/ai4ee/Pages/default.aspx) (FG-AI4EE) was established to identify the standardization gaps related to the environmental performance of AI and other emerging technologies including automation, augmented reality, virtual reality, extended reality, smart manufacturing, industry 5.0, cloud/edge computing, nanotechnology, 5G, among others. The Focus Group develops technical reports and technical specifications to address the environmental efficiency, as well as water and energy consumption of emerging technologies.
* The [*ITU-T Focus Group on “AI for autonomous and assisted driving”*](https://www.itu.int/en/ITU-T/focusgroups/ai4ad/Pages/default.aspx) (FG-AI4AD) was established in October 2019 to support standardisation activities of AI evaluation in autonomous and assisted driving. To this end, the FG aims to create an open framework for collaboration and sharing of expertise that leads towards international harmonisation on the definition of a universal minimal performance threshold for AI enabled driving functions (such as AI as a Driver), which is essential to building the global public trust required for widespread deployment of AI on our roads.
* **The** [*ITU-T Focus Group on "Quantum Information Technology for Networks" (FG-QIT4N)*](https://www.itu.int/en/ITU-T/focusgroups/qit4n/Pages/default.aspx)was established by TSAG in September 2019 to provide a collaborative platform for pre-standardization aspects of QIT for networks. Its main objectives are to study the evolution and applications of QIT for networks; to focus on terminology and use cases for QIT for networks; to provide necessary technical background information and collaborative conditions to effectively support QIN-related standardization work in ITU-T Study Groups; and to provide an open cooperation platform with ITU-T Study Groups and other SDOs.

**2.12** 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)).

**2.13** ITU-D SG 1 and SG 2 concluded their [2014-2017 study period](http://www.itu.int/itu-d/study-groups) and released a number of Internet-related reports and guidelines (See [ITU-D SG1](https://www.itu.int/pub/D-STG-SG01) and [ITU-D SG2](https://www.itu.int/pub/D-STG-SG02) reports). Following WTDC-17, work will continue on IP-related issues such as NGN interconnection, VoIP, cloud services, and strategies, policies, and technologies for the deployment of broadband. The groups will explore 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 will work 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.

**2.14** 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.).

**2.15** 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”.

**2.16** 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.

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

**2.18** 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 covers the installation, IoT operating systems, security, test, IoT communication systems and IoT vulnerabilities scanning tools. The subjects covered include, but are not limited to: IoT Architecture & Ecosystem, Hardware & Software Platforms, Communication Channels & Protocols, Data Streaming & IoT, IoT Applications in different domains (Agriculture, Medical, Meteorology), IoT Security Overview, Challenges to Secure IoT Deployments, Baseline Policies for IoT Security and IoT Endpoint Security Guidelines.

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

* This training was organized in Hanoi, Vietnam from 14 to 18 October 2019 at the PTIT (Ministry of Information and Communications, Posts and Telecommunications Institute of Technology). In the hands-on sessions, participants performed connectivity and simulated security scenarios in a lab environment to have a closer look at how such attacks happen under actual conditions.
* This training was also organized in Malang Indonesia from 9 to 13 December 2019 and was hosted by the Brawijaya University. Attended by 30 participants, the training explained the IoT connectivity & security challenges and other important issues on IoTs ecosystems and business models. Participants are now able to start and contribute to the development of National IoT Policy and Plans at the national level and train other participants. The participants recommended ITU / BDT:
* to also consider more Open Source based IoT connectivity & security systems;
* to include trainings on Linux/Unix systems;
* when the group of participants is large (i.e. 30 and above), to use more equipment for the training and labs.
* Another training took place in India at IIT Madras Research Park, Chennai, India from 16 to 20 December 2019 in close collaboration with ERNET India (National Research and Education Network established in 1998 as an autonomous scientific society under the Ministry of Electronics & Information Technology (MeitY), Government of India). 23 participants attended the workshop. It covered the basic and intermediate levels of IoT ecosystems including IoT security challenges, the IoT devices, applications and services. The target audience was IoT solution Designers, IoT Developers, IoT Implementers, IT Managers, IT Auditors and anyone who is ready to master the steps required and qualifications to implement IoT systems at the national level.

