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| **Keywords:** | Signalling; protocols; IMT-2020, conformance; interoperability; testing; counterfeiting; stolen; ICT devices; CASC; |
| **Abstract:** | This report contains the report of the ITU-T SG11 on lead study group activities (March – December 2018). |

1. **Background**

According to Resolution 2 of WTSA-16, ITU-T SG11 is the lead study group on:

* signalling and protocols, including for IMT-2020 technologies;
* establishing test specifications, conformance and interoperability testing for all types of networks, technologies and services that are the subject of study and standardization by all ITU‑T study groups;
* combating counterfeiting of ICT devices;
* combating the use of stolen ICT devices.

1. **Report of ITU-T SG11 on lead study group activities (March – December 2018)**
   1. **Signalling and protocols, including for IMT-2020 technologies**
      1. **Approved ITU-T Recommendations and agreed Supplements and Corrigendum on signalling aspects**

The following ITU-T Recommendations have been approved since March 2018:

* New ITU-T Q.3641: IMS references to Release 11 for communication between IMS and NGN Networks in order to support the end-to-end service interoperability;
* Revised ITU-T Q.850: Usage of cause and location in the Digital Subscriber Signalling System No. 1 and the Signalling System No. 7 ISDN User Part;
* New ITU-T Q.3718: Signalling requirements of the Sew interface for Virtual Data Center;
* New ITU-T Q.3405: IPv6 protocol procedures for broadband services;
* New ITU-T Q.3717: Signalling requirements for automatic management of IP address pool by SDN technologies on BNG;
* New ITU-T Q.5001: Signalling requirements and architecture of intelligent edge computing.

The following Supplement and Corrigendum have been agreed since March 2018:

* Supplement 69 to ITU-T Q-series Recommendations: Framework for interconnection between VoLTE-based network and other networks supporting emergency telecommunications service (ETS);
* Corrigendum to the Appendix IV of the Recommendation ITU-T Q.1912.5: Interworking between session initiation protocol (SIP) and bearer independent call control protocol or ISDN user part.

The following ITU-T Recommendations have been consented by WP2/11 in October 2018:

* New ITU-T X.609.6: Managed P2P communications: Content distribution signalling requirements;
* New ITU-T X.609.7: Managed P2P communications: Content distribution peer protocol.
  + 1. **Managed P2P communications**

Two new draft ITU-T Recommendations dealing with Managed P2P communications were consented by WP2/11 in October 2018. These new ITU-T Recommendations define content distribution signalling requirements (ITU-T X.609.6) and content distribution peer protocol (ITU-T X.609.7) respectively. Following this result, as a continuation of these activities, it was decided to start new work items under X.609.x-series, as follows:

* X.mp2p-ocmp: Managed P2P communications: Overlay content management protocol;
* X.mp2p-srds: Managed P2P communications: Signalling requirements for data streaming;
* X.mp2p-ldmp: Managed P2P communications: Management protocol for live data sources.
  + 1. **IMT-2020 and SDN protocols**

Since March 2018, ITU-T SG11 progressed well on developing standards on IMT-2020. Following the approval of the first recommendation on intelligent edge computing (ITU-T Q.5001) which is the first ITU-T SG11 Recommendation on AI, ITU-T SG11 decided to start a new sub category of the Q.series, as follow:

Q.5000-Q.5049: Signalling requirements and protocols for IMT-2020

Q.5000-Q.5019: Signalling requirements and architecture of IMT-2020

It is expected that this sub-category will be filled with some ongoing work items, which are currently under study, including:

* Q.IMT2020-PFW: Protocol Framework for IMT-2020;
* Q.NS-LCMP: Protocol for network slice lifecycle management;
* Q.CE-APIMP: Protocol for managing capability exposure APIs in IMT-2020 network;
* Q.D2D-EECP: Energy efficient D2D communication protocol for IMT 2020 network.

ITU-T SG11 also continues working on SDN activities and achieved progress on two ongoing work items:

* Q.MEA-SRA, Signalling requirement and architecture for media service entity attachment;
* Q.QMP-TCA, QoS management protocol for time constraint applications over SDN;
  + 1. **SS7 issues**

SG11 meeting discussed a number of contributions addressed to SS7 issues. Among them were contributions which proposed to revise ITU-T Q.731.3.

