International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

WORLD TELECOMMUNICATION STANDARDIZATION ASSEMBLY
Hammamet, 25 October – 3 November 2016

Resolution 2 – ITU Telecommunication Standardization Sector study group responsibility and mandates

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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RESOLUTION 2 (Rev. Hammamet, 2016)

ITU Telecommunication Standardization Sector study group responsibility and mandates

*(Helsinki, 1993; Geneva, 1996; Montreal, 2000; Florianópolis, 2004;
Johannesburg, 2008; 2009[1]; Dubai, 2012; 2015[2]; 2016[3]; Hammamet, 2016)*

The World Telecommunication Standardization Assembly (Hammamet, 2016),

recognizing

the resolutions adopted by this assembly, which contain many instructions and implications for the work of the relevant study groups,

considering

a)　　that the mandate for each study group needs to be clearly defined in order to avoid duplication of effort between study groups and to ensure the coherence of the overall work programme of the ITU Telecommunication Standardization Sector (ITU-T);

b)　　that ITU-T has to evolve in order to stay relevant to the changing telecommunication environment and to its membership interests;

c)　　that collocation of study group, working party or rapporteur group meetings could also be a means to avoid duplication of work and to improve efficiency of work; in practice, collocation enables:

–　　attendees' participation in the work of more than one study group;

–　　reduction in the need for exchange of liaison statements between the study groups concerned;

–　　saving costs for ITU and for ITU members and other experts;

d)　　that the World Telecommunication Standardization Assembly (WTSA), through Resolution 22, assigns authority to the Telecommunication Standardization Advisory Group (TSAG) in the interval between WTSAs to restructure and establish ITU-T study groups in response to changes in the telecommunication marketplace,

noting

that the study group structure, responsibilities and mandates agreed at WTSA may be modified in the interval between WTSAs, and that the current study group structure, responsibility and mandates may be found on the ITU-T website or obtained from the Telecommunication Standardization Bureau (TSB),

resolves

1　　that the mandate of each study group, which it shall use as the basis for organizing its study programme, shall consist of:

–　　a general area of responsibility, as set out in Annex A to this resolution, within which the study group may amend existing Recommendations, in collaboration with other groups, as appropriate;

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[1]　Changes to the ITU-T Study Group 5 mandate agreed by TSAG on 30 April 2009.

[2]　Creation of ITU-T Study Group 20 by TSAG on 5 June 2015.

[3]　Changes to the ITU-T Study Group 20 lead study group role agreed by TSAG on 5 February 2016.

–   a set of Questions related to particular areas of study, which are compatible with the general area of responsibility and which should be results-oriented (refer to Section 7 of Resolution 1 (Rev. Hammamet, 2016) of this assembly);

2   to encourage the study groups to consider collocation (e.g. of study group plenaries, working parties or rapporteur meetings) as a means to improve cooperation in some areas of work; the study groups involved will need to identify the areas in which they need to cooperate, based on their mandates, and keep TSAG and TSB informed,

instructs the Telecommunication Standardization Bureau

to support and facilitate the operational aspects of such collocation.

ANNEX A
(to Resolution 2 (Rev. Hammamet, 2016))

PART 1 – GENERAL AREAS OF STUDY

ITU-T Study Group 2

Operational aspects of service provision and telecommunication management

ITU-T Study Group 2 is responsible for studies relating to:

•   numbering, naming, addressing and identification requirements and resource assignment, including criteria and procedures for reservation, assignment and reclamation;

•   routing and interworking requirements;

•   principles of service provision, definition and operational requirements;

•   operational and management aspects of networks, including network traffic management, designations and transport-related operations procedures;

•   operational aspects of interworking between traditional telecommunication networks and evolving networks;

•   evaluation of feedback from operators, manufacturing companies and users on different aspects of network operation;

•   management of telecommunication services, networks and equipment via management systems, including support for next-generation networks (NGN), cloud computing, future networks (FN), software-defined networking (SDN), IMT-2020, and the application and evolution of the telecommunication management network (TMN) framework;

•   ensuring the consistency of the format and structure of identity management (IdM) identifiers;

•   specifying interfaces to management systems to support the communication of identity information within or between organizational domains; and

•   the operational impact of the Internet, convergence (services or infrastructure) and new services, such as over-the-top (OTT), on international telecommunication services and networks.

ITU-T Study Group 3

Tariff and accounting principles and international telecommunication/ICT economic and policy issues

ITU-T Study Group 3 is responsible, *inter alia*, for studying international telecommunication/ICT policy and economic issues and tariff and accounting matters (including costing principles and methodologies), with a

view to informing the development of enabling regulatory models and frameworks. To this end, Study Group 3 shall in particular foster collaboration among its participants with a view to the establishment of rates at levels as low as possible consistent with an efficient service and taking into account the necessity of maintaining independent financial administration of telecommunications on a sound basis. Additionally, Study Group 3 will study the economic and regulatory impact of the Internet, convergence (services or infrastructure) and new services, such as over-the-top (OTT), on international telecommunication services and networks.

ITU-T Study Group 5

Environment, climate change and circular economy

ITU-T Study Group 5 is responsible for studying ICT environmental aspects of electromagnetic phenomena and climate change.

Study Group 5 will also study issues related to resistibility, human exposure to electromagnetic fields, circular economy, energy efficiency and climate-change adaptation and mitigation.

It is responsible for studies relating to:

• protection of telecommunication networks and equipment from interference and lightning;

• electromagnetic compatibility (EMC), particle radiation effects, and assessment of human exposure to electromagnetic fields (EMF) produced by ICT installations and devices, including cellular phones and base stations;

• the existing copper network outside plant and related indoor installations;

• achieving energy efficiency and sustainable clean energy in ICTs;

• methodologies for assessing the environmental impact of ICT, publishing guidelines for using ICTs in an eco-friendly way, dealing with e-waste issues (also including the environmental impact of counterfeit devices), enhancing rare-metal recycling and energy efficiency of ICT, including infrastructures.

