

WORLD TELECOMMUNICATION STANDARDIZATION
ASSEMBLY
New Delhi, 15-24 October 2024

Resolution 2 – Scope and mandate of the ITU Telecommunication Standardization Sector study groups



FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, and 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.

RESOLUTION 2 (Rev. New Delhi, 2024)

Scope and mandate of the ITU Telecommunication Standardization Sector study groups

(Helsinki, 1993; Geneva, 1996; Montreal, 2000; Florianópolis, 2004; Johannesburg, 2008; 2009¹; Dubai, 2012; 2015²; 2016³; Hammamet, 2016; Geneva, 2022; New Delhi, 2024⁴)

The World Telecommunication Standardization Assembly (New Delhi, 2024),

recognizing

- a) that the ITU Telecommunication Standardization Sector (ITU-T) is entitled to study and develop outputs on technical, economic and policy issues related to the telecommunication/information and communication technology (ICT) field, as stated in Articles 17, 18, 19 and 20 of the ITU Constitution and Articles 13, 14, 14A, 15 and 20 of the ITU Convention;
- b) relevant resolutions of the ITU Plenipotentiary Conference which mandate ITU-T to study and develop outputs, including Recommendations, in many areas;
- c) that new and emerging technologies will have a noticeable impact on telecommunications/ICTs;
- d) the resolutions adopted by this assembly, which contain many instructions and implications for the work of the relevant ITU-T study groups,

considering

- a) that the mandate for each ITU-T study group needs to be clearly defined in order to ensure the coherence of the overall work programme of ITU-T and to minimize duplication of studies undertaken by ITU-T and by the other Sectors;
- b) that ITU-T has to evolve in order to stay relevant to the changing telecommunication environment and to its membership's interests;
- c) that collocation of study group, working party or rapporteur group meetings has also been a means to minimize duplication of work and to improve efficiency of work;
- 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),

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.

⁴ Consolidation of ITU-T Study Groups 9 and 16 into ITU-T Study Group 21.

resolves

- 1 that the mandate of each ITU-T study group, which it shall use as the basis for organizing its study programme, taking into account *recognizing a), b), c) and d)* above, shall consist of:
 - a general area of responsibility, as set out in Annex A to this resolution, within which the study group may develop new ITU-T Recommendations and amend existing ITU-T Recommendations, in collaboration with other groups, as appropriate; and
 - 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. Geneva, 2022) of WTSA);
- 2 to encourage the ITU-T 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;
- 3 that the ITU-T study groups should consider the outputs and materials of the other two Sectors and the ITU Council relevant to a study group's terms of reference;
- 4 ITU-T study groups should collaborate with other ITU groups on issues of mutual interest;
- 5 to encourage ITU-T study groups to conduct work on how to ensure wider implementation of ITU-T Recommendations at the national level in collaboration with the study groups of the ITU Telecommunication Development Sector.

ANNEX A

(to Resolution 2 (Rev. New Delhi, 2024))

PART 1 – GENERAL AREAS OF STUDY

ITU-T Study Group 2

Operational aspects of telecommunications and ICTs

ITU-T Study Group 2 is responsible for studies relating to operational aspects of telecommunications and ICTs, which include studies related to procedures, actions or processes to manage telecommunication/ICT services and networks. This comprehensive endeavour, which considers ongoing coordination within ITU-T and with other standards-development organizations, encompasses the following aspects:

- international telecommunication/ICT numbering, naming, addressing and identification (NNAI) resources;
- the deployment of NNAI requirements, along with resource allocation and management, incorporating criteria and procedures for reservation, assignment and reclamation; additionally, there is a focus on the evolution and specification of NNAI requirements and resource assignment for future telecommunication/ICT architectures, capabilities, applications and services;
- the principles governing the administration of international NNAI resources;
- the principles of service provision, definition and operational requirements for both current and future telecommunication/ICT architectures, capabilities, applications and services;
- the operational impact of factors, such as the Internet, convergence (services or infrastructure), quality of service (QoS), and emerging services, such as over-the-top (OTT), on international telecommunication services and networks;
- both operational and managerial dimensions of networks, such as network traffic management, designations and transport-related operational procedures; the systematic evaluation of feedback from operators, manufacturing entities and users, spanning various facets of network operation; the management of forthcoming telecommunication/ICT architectures, capabilities, applications and services; and the evolution of the management interface specification methodology and the specification of interfaces for management systems, which are crucial for supporting the communication of identity information within or between organizational domains;
- interworking, by developing the scope, principles and operational facets of routing, interworking, number portability, billing and carrier switching; the operational aspects of interworking between conventional telecommunication networks and continually evolving telecommunication/ICT architectures, capabilities, applications and services;
- telecommunications for disaster relief by leading ITU's work on developing standards in support of telecommunications for disaster relief/early warning, network resilience and recovery, such as with Recommendation ITU-T E.106, on international emergency preference scheme for disaster relief operations, which specifies means of prioritizing calls in disaster situations, ensuring that telecommunication networks remain available for urgent communications by clearing non-urgent calls;
- emergency telecommunication service provision.