According to the discussion, the working number and the title of this work item had been changed to Amendment 1 to Recommendation ITU-T Q.731.3 "STAGE 3 DESCRIPTION FOR NUMBER IDENTIFICATION SUPPLEMENTARY SERVICES USING SIGNALLING SYSTEM No.7 – CALLING LINE IDENTIFICATION PRESENTATION, Amendment 1 New functionalities to the calling line identification presentation". It is expected that the revised ITU-T Q.731.3 will be proposed for consent at the next SG11 meeting.

* + 1. **VoLTE/ViLTE interconnection**

Following the approval of two new Recommendations ITU-T Q.3640 and ITU-T Q.3953 in January 2018, ITU-T SG11 continues working on VoLTE/ViLTE issues. In July 2018, ITU-T SG11 agreed the new Q.Supplement 69: Framework for interconnection between VoLTE-based network and other networks supporting emergency telecommunications service (ETS) and approved new Recommendation ITU-T Q.3641: IMS references to Release 11 for communication between IMS and NGN Networks in order to support the end-to-end service interoperability.

ITU-T SG11 achieved good progress on the following topics:

* Q.DEN\_IMS: Signalling architecture of distributed ENUM networking for IMS;
* Q.VoLTE-SAO-req: Requirements for signalling network analyses and optimization in VoLTE;
* Q.suppl.Multi\_Device\_ETS: Signalling requirements for VoLTE-based network and GSM/UMTS network supporting Multi-device emergency telecommunications service.

ITU-T SG11 started a new work items Q.Interop\_IMS\_Rel\_12: IMS references to Release 12 for communication between IMS and NGN Networks in order to support the end-to-end service interoperability.

* + 1. **Signalling for emerging networks**

ITU-T SG11 started several new work items on signalling aspects related to emerging technologies such as:

* Q.SFD: Signalling requirements for Service Function's discovery;
* Q.BNG-PAC: Procedures for vBNG acceleration with programmable acceleration card;
* Q.HET-GW: Signalling protocol for Heterogeneous IoT gateways.
  1. **Establishing test specifications, conformance and interoperability testing for all types of networks, technologies and services that are the subject of study and standardization by all ITU‑T study groups**
     1. **Approved ITU-T Recommendations on conformance and interoperability testing**

The following ITU-T Recommendations, which define test specifications, have been approved since March 2018:

* New ITU-T Q.4060: The structure of the testing of heterogeneous Internet of Things gateways in a laboratory environment;

The following ITU-T Recommendations have been consented by WP3/11 in October 2018:

* New ITU-T Q.4042.1: Cloud interoperability testing about web application – part 1: Interoperability testing between CSC and CSP.
  + 1. **Implementation of ITU C&I Programme**

According to received inputs from different ITU-T SGs, ITU-T SG11 updated the reference table of ITU-T Recommendations suitable for C&I testing and list of pilot projects on conformance testing against ITU-T Recommendations. The information was updated on the [ITU C&I Portal](https://www.itu.int/en/ITU-T/C-I/Pages/default.aspx) accordingly and it is available at:

* [www.itu.int/go/pilot-projects](https://www.itu.int/go/pilot-projects);
* [www.itu.int/go/reference-table](https://www.itu.int/go/reference-table).
  + 1. **Testing specifications**

Following the approval of ITU-T Q.4060 on IoT testing, the new subcategory for Recommendations of Q.series was opened, as follows:

Q.4060-Q.4099: Testing specifications for IMT-2020 and IoT.

ITU-T SG11 achieved progress on the following ongoing work items on testing, as follows:

* Q.TI-TEST: Framework of model network for Tactile Internet testing;
* Q.vs-iop-reqts: Interoperability testing requirements of virtual switch;
* Q.FW\_IoT/Test: Framework for IoT Testing;
* Q.39\_FW\_Test\_ID\_IoT: The framework of testing of identification systems used in IoT;
* Q.BNGP: Set of parameters of vBNG for monitoring;
* Q.SQM: Signalling requirements and architecture for the Internet service quality monitoring system;
* Q.SP-RT-NP: Signalling procedures of the probes to be used for remote testing of network parameters;
* Q.SDN-CT: Framework of SDN controller testing.

and started several new work items, including:

* Q.SDN-OFT: The compatibility testing of SDN-based equipment using different versions of OpenFlow protocol;
* Q.TP\_AR: Testing procedures of Augmented Reality applications;
* Q.vbng-iop-reqts: Interoperability testing requirements of virtual Broadband Network Gateway;

ITU-T SG11 also started a new 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.