Study Group 5 is responsible for studies on how to use ICTs to help countries and the ICT sector to adapt to the effects of environmental challenges, including climate change, in line with the Sustainable Development Goals (SDGs).

Study Group 5 also identifies the needs for more consistent and standardized eco-friendly practices for the ICT sector (e.g. labelling, procurement practices, standardized power supplies/connectors, eco-rating schemes).

ITU-T Study Group 9

Television and sound transmission and integrated broadband cable networks

ITU-T Study Group 9 is responsible for studies relating to:

• use of telecommunication systems for contribution, primary distribution and secondary distribution of television, sound programmes and related data services including interactive services and applications, extendable to advanced capabilities such as ultra-high definition, 3D, multiview and high-dynamic range television, etc.;

• use of cable and hybrid networks, primarily designed for television and sound-programme delivery to the home, as integrated broadband networks to also carry voice or other time-critical services, video-on-demand (e.g. over-the-top (OTT)), interactive services, multiscreen services, etc. to customer premises equipment (CPE) in the home or enterprise.

ITU-T Study Group 11

Signalling requirements, protocols, test specifications and combating counterfeit products

ITU-T Study Group 11 has been attributed the responsibility for studies related to signalling-system architecture, signalling requirements and protocols, for all types of networks and technologies, future networks (FN), software-defined networking (SDN), network function virtualization (NFV), cloud-computing networks, VoLTE/ViLTE-based network interconnection, virtual networks, IMT-2020 technologies, multimedia, next-generation networks (NGN), flying ad-hoc networks, tactile Internet, augmented reality and signalling for legacy network interworking.

Study Group 11 is also responsible for studies to combat counterfeiting products including telecommunication/ICT and mobile device theft.

Study Group 11 will also develop test specifications for testing conformance and interoperability (C&I) for all types of networks, technologies and services, a testing methodology and test suites for standardized network parameters in relation to the framework for Internet-related performance measurement, as well as for existing technologies (e.g. NGN) and emerging technologies (e.g. FN, cloud, SDN, NFV, IoT, VoLTE/ViLTE, IMT-2020 technologies, flying ad-hoc networks, tactile Internet, augmented reality, etc.).

In addition, Study Group 11 will study a way to implement a testing laboratory recognition procedure in ITU-T through the work of the ITU-T Conformity Assessment Steering Committee (CASC).

ITU-T Study Group 12

Performance, quality of service and quality of experience

ITU-T Study Group 12 is responsible for Recommendations on performance, quality of service (QoS) and quality of experience (QoE) for the full spectrum of terminals, networks, services and applications ranging from speech over fixed circuit-based networks to multimedia applications over networks that are mobile and packet based. Included in this scope are the operational aspects of performance, QoS and QoE; the end-to-end quality aspects of interoperability, and the development of multimedia quality assessment methodologies, both subjective and objective.

ITU-T Study Group 13

Future networks, with focus on IMT-2020, cloud computing and trusted network infrastructures

ITU-T Study Group 13 is responsible for studies relating to the requirements, architectures, capabilities and APIs as well as softwarization and orchestration aspects of converged future networks (FN), specifically focusing on IMT-2020 non-radio related parts. This also includes IMT-2020 project management coordination across all ITU-T study groups and release planning and implementation scenarios. It is responsible for studies relating to cloud-computing technologies, big data, virtualization, resource management, reliability and security aspects of the network architectures considered. It is responsible for studies relating to fixed-mobile convergence (FMC), mobility management, and enhancements to existing ITU-T Recommendations on mobile communications, including the energy-saving aspects. Furthermore, Study Group 13 responsibility includes studies on emerging network technologies for IMT-2020 networks and FN, such as information-centric networking (ICN)/content-centric networking (CCN). Study Group 13 is also responsible for studies relating to standardization of concepts and mechanisms to enable trusted ICT, including framework, requirements, capabilities, architectures and implementation scenarios of trusted network infrastructures and trusted cloud solutions in coordination with all study groups concerned.

ITU-T Study Group 15

Networks, technologies and infrastructures for transport, access and home

ITU-T Study Group 15 is responsible in ITU-T 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. This includes related installation, maintenance, management, test, instrumentation and measurement techniques, and control plane technologies to enable the evolution toward intelligent transport networks, including the support of smart-grid applications.

ITU-T Study Group 16

Multimedia coding, systems and applications

ITU-T Study Group 16 is responsible for studies relating to ubiquitous multimedia applications, multimedia capabilities for services and applications for existing and future networks. This encompasses accessibility; multimedia architectures and applications; human interfaces and services; terminals; protocols; signal processing; media coding and systems (e.g. network signal processing equipment, multipoint conference units, gateways and gatekeepers).

ITU-T Study Group 17

Security

ITU-T Study Group 17 is responsible for building confidence and security in the use of information and communication technologies (ICT). This includes studies relating to cybersecurity, security management, countering spam and identity management. It also includes security architecture and framework, protection of personally identifiable information, and security of applications and services for the Internet of things (IoT), smart grid, smartphone, software-defined networking (SDN), Internet protocol television (IPTV), web services, social network, cloud computing, big data analytics, mobile financial system and telebiometrics. Study Group 17 is also responsible for the application of open system communications, including directory and object identifiers, and for technical languages, the method for their usage and other issues related to the software aspects of telecommunication systems and test specification languages in support of conformance testing to improve the quality of Recommendations.