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 timely development of enabling regulatory models and frameworks for universal connectivity and sustainable digital transformation. To this end, ITU-T Study Group 3 shall foster collaboration among its participants with a view to promoting affordable rates through service competition and with due consideration to cost modelling. Additionally, ITU-T Study Group 3 will study the economic impact and the policy and regulatory aspects of the Internet, new and emerging technologies, convergence (services or infrastructure) and new services, such as over-the-top (OTT), pertaining to international telecommunication/ICT services and networks.

ITU-T Study Group 5

Environment, climate action, circular economy and electromagnetic fields

ITU-T Study Group 5 is responsible for the development of standards on the environmental aspects of telecommunications/ICTs (including new and emerging) and protection of the environment, including electromagnetic phenomena and climate change.

ITU-T Study Group 5 will study how these telecommunications/ICTs and digital transformation can be shaped to ensure they support transitions towards more sustainable societies.

ITU-T Study Group 5 will also study issues related to resistibility, human exposure to electromagnetic fields (EMF), circular economy, energy efficiency and climate-change adaptation and mitigation. It will develop international standards (ITU-T Recommendations), supplements and technical reports that support the sustainable use and deployment of new and emerging telecommunications/ICTs. Additionally, it will evaluate the environmental performance, including impacts on environment, climate and biodiversity, of new and emerging telecommunications/ICTs.

ITU-T Study Group 5 is also responsible for studying design methodologies and frameworks to reduce the volume and adverse environmental effects of e-waste and to support the transition towards a circular economy.

ITU-T Study Group 5 will also develop international standards (ITU-T Recommendations), supplements and technical reports to use the enablement effect of telecommunications/ICTs to reduce the climate impact of other sectors (e.g. energy, manufacturing, transportation and construction). Additionally, it will study evaluation metrics and methods for a sustainable digital transition, focusing on industries with high greenhouse gas emissions.

ITU-T Study Group 5 has an extended role in evaluating the impact of ICTs in accelerating climate-change adaptation and mitigation actions, particularly in industries (including the ICT sector), cities, rural areas and communities. To this end, it is also working to develop standards and guidelines for building resilient ICT infrastructures and to develop assessment methodologies for the trajectories of the ICT sector in connection with the United Nations 2030 Agenda for Sustainable Development and the Paris Agreement under the United Nations Framework Convention on Climate Change.

In addition to its climate-focused activities, ITU-T Study Group 5 has five other important objectives:

- 1) to protect ICTs (including telecommunication equipment and installations) against damage and malfunction due to electromagnetic phenomena, such as lightning, as well as from particle radiations;
- 2) to ensure the safety of personnel and users of networks in relation to electrical hazards existing in telecommunication/ICT networks;
- 3) to improve confidence in the use of radio frequencies by developing standards to assess EMF levels and to verify compliance with the World Health Organization recommended human exposure guidelines and limits;
- 4) to enhance the reliability and safety of telecommunication/ICT networks, by providing requirements on resistibility and electromagnetic compatibility, and addressing the effect of particle radiation;
- 5) to ensure that the functionality of telecommunication/ICT equipment is not compromised by electromagnetic interference related to radiated and conducted disturbances emitted by other electrical or communication systems.

ITU-T Study Group 5 is responsible for studies on how to use new and emerging telecommunications/ICTs to tackle environmental challenges in line with the Sustainable Development Goals (SDGs).