* + 1. **Conformity Assessment Steering Committee (CASC)**

The sixth meeting of the ITU-T Conformity Assessment Steering Committee (CASC) took place during the ITU-T SG11 meeting on 20 July 2018.

IEC presented the draft Operational Document (OD) named "ICT Laboratory Recognition Service on ITU–T Recommendations" that is intended to be set up as a standalone service based on the IECEE CB scheme (SG11-C200). This document was prepared by IECEE TF as a concept and it specifies the requirements and processes of the ICT Laboratory Recognition Service based on ITU‑T Recommendations. It was noted that the IECEE OD is in line with the ITU TL recognition procedure specified in the relevant Guideline on "Testing Laboratories recognition procedure" agreed by ITU-T SG11 in 2015.

The CASC decided to seek approval of the conceptual, draft, OD in IECEE first and then CASC will develop its own guideline which would refer to the OD accordingly to ensure the protection of IEC intellectual property.

Finally, CASC noted that to facilitate a joint process for assessment and recognition of laboratories between ITU and IECEE, the established TL recognition procedure will provide the Testing Laboratories with some unique key advantages. As two truly international organizations covering a large scope of products and services, ITU and IECEE support laboratories to have a harmonized process, which includes the scope of testing of both organizations. Such a harmonized process would allow laboratories to receive recognition from both organizations based on a single assessment per location. For large testing organizations as well as small test laboratories, this supports an economical and optimized access to a larger testing portfolio based on their expertise and competence.

The OD is supposed to be adopted by IECEE CMC in 2019.

* 1. **Combating counterfeiting of ICT devices**

SG11 continues working on the issues related to combat counterfeiting.

In July 2018, ITU-T SG11 determined draft new Recommendation ITU-T Q.5050 "Framework for solution to combat counterfeit ICT Devices" for approval using TAP procedure according to Resolution 1 (WTSA-16). The approval of this draft new Recommendation is planned to take place at the next SG11 meeting (6-15 March 2019).

ITU-T SG11 also achieved progress on Technical Report - Guidelines on Best Practice and Solutions for Combating Counterfeit ICT devices (TR-BP\_CF).

The actions plans for implementation for the WTSA-16 Resolution 96 was revised with the latest activities. The output document can be found in [TD620/GEN](https://www.itu.int/md/T17-SG11-180718-TD-GEN-0620/en).

* 1. **Combating the use of stolen ICT devices**

In July 2018, ITU-T SG11 made progress on ongoing work item Q.FW\_CSM “Framework for Combating the use of Stolen Mobile ICT Devices”.

The actions plans for implementation for the WTSA-16 Resolution 97 were revised with the latest activities. The output document can be found in [TD620/GEN](https://www.itu.int/md/T17-SG11-180718-TD-GEN-0620/en).

1. **ITU-T SG11 workshops**
   1. **ITU-T Study Group 11 Regional Workshop for Africa on “Counterfeit ICT Devices, Conformance and Interoperability Testing Challenges in Africa” (23 April 2018, Tunis, Tunisia)**

It was the second Regional [Workshop](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20180423/Pages/default.aspx) for Africa Region on combating counterfeiting and Conformance and Interoperability (C&I). The discussion was focused on:

* problems and impact of counterfeiting issues on ICT market, ranging from lost taxes and other revenue; erosion of brand value, network disruptions and interoperability challenges resulting in poor quality of service delivery; and risks to health, safety and environment;
* new trends and mechanisms in ICT counterfeiting, tampering and/or duplication of unique device identifiers;
* mechanisms to secure the supply chain management (from manufacturing, importation distribution and marketing) to ensure traceability, security, privacy and trust of people, products and networks;
* technical solutions to combat counterfeit ICT devices;
* Implementation of the ITU C&I Programme;
* C&I activities and testing laboratories in the Region;
* MRAs and Harmonized Standards Development for the Region;
* Joint ITU-T/IEC activities including CASC and joint certification schemes;
* SG11 activities on C&I and combating counterfeiting ICT devices.