ITU-T Study Group 20

Internet of things (IoT) and smart cities and communities

Study Group 20 is responsible for studies relating to Internet of things (IoT) and its applications, and smart cities and communities (SC&C). This includes studies relating to big data aspects of IoT and SC&C, e-services and smart services for SC&C.

PART 2 – LEAD ITU-T STUDY GROUPS IN SPECIFIC AREAS OF STUDY

SG2   Lead study group on numbering, naming, addressing, identification and routing
        Lead study group on service definition
        Lead study group on telecommunications for disaster relief/early warning, network resilience and recovery
        Lead study group on telecommunication management

SG3   Lead study group on tariff and accounting principles relating to international telecommunications/ICT
        Lead study group on economic issues relating to international telecommunications/ICT
        Lead study group on policy issues relating to international telecommunications/ICT

SG5   Lead study group on electromagnetic compatibility, lightning protection and electromagnetic effects
        Lead study group on ICTs related to the environment, climate change, energy efficiency and clean energy
        Lead study group on circular economy, including e-waste

SG9   Lead study group on integrated broadband cable and television networks

SG11   Lead study group on signalling and protocols, including for IMT-2020 technologies
        Lead study group on 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
        Lead study group on combating counterfeiting of ICT devices
        Lead study group on combating the use of stolen ICT devices

SG12   Lead study group on quality of service and quality of experience
        Lead study group on driver distraction and voice aspects of car communications
        Lead study group on quality assessment of video communications and applications

SG13   Lead study group on future networks such as IMT-2020 networks (non-radio related parts)
        Lead study group on mobility management
        Lead study group on cloud computing
        Lead study group on trusted network infrastructures

SG15   Lead study group on access network transport
        Lead study group on home networking
        Lead study group on optical technology
        Lead study group on smart grid

SG16   Lead study group on multimedia coding, systems and applications
        Lead study group on ubiquitous multimedia applications
        Lead study group on telecommunication/ICT accessibility for persons with disabilities
        Lead study group on human factors
        Lead study group on multimedia aspects of intelligent transport system (ITS) communications
        Lead study group on Internet protocol television (IPTV) and digital signage
        Lead study group on multimedia aspects of e-services

SG17   Lead study group on security
        Lead study group on identity management
        Lead study group on languages and description techniques

SG20   Lead study group on Internet of things (IoT) and its applications
        Lead study group on smart cities and communities, including its e-services and smart services
        Lead study group for Internet of things identification

ANNEX B
(to Resolution 2 (Rev. Hammamet, 2016))

Points of guidance to ITU-T study groups for development of the post-2016 work programme

B.1   This annex provides points of guidance to study groups for the development of post-2016 study Questions in accordance with their proposed structure and general areas of responsibility. The points of guidance are intended to clarify, where appropriate, interaction between study groups in certain areas of common responsibility, and are not intended to provide a comprehensive list of such responsibilities.

B.2   This annex will be reviewed by TSAG as necessary to facilitate interaction between study groups, to minimize duplication of effort and to harmonize the overall ITU-T work programme.

ITU-T Study Group 2

ITU-T Study Group 2 is the lead study group for numbering, naming, addressing and identification (NNAI), routing and service definition (including future services or mobile services). It is responsible for creating principles of service and operational requirements, including billing and operational quality of service/network performance. Service principles and operational requirements must be developed for current and evolving technologies.

Study Group 2 is to define and describe services from a user's point of view to facilitate global interconnection and interoperation and, to the extent practicable, ensure compatibility with the International Telecommunication Regulations and related intergovernmental agreements.

Study Group 2 should continue to study service policy aspects, including those that may arise in the operation and provision of transborder, global and/or regional services, taking due account of national sovereignty.

Study Group 2 is responsible for studying, developing and recommending general principles of NNAI and routing for all types of network.

The chairman of Study Group 2 (or, if necessary, the chairman's delegated representative), in consultation with Study Group 2 participants, should provide technical advice to the Director of TSB concerning general principles for NNAI and routing and the effect on allocation of international codes.

Study Group 2 should provide the Director of TSB with advice on technical, functional and operational aspects in the assignment, reassignment and/or reclamation of international numbering and addressing resources in accordance with the relevant ITU-T E- and F-series Recommendations, taking into account the results of any ongoing studies.

Study Group 2 should recommend measures to be taken to assure operational performance of all networks (including network management) in order to meet the requisite in-service network performance and quality of service.

As the lead study group on telecommunication management, Study Group 2 is also responsible for the development and maintenance of a consistent ITU-T work plan, prepared with the cooperation of relevant ITU-T study groups, on activities associated with telecommunication management and with operations, administration and management (OAM). In particular, this work plan will focus on activities involving two types of interfaces:

- for fault, configuration, accounting, performance and security management (FCAPS) interfaces between network elements and management systems, and between management systems; and

- for transmission interfaces between network elements.

In support of market-acceptable FCAPS interface solutions, Study Group 2 studies will identify service-provider and network-operator requirements and priorities for telecommunication management, continue the evolution of the telecommunication management framework currently based on telecommunication management network (TMN), next-generation network (NGN), software-defined networking (SDN) concepts, and address the management of NGN, cloud computing, future networks (FN), SDN and IMT-2020.

Study Group 2 FCAPS interface solutions will specify reusable management information definitions via protocol-neutral techniques, continue management information modelling for the major telecommunication technologies, such as optical and IP-based networking, and extend management technology choices consistent with market needs, industry recognized value, and major, emerging technical directions.

To support the generation of such interface solutions, Study Group 2 will strengthen the collaborative relationships with standards development organizations (SDOs), forums, consortia and other experts as appropriate.

Additional studies will also cover network and service operational requirements and procedures, including support for network traffic management, support for the Service and Network Operations (SNO) group, and designations for interconnections among network operators.