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

* The Ministry of Economy will establish a national body to coordinate activities regarding the  transition to IPv6 by the end of this year 2020. The members of the national body will be representatives of  Ministry of Economy, Ministry of Public Administration, University of Montenegro and Agency of Electronic Communications and Postal Services;
* The task  is to establish a laboratory within AMUCG data centre,  necessary for the IPv6 transition testing;
* To implement e-services accessible by IPv6  within the Ministry of Public Administration;
* To collaborate with telecom operators on their IPv6 plans in 2020 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 in the first and second Quarter 2020 for Argentina, Morocco, Senegal, Sri Lanka, Thailand, Malaysia and Vietnam etc.

**3.7** An ITU Forum on "*Internet of Things: future applications and services. Perspective 2030*" and the *4th ITU Workshop on Network 2030* was organised from 20 to 22 May 2019 for the CIS Region.

**3.8** 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.

**3.9** 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.

**3.10** 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 keys 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

**3.11** BDT continues to collaborate closely with NBTC ([Office Of The National Broadcasting Telecommunications Commission](http://house.nbtc.go.th/wps/portal/Eng/Home/Contactus/Headquarters/%21ut/p/z1/04_Sj9CPykssy0xPLMnMz0vMAfIjo8ziDS1NPd0tLQx83L2dDA0czcKc_B29gwNDTUz1w8EKDFCAo4FTkJGTsYGBu7-RfhQx-vEoiMIwHtkioP4oVCv8zTzcgCZYGnmbObkFBvkYQhXgcyIhSwpyQyMMMj0VAZP0pEY%21/?1dmy&urile=wcm%3apath%3a%2Feng%2Bsite%2F8contactus%2F81contactus_detail%2Foffice%2Bof%2Bthe%2Bnational%2Bbroadcasting%2Btelecommunications%2Bcommission)) to build capacity in priority areas of interest such as AI-Artificial Intelligence Overview (16-19 September 2019, Bangkok, Thailand) and Traffic engineering (CDN and international traffic routing) and advanced wireless (5G/IOT) network planning (30 September-3 October 2019, Bangkok, Thailand). In partnership with APNIC and Australia, training on “*Internet and IPv6 Infrastructure Security Program*” was conducted in Tonga for the Pacific region and, the IPv6 Roadmap was developed and is available now for Mongolia and Brunei.

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

**3.13** 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.

**3.14** 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 14th IGF meeting, held from 25 to 29 November 2019 in Berlin, Germany. ITU organized the annual EQUALs in Tech Awards, the world’s largest event celebrating those working to close the gender digital divide. ITU also co-organized an Open Forum on Implementation of WSIS Action Lines for SDGs and WSIS Forum 2020 (co-organized by the WSIS Action Line Facilitators) and a roundtable discussion on “*Championing Gender Equality in the Digital Age: What Role for Governments?*” (co-organized with the Government of Germany).

**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 the ITU membership. Several training and capacity building activities were implemented in 2019.

A regional workshop on “*Strengthening capacities in international Internet governance*” was organized for the Arab region in Manama, Kingdom of Bahrain, from 1-2 October 2019, in partnership with Diplo Foundation, ICANN, ISOC, RIPE NCC and others. The workshop attracted more than 100 participants. ITU also contributed to capacity building events during the WSIS Forum 2018 and the IGF 2018, in partnership with ICANN and Diplo Foundation.

**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 started work on a new draft Recommendation E.ENUMINF “*Differentiating between ENUM and Infrastructure ENUM*”.

**5.3** ITU-T SG11 has been working on VoLTE/ViLTE interconnection and adoption of ENUM for IMS interconnection in liaising with SG2; SG11 is finalizing draft Recommendation Q.3643 (exQ.DEN\_IMS) "*Signalling architecture of distributed ENUM networking for IMS*" and is collaborating with ITU-T SG2 on this text.

# 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; supporting strengthening capabilities of the national IXPs (Montenegro) and the National Internet Exchange in Timor Leste; developing a new publication on “Internet Exchanges” including Renewable Energies for Rural Communications, and so on.

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

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

**6.4** During the Middle East Network Operators Group Meeting & Peering Forum (MENOG19) held in Beirut on 3 and 4 April 2019, BDT presented the peering landscape in the Arab Region, including the status of Internet exchange points, submarine cable infrastructure, Internet traffic peering maps and content delivery networks were presented[[1]](#footnote-2).

**7. OTT**

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

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

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1. More details are available at <https://www.itu.int/itu-d/tnd-map/> [↑](#footnote-ref-2)