The Workshop was followed by the SG11 Regional Group for Africa ([SG11RG-AFR](https://www.itu.int/en/ITU-T/studygroups/2017-2020/11/sg11rgafr/Pages/default.aspx)).

Following the discussion at the SG11RG-AFR and outcomes ([TD27](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-SG11RG.AFR-180423-TD-PLEN-0027)) of the Workshop, it was noted that duplication/cloning and tampering of unique identifiers of ICT devices, such as IMEI, are still a huge problem in the African Region. It was stated that ITU should address this problem by proposing secure mechanisms to be used for identification of ICT devices, not limited to mobile phones.

Nigeria, Tunisia, Ghana, Burkina Faso, Sudan and Malawi observe the need to seek a solution to the concern about the possibility of IMEI duplication. Therefore, opined that ITU-T SG11 can invite for a new work item that would seek a technical generic solution on this matter in collaboration with GSMA.

More details are highlighted in the report of the SG11RG-AFR ([SG11RG-AFR–R2](https://www.itu.int/md/T17-SG11RG.AFR-R-0002/en)).

* 1. [**ITU Regional Forum**](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20180604/Pages/default.aspx) **on Internet of Things, Telecommunication Networks and Big Data as basic infrastructure for Digital Economy (4-6 June 2018, Saint Petersburg, Russia)**

In June 2017, ITU organized the [ITU Regional Forum](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20180604/Pages/default.aspx) on Internet of Things, Telecommunication Networks and Big Data as basic infrastructure for Digital Economy. The event took place in Saint Petersburg at the kind invitation of Rostelecom and the Saint Petersburg State University of Telecommunications (SPbSUT).

The Workshop focused on several aspects which are of interest to the Region, including: IoT technologies, IoT data processing, new 5G technologies, networking issues (e.g. VoLTE/ViLTE interconnection, ENUM signalling architecture, testing of 5G technologies, etc.) and testing.

During the roundtable, participants expressed their views on the key issues, which, from the Region perspective, require international standardization, including:

* Identification of IoT devices;
* Billing in 5G and IoT-based networks;
* New signaling protocols for 5G networks;
* Data processing, including data format;
* ENUM signaling architecture for IMS interconnection;
* Interoperability of IoT and devices of 5G-based networks.

The event was followed by the SG11 Regional Group for EECAT ([SG11RG-EECAT](https://www.itu.int/en/ITU-T/studygroups/2017-2020/11/sg11eecat/Pages/default.aspx)) which took place back-to-back with SG20 Regional Group for EECAT ([SG20RG-EECAT](https://www.itu.int/en/ITU-T/studygroups/2017-2020/20/sg20rgeecat/Pages/default.aspx)), held in Saint Petersburg (Russia) on 4-6 June 2018.

* 1. **ITU** [**Workshop**](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20180723/Pages/default.aspx) **on "Global approaches on combating counterfeiting and stolen ICT devices" (23 July 2018, Geneva, Switzerland)**

In July 2018, ITU-T SG11 organized a [Workshop](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20180723/Pages/default.aspx) on "Global approaches on combating counterfeiting and stolen ICT devices" which took place in Geneva on 23 July 2018.  
One of the aims of the Workshop was to focus on concerns raised by ITU Member States during Council-18 on tampering with unique telecommunication device identifiers used in ICT devices such as IMEI.