Study Group 2 will hold meetings back-to-back with those of Study Group 3.

Study Group 2 will work on relevant identification aspects in collaboration with Study Group 20 for Internet of things (IoT) and with Study Group 17, as per the mandate of each study group.

ITU-T Study Group 3

ITU-T Study Group 3 should study and develop Recommendations, technical papers, handbooks and other publications for members to respond positively and proactively to the evolution of international telecommunication/ICT markets, in order to ensure that the policy and regulatory frameworks governing these markets remain relevant, for the benefit of users and the global economy, and to enable a policy environment for digital transformation.

In particular, Study Group 3 should ensure that tariffs, economic policies and regulatory frameworks are forward-looking and serve to encourage take-up and use, industry innovation and investment. Furthermore, these frameworks need to be adequately flexible to adjust to rapidly evolving markets, emerging technologies and business models, while ensuring the necessary competitive safeguards, the protection of consumers and the maintenance of trust.

In this context, the work of Study Group 3 should also consider new and emerging technologies and services so its work will help drive new economic opportunities and enhance societal benefits in different areas including healthcare, education and sustainable development.

Study Group 3 should study and develop appropriate instruments, with a view to creating an enabling policy environment for the transformation of markets and industries, through the promotion of open, innovation-driven and accountable institutions.

New services are emerging which will be provided by a combination of new and traditional operators. This is changing the international telecommunication landscape and it is therefore incumbent on Study Group 3 to develop Recommendations, handbooks and guidelines, to enhance the provision of such services, taking into account the cost of operation of networks and providing services. The financial consequences of such actions on accounting and settlement in relation to international telecommunications/ICT between service providers should be addressed by Study Group 3.

All study groups shall notify Study Group 3 at the earliest opportunity of any development that may have an impact on tariff and accounting principles and international telecommunication/ICT economic and policy issues.

ITU-T Study Group 5

ITU-T Study Group 5 will develop Recommendations, supplements and other publications related to:

- protection of ICT networks and equipment from interference, lightning and power faults;

- electromagnetic compatibility (EMC);

- the assessment of human exposure to electromagnetic fields (EMF) produced by ICT installations and devices;

- safety and implementation aspects related to ICT powering and to powering through networks and sites;

- components and application references for protection of ICT equipment and the telecommunication network;

- ICTs, circular economy, energy efficiency and climate change to achieve the Sustainable Development Goals (including the Paris Agreement, Connect 2020 Agenda, SDGs, etc.);

- study lifecycle and rare-metal recycling approaches for ICT equipment to minimize the environmental and health impact of e-waste;

- study of methodologies for assessing the environmental impact of ICT, both in terms of its own emissions, power usage and the savings created through ICT applications in other industry sectors;

- study of power-feeding methodologies that effectively reduce power consumption and resource usage, increase safety and increase global standardization for economic gains;

- study of methodologies, such as recycling, that reduce environmental effects of ICT facilities and equipment;

- setting up a low-cost sustainable ICT infrastructure to connect the unconnected;

- studies on how to use ICTs to help countries and the ICT sector to adapt and build resilience to the effects of environmental challenges, including climate change;

- environmentally sound management of e-waste and ICT eco-friendly design, including dealing with counterfeit devices;

- assessment of the sustainability impact of ICT to promote the Sustainable Development Goals.

Study Group 5 will also take care of aspects related to the deployment of new services on existing copper networks, such as the coexistence of different services from different providers in the same cable or same cable bundle and the positioning of components (e.g. surge protection components) inside the central office main distribution frame, including also the need to provide performance requirements of new copper-pair cables designed to support a higher bandwidth.

This activity is related to the continuation of studies on local loop unbundling (LLU), the continuing integration of fibre with copper, with the scope to provide all the correct technical solutions needed to assure network integrity and interoperability, the easy use of equipment and access security, in a context where operators can interact without negatively affecting the quality of service defined by regulatory and administrative issues.

The meetings of Study Group 5 and its working parties/Questions should as far as practicable be collocated with other study groups/working parties/Questions involved in the study of environment, circular economy, energy efficiency and climate change to address the Sustainable Development Goals.

ITU-T Study Group 9

Within its general area of responsibility, ITU-T Study Group 9 will develop and maintain Recommendations on:

• the use of IP or other appropriate protocols and middleware to provide time-critical services, services on demand or interactive services over cable or hybrid networks, in cooperation with other study groups where necessary;

• procedures for the operation of television and sound-programme networks;

• television and sound-programme systems for contribution and distribution networks;

• transmission systems for television, sound programmes and interactive services, including Internet applications on networks intended primarily for television;

• devices that terminate cable-TV access networks and that interface to home networks.

Study Group 9 is responsible for coordination with the ITU Radiocommunication Sector (ITU-R) on broadcasting matters.

Intersector rapporteur group activities of different Sectors and/or joint rapporteur group activities of different study groups (under a global standards initiative (GSI) or other arrangements) shall be seen as complying with the WTSA expectations for collaboration and coordination.

ITU-T Study Group 11

ITU-T Study Group 11 will develop Recommendations on the following subjects:

• network signalling and control architectures in emerging telecommunication environments (e.g. SDN, NFV, FN, cloud computing, VoLTE/ViLTE, IMT-2020 technologies, etc.);

• services and application control and signalling requirements and protocols;

• session control and signalling requirements and protocols;

• resource control and signalling requirements and protocols;

• signalling and control requirements and protocols to support attachment in emerging telecommunication environments;

• signalling and control requirements and protocols to support broadband network gateways;

• signalling and control requirements and protocols to support emerging multimedia services;

• signalling and control requirements and protocols to support emergency telecommunication services (ETS);

• signalling requirements for establishing the interconnection of packet-based networks, including VoLTE/ViLTE-based networks, IMT-2020 and beyond;

• test methodologies and test suites as well as monitoring of parameters set for emerging network technologies and their applications, including cloud computing, SDN, NFV, IoT, VoLTE/ViLTE, IMT-2020 technologies, etc., to enhance interoperability;

• conformance, interoperability testing and network/system/service testing, including benchmark testing, a testing methodology and testing specification of standardized network parameters in relation to the framework for Internet-related performance measurement, etc.;

• combating counterfeiting of ICT devices.