ITU-T Study Group 11

Signalling requirements, protocols, test specifications and combating counterfeit telecommunication/ICT devices

ITU-T Study Group 11 has been assigned responsibility for studies related to signalling-system architecture, signalling requirements and protocols, for all types of networks such as future networks (FN), cloud-computing networks, VoLTE/ViLTE/VoNR/ViNR-based network interconnection, virtual networks, multimedia, next-generation networks (NGNs), signalling for legacy network interworking, satellite-terrestrial networks, software-defined networking (SDN) technologies, network function virtualization (NFV) technologies, International Mobile Telecommunications (IMT) systems, including IMT-2030 networks (non-radio part), quantum key distribution network (QKDN) and related technologies, and augmented reality.

ITU-T Study Group 11 is also responsible for studies to combat counterfeiting, tampering and theft of telecommunication/ICT devices, counterfeiting and tampering of telecommunication/ICT software and the negative impacts of these issues.

ITU-T 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 and emerging technologies.

In addition, ITU-T Study Group 11 maintains and improves 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 ITU-T 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 and emerging network technologies

ITU-T Study Group 13 is responsible for studies relating to the requirements, architectures, capabilities and application programming interfaces (APIs), softwarization, orchestration and the use of artificial intelligence (AI), including machine learning of future networks (FN). It develops standards related to information-centric networking (ICN). Regarding International Mobile Telecommunications (IMT) systems, including IMT-2030, it particularly focuses on the non-radio part. The responsibility of ITU-T Study Group 13 also includes project coordination on future networks (FNs) across all ITU-T study groups and release planning. Moreover, it includes the study on the integration of computing and networking from the viewpoint of future networks.

ITU-T Study Group 13 is also responsible for studies relating to future computing, including cloud computing and data handling in telecommunication networks. This covers capabilities and technologies from the network side to support data utilization, exchange, sharing and data quality assessment, and also end-to-end awareness, control and management of future computing, including cloud, cloud security and data handling.

ITU-T Study Group 13 studies aspects relating to fixed, mobile and satellite convergence for multi-access networks, including various ways to manage them, and enhancements to existing ITU-T Recommendations on mobile communications, including the energy-saving aspects.

ITU-T Study Group 13 develops standards for quantum networks and their related technologies including networking aspects of quantum key distribution networks (QKDN).

ITU-T Study Group 13 further studies 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. In this context, digital asset treatment over future networks is also a study target.

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 17

Security

ITU-T Study Group 17 is responsible for developing international standards to enhance confidence, security and trust in the use of telecommunications/ICTs, in the context of an ever-growing attack surface and confronted with an unbalanced threat landscape.

While providing security by ICTs and ensuring security for ICTs are both major study areas for ITU-T Study Group 17, it is recognized that the other ITU-T study groups may study security aspects within their mandates.

The increase of compliance requirements and the ongoing coordination between ITU-T Study Group 17 and the other ITU-T study groups, as well as other standards-development organizations, require a comprehensive and transformative approach to consider the following areas.

Security model, framework, architecture and lifecycle: this includes studies of cybersecurity, wholistic security approaches spanning development, deployment and operation phases, managed security services and security automation. In particular, it delves into both security models, such as zero trust for network infrastructure, and, at the same time, supply chain security, especially concerning software.

Cybersecurity and service: this includes adapting to the evolving threat landscape (targeted attacks and ransomware); understanding the characteristics of emerging malware types; addressing and managing cybersecurity incidents; identifying security requirements and core cybersecurity solutions; exchanging threat intelligence; combating spam; endpoint detection and response; and developing new simulation and prediction capabilities. It also includes services and their organizations, such as the development of cybersecurity centres, incident response teams and managed security services.

Security management: this includes information-security management, identity solutions and management, authentication mechanisms and telebiometrics, all stimulated by new and emerging security technologies.

It also includes studying appropriate technical standardization solutions for child online protection.

End-device, edge, network, cloud and application security: this addresses security in the context of end-devices, edge, networks, cloud, applications and services, which is of paramount importance. It considers aspects of endpoint security; smart devices and Internet of Things (IoT) devices; networks ranging from IMT-2020/5G and beyond and IMT-2030/6G; and intelligent transport system security, which extends to vehicle-to-vehicle (V2X) communication and autonomous driving. Additionally, it also considers multifaceted approaches of security for smart cities and communities, verticals including smart grid, smart factory and digital health, industrial control systems (ICS), terrestrial-satellite and satellite-satellite network convergence, the radio navigation satellite service (RNSS), the automatic identification system (AIS), software-defined networking (SDN), network function virtualization (NFV), Internet Protocol television (IPTV), web services, over-the-top (OTT), metaverse, digital twin technology, cloud computing, in-network computing, big data analytics and digital financial services (DFS).