The objectives of the Workshop were:

* tampering and duplication of IMEI identifiers used in mobile devices;
* key challenges faced by telecom operators, regulators and ICT vendors producing genuine end-devices, in using existing identifiers of ICT devices, including issues related to cloning, tampering and duplication of identifiers;
* identification systems, which are currently used for combating counterfeiting and stolen ICT devices, and discuss the importance of reliable unique ICT device identifiers for such tasks;
* identification systems, which guarantee that existing identifiers could be securely stored on devices and rendered tamper-proof, and implement means of detecting clones and differentiating them from genuine devices;
* action plan on developing possible technical solutions to address the problem of duplication/tampering/cloning of unique ICT device identifiers to be used for combating counterfeiting and stolen ICT devices;
* problems and impact of counterfeiting issues on ICT market, ranging from lost taxes and other revenue; erosion of brand value, network disruptions and interoperability challenges resulting in poor quality of service delivery; and risks to health, safety and environment;
* new trends and challenges in the combat of counterfeit and stolen ICT devices, including the tampering and/or duplication of unique device identifiers;
* mechanisms to secure the supply chain management (from manufacturing, importation distribution and marketing) to ensure traceability, security, privacy and trust of people, products and networks;
* technical solutions to combat counterfeit and stolen ICT devices;
* national/regional and global activities on combating counterfeiting and stolen ICT devices;
* SG11 activities on combating counterfeiting ICT devices and combating the use of stolen ICT devices.

Two demo-zones were deployed at the Workshop to demonstrate technical solutions on combating counterfeiting and stolen ICT devices, which basic concepts were presented during the Workshop, as follows:

* IMEI-DOA solution to combat counterfeiting ICT devices, Rostelecom;
* Combat Mobile Device Theft with blockchain-based Global IMEI Storage and Services Innovation, Deutsche Telekom, SAP and Camelot ITLab.

During the Workshop, it was noted that the reliability of ICT identifiers are still a key important issue for most of countries. The key issues highlighted by the speakers are available in [SG11-TD560/GEN](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-SG11-180718-TD-GEN-0560).

Also, according to the outcomes of the wrap-up session, participants of the Workshop agreed with some key actions which aim to increase reliability of existing ICT identifiers. ITU-T SG11 is encouraged to:

* Study approaches on how to defend existing ICT identifiers against tampering/cloning of existing ICT identifiers;
* Draw up a list of unique ICT identifiers to be used for combating counterfeit and mobile device theft;
* Develop methods of assessing and verifying identifiers used for purposes of combating counterfeit and stolen devices;
* Consider Blockchain-based technologies to address the tampering/cloning of existing ICT identifiers, combat counterfeiting and stolen ICT devices;
* Develop mechanisms as appropriate for identifying counterfeit production.

Following the results of the Workshop, ITU-T SG11 decided to request the TSB Director to inform Council on the results of this event. The details are available in the report of the SG11 meeting (July 2018, [R11](https://www.itu.int/md/T17-SG11-R-0011/en)).

* 1. **ITU Regional Workshop on Deployment of VoLTE/ViLTE networks based on IMS: from Standardization to Implementation (2-3 October 2018, Samarkand, Uzbekistan)**

In October 2018, ITU organized a [Workshop](https://www.itu.int/en/ITU-D/Regional-Presence/CIS/Pages/EVENTS/2018/10_Samarkand/10_Samarkand.aspx) on Deployment of VoLTE/ViLTE networks based on IMS: from Standardization to Implementation. The topic of the Workshop is within the scope of SG11 activities on VoLTE interconnection. The event took place in Samarkand (Uzbekistan) from 2-3 October 2018.

The Workshop was aimed at sharing experiences on IMS and VoLTE technologies. In particular, the Workshop covered following issues:

* Principles of 4G networks (VoLTE/ViLTE) deployment based on IMS platform;
* Key scalability challenges in the IMS-based VoLTE/ViLTE networks;
* Role of ENUM in VoLTE/ViLTE interconnection;
* Legal, normative and regulatory aspects of IMS and VoLTE application;
* Directions of international standardization that will help to resolve challenges faced by operators during VoLTE/ViLTE deployment based on IMS platform.

1. **SG11 Regional groups**

The Regional groups of SG11 (SG11RG-AFR and SG11RG-EECAT) conducted their meetings in April 2018 and June 2018 respectively. The reports of these meetings are available in [SG11RG-AFR-R2](https://www.itu.int/md/T17-SG11RG.AFR-R-0002/en) and [SG11RG-EECAT-R2](https://www.itu.int/md/T17-SG11RG.EECAT-R-0002/en).

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