Study Group 11 is to lend assistance to developing countries in the preparation of technical reports and guidelines on the deployment of packet-based networks as well as emerging networks.

The development of signalling requirements, protocols and test specifications will be as follows:

• Study and develop signalling requirements;

- Develop protocols to meet the signalling requirements;

- Develop protocols to meet the signalling requirements of new services and technologies;

- Develop protocol profiles for the existing protocols;

- Study existing protocols to determine if they meet the requirements, and work with the relevant standards development organizations (SDOs) to avoid duplication and for necessary enhancements or extensions;

- Study existing open-source codes from open-source communities (OSCs) to support the implementation of ITU-T Recommendations;

- Develop signalling requirements and relevant test suites for interworking between new signalling protocols and existing ones;

- Develop signalling requirements and relevant test suites for interconnection between packet-based networks (e.g. VoLTE/ViLTE-based networks, IMT-2020 and beyond);

- Develop test methodologies and test suites for the relevant signalling protocols.

Study Group 11 is to work on enhancements to existing Recommendations on signalling protocols of legacy networks and systems, e.g. Signalling System Number 7 (SS7), digital subscriber signalling 1 and 2 (DSS1 and DSS2), etc. The objective is to satisfy business needs of member organizations that wish to offer new features and services using networks based on existing Recommendations.

Study Group 11 is to continue coordination of the ITU-T/IEC certification scheme intended to develop procedures for applying the ITU Testing Laboratories recognition procedure and establishing collaboration with existing conformance assessment programmes.

Study Group 11 is to continue its work on any test specifications for use in benchmarks testing and testing specification for standardized network parameters in relation to the framework for Internet-related measurements.

Study Group 11 is to continue its work with relevant standards organizations and forums on subject areas established by the cooperation agreement

When meeting in Geneva, Study Group 11 will hold collocated meetings with Study Group 13.

ITU-T Study Group 12

A particular focus of ITU-T Study Group 12 is on the end-to-end quality (as perceived by the customer) delivered using a path that, with increasing frequency, involves complex interactions between terminals and network technologies (e.g. mobile terminals, multiplexers, gateway and network signal processing equipment, and IP-based networks).

As the lead study group for quality of service (QoS) and quality of experience (QoE), Study Group 12 coordinates QoS and QoE activities not only within ITU-T, but also with other standards development organizations (SDOs) and forums, and develops frameworks to improve collaboration.

Study Group 12 is the parent group for the Quality of Service Development Group (QSDG); and the Regional Group of Study Group 12 on QoS for the Africa region (SG12 RG-AFR).

Examples of the work Study Group 12 plans to undertake:

- end-to-end QoS planning, focusing on all-packet networks, but also considering hybrid IP/digital circuit-based paths;

- QoS operational aspects and related interworking guidance and resource management to support QoS;

- technology-specific (e.g. IP, Ethernet, MPLS) performance guidance;

- application-specific (e.g. smart grid, IoT, M2M, HN) performance guidance;

- definition of QoE requirements and performance targets, and associated evaluation methodologies, for multimedia services;

- subjective quality assessment methodologies for new technologies (e.g. telepresence);

- quality modelling (psychophysical models, parametric models, intrusive and non-intrusive methods, opinion models) for multimedia and speech (including wideband, superwideband and fullband);

- speech quality in motor vehicle environments, and aspects of driver distraction;

- speech terminal characteristics and electro-acoustic measurement methods (including wideband, superwideband and fullband).

ITU-T Study Group 13

The key areas of competence of ITU-T Study Group 13 include:

- IMT-2020 network aspects: Studies on the requirements and capabilities for IMT-2020 networks based on the service scenarios of IMT-2020. This includes development of Recommendations on the framework and architecture design of IMT-2020 based on, but not limited to, the above-identified requirements and capabilities and the gap analysis identified by the Focus Group on IMT-2020, including also IMT-2020 network-related aspects of reliability, quality of service (QoS) and security. Furthermore, it includes interworking with current networks including IMT-Advanced, etc.

- Software-defined networking (SDN), network slicing and orchestration aspects: Studies on SDN and data plane programmability to support functions such as network virtualization and network slicing necessary for exploding and diversifying services taking into account scalability, security and distribution of functions. Development of Recommendations on the orchestration and related management-control continuum capabilities/policies of network function components, softwarized network and network slices, including enhancement and support of distributed networking capabilities.

- Open-source aspects: Study of potential utilization and guide of open-source software activities related to the scope of Study Group 13.

- Next-generation network (NGN) evolution aspects: Based on emerging advanced communication and information technologies (e.g. SDN, NFV and CDN) and related use cases, study of enhancements to NGN in terms of requirements for supporting capabilities, functional architecture and deployment models.

- Information-centric networking (ICN) and public packet telecom data network aspects: Studies related to analysis of ICN applicability to IMT-2020 and future network. Development of new Recommendations on ICN general requirements, functional architecture and mechanisms of ICN networking and use-case specific mechanisms and architectures, including identifiers. Development of Recommendations on packet data network based on the study of requirements, frameworks and candidate mechanisms. Development of Recommendations on architecture, network virtualization, resource control and other technical issues of future packet-based network (FPBN), including migration from the conventional IP-based network to FPBN.