Data protection techniques: in the pursuit of building confidence, security and trust in the use of telecommunications/ICTs, ITU-T Study Group 17 is deeply involved in safeguarding sensitive data, including protecting personally identifiable information (PII). This involves various technical and operational aspects of data protection using federated learning, synthetic data generation, differential privacy and data masking, to ensure confidentiality, integrity and availability of PII.

New and emerging security technologies: this includes studying how artificial intelligence (AI) can bolster security measures, how secure AI systems and AI-based applications can be achieved in support of telecommunications/ICTs, how to counteract the growing threat landscape fuelled by AI advances, including addressing unintended consequences of generative AI, quantum-based security, including quantum key distribution (QKD) and the use of post-quantum cryptography (PQC) algorithms. It also examines security considerations related to distributed ledger technology (DLT), and also the utilization of cryptographic schemes and protocols, such as homomorphic algorithms, zero-knowledge proofs, and secure multi-party computation (MPC).

Open systems interconnection (OSI) and technical languages: ITU-T Study Group 17 is also responsible for the application of OSI, which includes managing directories and object identifiers, such as public key infrastructure (PKI) and distributed PKI (DPKI). It extends to addressing technical languages such as Abstract Syntax Notation One (ASN.1) and the use of JavaScript Object Notation (JSON). Ensuring proper methods for their application and addressing software-related issues in telecommunication systems is a key focus. Additionally, it encompasses enhancing ITU-T Recommendations in support of conformance testing.

ITU-T Study Group 20

Internet of Things, digital twins and smart sustainable cities and communities

ITU-T Study Group 20 is responsible for the development of innovative standards (ITU-T Recommendations), guidelines, reports, methodologies and best practices for the Internet of Things (IoT), digital twins, metaverse and smart sustainable cities and communities (SSC&C), with the goal of accelerating digital transformation in both urban and rural areas. This includes studies on digital services, SSC&C applications, systems and services, interoperability and interworking, digital twins, requirements, capabilities and architectural frameworks of IoT and SSC&C across verticals, and human-centric approaches enabled by IoT and SSC&C, in particular in digital health, accessibility and inclusion.

Additionally, ITU-T Study Group 20 addresses architectures, functionalities and protocols in applications of verticals and infrastructures of IoT and SSC&C, decentralized/distributed IoT and data analytics, data sharing, data processing and management, including big data aspects of IoT and SSC&C. The study group also focuses on terminology and definitions, the study and research of emerging digital technologies (e.g. metaverse and artificial intelligence), security, privacy, trustworthiness and identification of IoT and SSC&C, and also the evaluation and assessment of SSC&C and related digital services.

By developing robust standards and best practices, ITU-T Study Group 20 aims to foster global innovation for IoT and SSC&C in line with the Sustainable Development Goals.

ITU-T Study Group 21

Technologies for multimedia, content delivery and cable television

ITU-T Study Group 21 is responsible for studies relating to multimedia technologies, capabilities, systems, applications and services for existing and future networks, including Internet Protocol (IP)-based and cable-based networks.

This encompasses studies relating to:

- ICTs for multimedia systems, applications, services, terminals and delivery platforms; accessibility for digital inclusion; ICTs for active assisted living; human interfaces; multimedia aspects of distributed ledger technologies (DLTs); media and signal coding and systems; digital multimedia services to support various verticals (e.g. digital health, digital culture and mobility); and multimedia aspects of metaverse-related issues;
- use of telecommunication systems for: a) contribution, primary distribution and secondary distribution of audiovisual content (including television programmes and related data services, and advanced capabilities, e.g. ultra-high definition, high-dynamic range); and b) multimedia applications providing immersive experiences, virtual reality, augmented reality and multiview, including 3D (stereoscopy type and holographic type);

- use of telecommunication networks, e.g. coaxial cable, optical fibre, hybrid fibre-coaxial cable and IP networks, to also provide integrated broadband services including interconnection with other types of networks such as fixed wireless access networks (e.g. radio local access network, private International Mobile Telecommunications-2020 (IMT-2020) network and beyond);

NOTE 1 – Private IMT-2020 network is intended to refer to private wireless networks specifically designed for supplementing a cable television access network;

NOTE 2 – The cable network, primarily designed for audiovisual content delivery to the home, also carries time-critical services, such as voice, gaming, video-on-demand, interactive and multiscreen services, to customer premises equipment in the home or enterprise;

- use of cloud computing, artificial intelligence (AI) and other advanced technologies to enhance multimedia applications and services and integrated broadband services over telecommunication networks.