- Fixed-mobile convergence (FMC) aspects: Studies related to access-agnostic core, which integrates fixed and mobile core. This includes the development of Recommendations on network architecture enhancements to support FMC and mobility management between fixed and mobile access.

- Knowledge-centric trustworthy networking and services aspects: Studies related to requirements and functions to support the building of trusted ICT infrastructures. Development of Recommendations regarding environmental and socio-economic awareness in order to minimize the environmental impact of future networks, including IMT-2020, as well as to reduce the barriers to entry for various actors involved in the network ecosystem.

- Cloud computing and big data aspects: Studies of the requirements, functional architectures and their capabilities, mechanisms and deployment models of cloud computing, covering inter- and intra-cloud computing as well as distributed cloud aspects. This study includes the development of technologies supporting "X as a service" (XaaS)," such as virtualization, resource and service management, reliability and security. Developing Recommendations for high-level big data requirements and general capabilities, including cloud computing based big data, big data exchange framework.

Study Group 13 activities will also cover regulatory implications, including deep packet inspection, telecommunications for disaster relief, emergency communications and lower energy consumption networks. Furthermore, it includes activities related to innovative service scenarios, deployment models and migration issues based on future networks, including IMT-2020 and trusted network.

In order to assist countries with economies in transition, developing countries and especially the least developed countries in the application of networks of the future, including IMT-2020 and other innovative technologies, Study Group 13 maintains a dedicated Question on this topic and its regional group for Africa. Consultations should thereby be enabled with representatives of the ITU Telecommunication Development Sector (ITU-D) with a view to identifying how this assistance might best be done through an appropriate activity conducted in conjunction with ITU-D.

Study Group 13 shall maintain strong cooperative relations with external standards development organizations (SDOs) and develop a complementary programme. This shall also explicitly include open-source communities. It shall proactively promote communications with external organizations to allow for normative referencing in ITU-T Recommendations of specifications developed by those organizations.

When meeting in Geneva, Study Group 13 will hold collocated meetings with Study Group 11.

Joint rapporteur group activities of different study groups (under a global standards initiative (GSI) or other arrangements) shall be seen as complying with the WTSA expectations for collocation.

ITU-T Study Group 15

ITU-T Study Group 15 is the focal point in ITU-T for the development of standards on networks, technologies and infrastructures for transport, access and home. This encompasses the development of related standards for the customer premises, access, metropolitan and long-haul sections of communication networks.

Within this framework, the study group will handle the entire range of fibre and cable performance, field deployment and installation, taking into account the need for additional specifications driven by new optical fibre technologies and new applications. The activity on field deployment and installation will address reliability, security aspects and social issues, such as the reduction of excavation, the problems caused to traffic and the generation of construction noise, and will include the investigation and standardization of new techniques allowing faster, cost-effective and safer cable installation. Planning, maintenance and management of the physical infrastructure will take into account the advantages of emerging technologies. Solutions for improving network resilience and recovery against disasters will be studied.

Particular emphasis is given to providing global standards for a high-capacity (terabit) optical transport network (OTN) infrastructure, and for high-speed (multi-Mbit/s and Gbit/s) network access and home networking. This includes the related work on modelling for network, system and equipment management, transport network architectures and layer interworking. Special consideration is being given to the changing telecommunication environment towards packet networks as part of the evolving next-generation (NGN) and future (FN) networks, including networks supporting the evolving needs of mobile communications.

Access network technologies addressed by the study group include passive optical network (PON), point-to-point optical, and copper-based digital subscriber line technologies, including ADSL, VDSL, HDSL, SHDSL and G.fast. These access technologies find application in their traditional uses as well as in backhaul and

fronthaul networks for emerging services such as broadband wireless and data centre interconnect. Home networking technologies include wired broadband, wired narrowband and wireless narrowband. Both access and home networking for smart-grid applications are supported.

Network, system and equipment features covered include routing, switching, interfaces, multiplexers, cross-connect, add/drop multiplexers, amplifiers, transceivers, repeaters, regenerators, multilayer network protection switching and restoration, operations, administration and maintenance (OAM), network synchronization for both frequency and precision time, transport resource management and control capabilities to enable increased transport network agility, resource optimization, and scalability (e.g. the application of software-defined networking (SDN) to transport networks). Many of these topics are addressed for various transport media and technologies, such as metallic and terrestrial/submarine optical fibre cables, dense and coarse wavelength division multiplexing (DWDM and CWDM) optical systems, optical transport network (OTN), including the evolution of OTN beyond 100 Gbit/s rates, Ethernet and other packet-based data services.

In its work, Study Group 15 will take into account related activities in other ITU study groups, standards development organizations (SDOs), forums and consortia, and collaborate with them to avoid duplication of effort and identify any gaps in the development of global standards.

ITU-T Study Group 16

ITU-T Study Group 16 will work on the following items:

- development of a framework and roadmaps for the harmonized and coordinated development of multimedia telecommunication standardization over wired and wireless networks to provide guidance across all ITU-T and ITU Radiocommunication Sector (ITU-R) study groups (in particular ITU-T Study Group 9 and ITU-R Study Group 6), and in close cooperation with other regional and international standards development organizations (SDOs) and industry forums; these studies will include mobility, IP and interactive broadcasting aspects; close cooperation between ITU-T and ITU-R is encouraged at all levels;
- development and maintenance of a database of existing and planned multimedia standards;
- development of multimedia end-to-end architectures, including home network environments (HNE) and vehicle gateway for intelligent transport system (ITS);
- operation of multimedia systems and applications, including interoperability, scalability and interworking over different networks;
- high-layer protocols and middleware for multimedia systems and applications, including Internet protocol television (IPTV), digital signage, ubiquitous multimedia applications and services for future networks;
- media coding and signal processing;
- multimedia and multimode terminals;
- signal processing network equipment and terminals, gateway implementations, and characteristics;
- quality of service (QoS), quality of experience (QoE) and end-to-end performance in multimedia systems;
- terminology for various multimedia services;
- security of multimedia systems and services;
- accessibility to multimedia systems and services for persons with disabilities;
- ubiquitous multimedia applications;
- multimedia aspects of e-services,
- studies on appropriate character sets, especially for non-Latin scripts and languages.

ITU-T Study Group 17

ITU-T Study Group 17 is responsible for building confidence and security in the use of information and communication technologies (ICT). This includes studies relating to security, including cybersecurity, countering spam and identity management. It also includes security architecture and framework, security management, protection of personally identifiable information (PII), and security of applications and services for the Internet of things (IoT), smart grid, smartphone, software-defined networking (SDN), Internet protocol television (IPTV), web services, social network, cloud computing, mobile financial system and telebiometrics. Study Group 17 is also responsible for the application of open system communications, including directory and object identifiers, and for technical languages, the method for their usage and other issues related to the software aspects of telecommunication systems, and for conformance testing to improve quality of Recommendations.

In the area of security, Study Group 17 is responsible for developing the core Recommendations on ICT security, such as security architecture and frameworks; the fundamentals related to cybersecurity, including threats, vulnerabilities and risks, incident handling/response and digital forensics; security management, including management of PII; and countering spam by technical means. Furthermore, Study Group 17 provides overall coordination of security work in ITU-T.

In addition, Study Group 17 is responsible for developing the core Recommendations on security aspects of applications and services in the areas of IPTV, smart grid, IoT, SDN, social network, cloud computing, big data analytics, smartphone, mobile financial system and telebiometrics.

Study Group 17 is also responsible for developing the core Recommendations on a generic identity management model that is independent of network technologies and supports the secure exchange of identity information between entities. This work also includes studying the process for discovery of authoritative sources of identity information; generic mechanisms for the bridging/interoperability of a diverse set of identity information formats; identity management threats; the mechanisms to counter these threats; the protection of personally identifiable information (PII); and the development of mechanisms to ensure that access to PII is only authorized when appropriate.

In the area of open system communication, Study Group 17 is responsible for Recommendations in the following areas:

• 	directory services and systems, including public key infrastructure (PKI) (ITU-T F.500- and ITU-T X.500-series);

• 	object identifiers (OIDs) and associated registration authorities (ITU-T X.660/ITU-T X.670-series);

• 	open systems interconnection (OSI), including Abstract Syntax Notation One (ASN.1) (ITU-T F.400-, ITU-T X.200-, ITU-T X.400-, ITU-T X.600-, ITU-T X.800-series); and

• 	open distributed processing (ODP) (ITU-T X.900-series).

In the area of languages, Study Group 17 is responsible for studies on modelling, specification and description techniques, which includes languages such as ASN.1, SDL, MSC, URN and TTCN-3.

This work will be developed in line with the requirements of and in cooperation with the relevant study groups such as Study Group 2, Study Group 9, Study Group 11, Study Group 13, Study Group 15, Study Group 16, and Study Group 20 (for IoT and SC&C security issues).

Study Group 17 will work on relevant identity management aspects in collaboration with Study Group 20 for IoT and Study Group 2, as per the mandate of each study group.

ITU-T Study Group 20

ITU-T Study Group 20 will work on the following items:

• framework and roadmaps for the harmonized and coordinated development of Internet of things (IoT), including machine-to-machine (M2M) communications, ubiquitous sensor networks and smart sustainable cities, in ITU-T and in close cooperation with the ITU Radiocommunication Sector (ITU-R) and ITU Telecommunication Development (ITU-D) study groups and other regional and international standards organizations and industry forums;

• requirements and capabilities of IoT and its applications including smart cities and communities (SC&C);

• definitions and terminology for IoT;

• IoT and SC&C infrastructure and services, including architecture framework and requirements of IoT for SC&C;

• efficient service analysis and infrastructure of IoT use in SC&C to assess how the use of IoT has an impact on the smartness of cities;

• guidelines, methodologies and best practices related to standards to help cities (including rural areas and villages) deliver services using IoT, with an initial view to address city challenges;

• IoT end-to-end architectures;

• identification of aspects of IoT in collaboration with Study Group 2 and Study Group 17, as per the mandate of each study group;

• data sets that will enable data interoperability for various verticals, including smart cities, e-agriculture, etc.;

• high-layer protocols and middleware for IoT systems and applications including SC&C;

• middleware for interoperability between IoT applications for different IoT verticals;

• quality of service (QoS) and end-to-end performance for IoT and its applications including SC&C;

• security, privacy[4] and trust[4] of IoT and SC&C systems, services and applications;

• database maintenance of existing and planned IoT standards;

• big data aspects of IoT and SC&C;

• e-services and smart services for SC&C;

• IoT and SC&C data analytics and intelligent control.

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[4] Some relevant aspects of this term may be considered differently from one Member State to another. The use of this term is framed in terms of international telecommunication standardization.

ANNEX C
(to Resolution 2 (Rev. Hammamet, 2016))

List of Recommendations under the responsibility of the respective ITU-T study groups and TSAG in the 2017-2020 study period

ITU-T Study Group 2

ITU-T E-series, except those in conjunction with Study Group 17 or under the responsibility of Study Groups 12 and 16

ITU-T F-series, except those under the responsibility of Study Groups 13, 16 and 17

Recommendations of the ITU-T I.220-, ITU-T I.230-, ITU-T I.240-, ITU-T I.250-series and ITU-T I.750-series

ITU-T G.850-series

ITU-T M-series

ITU-T O.220-series

ITU-T Q.513, ITU-T Q.800 – ITU-T Q.849, ITU-T Q.940-series

Maintenance of the ITU-T S-series

ITU-T V.51/M.729

ITU-T X.160-, ITU-T X.170-, ITU-T X.700-series

ITU-T Z.300-series

ITU-T Study Group 3

ITU-T D-series

ITU-T Study Group 5

ITU-T K-series

ITU-T L.1 – ITU-T L.9, ITU-T L.18 – ITU-T L.24, ITU-T L.32, ITU-T L.33, ITU-T L.71, ITU-T L.75, ITU-T L.76, ITU-T L.1000-series

ITU-T Study Group 9

ITU-T J-series, except those under the responsibility of Study Groups 12 and 15

ITU-T N-series

ITU-T Study Group 11

ITU-T Q-series, except those under the responsibility of Study Groups 2, 13, 15, 16 and 20

Maintenance of the ITU-T U-series

ITU-T X.290-series (except ITU-T X.292) and ITU-T X.600 – ITU-T X.609

ITU-T Z.500-series

ITU-T Study Group 12

ITU-T E.420 – ITU-T E.479, ITU-T E.800 – ITU-T E.859

ITU-T G.100-series, except ITU-T G.160- and ITU-T G.180-series

ITU-T G.1000-series

ITU-T I.350-series (including ITU-T G.820/I.351/Y.1501), ITU-T I.371, ITU-T I.378, ITU-T I.381

ITU-T J.140-, ITU-T J.240- and ITU-T J.340-series

ITU-T P-series

ITU-T Y.1220-, ITU-T Y.1530-, ITU-T Y.1540-, ITU-T Y.1560-series

ITU-T Study Group 13

ITU-T F.600-series

ITU-T G.801, ITU-T G.802, ITU-T G.860-series

ITU-T I-series, except those under the responsibility of Study Groups 2, 12 and 15, and those having double/triple numbering in other series

ITU-T Q.933, ITU-T Q.933*bis*, ITU-T Q.10xx-series and ITU-T Q.1700-series

ITU-T X.1 – ITU-T X.25, ITU-T X.28 – ITU-T X.49, ITU-T X.60 – ITU-T X.84, ITU-T X.90 – ITU-T X.159, ITU-T X.180 – ITU-T X.199, ITU-T X.272, ITU-T X.300-series

ITU-T Y-series, except those under the responsibility of Study Groups 12, 15, 16 and 20

ITU-T Study Group 15

ITU-T G-series, except those under the responsibility of Study Groups 2, 12, 13 and 16

ITU-T I.326, ITU-T I.414, ITU-T I.430-series, ITU-T I.600-series and ITU-T I.700-series, except ITU-T I.750-series

ITU-T J.190 and ITU-T J.192

ITU-T L-series, except those under the responsibility of Study Group 5

ITU-T O-series (including ITU-T O.41/ITU-T P.53), except those under the responsibility of Study Group 2

ITU-T Q.49/O.22 and ITU-T Q.500-series, except ITU-T Q.513

Maintenance of the ITU-T R-series

ITU-T X.50-series, ITU-T X.85/ Y.1321, ITU-T X.86/ Y.1323, ITU-T X.87/Y.1324

ITU-T V.38, ITU-T V.55/ O.71, ITU-T V.300

ITU-T Y.1300 – ITU-T Y.1309, ITU-T Y.1320 – ITU-T Y.1399, ITU-T Y.1501 and ITU-T Y.1700-series

ITU-T Study Group 16

ITU-T E.120 – ITU-T E.139 (except ITU-T E.129), ITU-T E.161, ITU-T E.180-series, ITU-T E.330-series, ITU-T E.340-series

ITU-T F.700-series, except those under the responsibility of Study Group 20, and ITU-T F.900-series

ITU-T G.160-series, ITU-T G.710 – ITU-T G.729 (except ITU-T G.712), ITU-T G.760-series (including ITU-T G.769/Y.1242), ITU-T G.776.1, ITU-T G.799.1/ Y.1451.1, ITU-T G.799.2, ITU-T G.799.3

ITU-T H-series, except those under the responsibility of Study Group 20

ITU-T T-series

ITU-T Q.50-series, ITU-T Q.115-series

ITU-T V-series, except those under the responsibility of Study Groups 2 and 15

ITU-T X.26/V.10 and ITU-T X.27/V.11

ITU-T Study Group 17

ITU-T E.104, ITU-T E.115, ITU-T E.409 (in conjunction with Study Group 2)

ITU-T F.400-series; ITU-T F.500 – ITU-T F.549

ITU-T X-series, except those under the responsibility of Study Groups 2, 11, 13, 15 and 16

ITU-T Z-series, except ITU-T Z.300-series and ITU-T Z.500-series

ITU-T Study Group 20

ITU-T F.744, ITU-T F.747.1 – ITU-T F.747.8, ITU-T F.748.0 – ITU-T F.748.5 and ITU-T F.771

ITU-T H.621, ITU-T H.623, ITU-T H.641, ITU-T H.642.1, ITU-T H.642.2 and ITU-T H.642.3

ITU-T Q.3052

ITU-T Y.4000-series, ITU-T Y.2016, ITU-T Y.2026, ITU-T Y.2060 – ITU-T Y.2070, ITU-T Y.2074 – ITU-T Y.2078, ITU-T Y.2213, ITU-T Y.2221, ITU-T Y.2238, ITU-T Y.2281 and ITU-T Y.2291

NOTE – Recommendations transferred from other study groups have double numbers in the Y.4000-series.

TSAG

ITU-T A-series Recommendations