NOTE 3 – When ITU-T Study Group 16 was created in 1996, one of its mandates was to continue ITU-T Study Group 1's studies on multimedia services. Accordingly, references to "services" in the context of ITU-T Study Group 21's mandate are to be understood as "multimedia services".

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

- | | |
|-----|---|
| SG2 | Lead study group on numbering, naming, addressing and identification
Lead study group on administration of international numbering, naming, addressing and identification resources
Lead study group on routing and interworking
Lead study group on number portability and carrier switching
Lead study group on operational aspects of telecommunication/ICT capabilities and applications
Lead study group on telecommunication/ICT service definition
Lead study group on telecommunications/ICTs for disaster relief/early warning, network resilience and recovery
Lead study group on emergency services provision, definition and deployment
Lead study group on telecommunication/ICT management
Lead study group on operational aspects of identity management
Lead study group on operational aspects of Internet of Things identification |
| SG3 | Lead study group on tariff and accounting principles relating to international telecommunications/ICTs
Lead study group on economic issues relating to international telecommunications/ICTs
Lead study group on policy issues relating to international telecommunications/ICTs |
| SG5 | Lead study group on electromagnetic compatibility (EMC), resistibility and lightning protection
Lead study group on soft error caused by particle radiations
Lead study group on human exposure to electromagnetic fields (EMF)
Lead study group on circular economy and e-waste management
Lead study group on ICTs related to the environment, energy efficiency, clean energy and sustainable digitalization for climate actions |

- SG11 Lead study group on signalling and protocols
 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 and tampering 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 performance and quality assessment of speech and multimedia communication systems, including vehicle communication systems
 Lead study group on video quality assessment of communications, applications and system components
- SG13 Lead study group on future networks, such as IMT systems, including IMT-2030 networks (non-radio part)
 Lead study group on fixed, mobile and satellite convergence
 Lead study group on computing, including cloud computing and data handling
 Lead study group on artificial intelligence, including machine learning for future networks
- SG15 Lead study group on access network transport
 Lead study group on home networking
 Lead study group on optical technology
- SG17 Lead study group on security
 Lead study group on identity management
 Lead study group on directory, public key infrastructure (PKI), formal languages and object identifiers
- SG20 Lead study group on the Internet of Things and its applications
 Lead study group on smart sustainable cities and communities and related digital services, including effective energy management, digital twins and citiverse
 Lead study group for Internet of Things identification
 Lead study group on digital health related to the Internet of Things and smart sustainable cities and communities
- SG21 Lead study group on multimedia technologies, applications, systems and services
 Lead study group on integrated broadband cable networks
 Lead study group on audiovisual content processing and delivery over multimedia distribution systems, including cable networks, IP-based television services and digital signage
 Lead study group on human factors and ICT accessibility for digital inclusion
 Lead study group on multimedia aspects of automotive-related intelligent services
 Lead study group on multimedia aspects of digital health
 Lead study group on digital culture
 Lead study group on multimedia aspects of distributed ledger technology (DLT) and its applications
 Lead study group on immersive multimedia technologies, including metaverse

ANNEX B
(to Resolution 2 (Rev. New Delhi, 2024))

**Points of guidance to ITU-T study groups for the development
of the post-2024 work programme**

B.1 This annex provides points of guidance to study groups of the ITU Telecommunication Standardization Sector (ITU-T) for the development of post-2024 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 the Telecommunication Standardization Advisory Group (TSAG) as necessary to facilitate interaction between study groups, minimize duplication of effort and harmonize the overall ITU-T work programme.

ITU-T Study Group 2

ITU-T Study Group 2 is the lead study group for operational aspects of telecommunications/ICTs including numbering, naming, addressing and identification (NNAI), service provisioning, network management, interworking and disaster relief (see Annex A). ITU-T Study Group 2 will continue to be responsible for creating principles of service and operational requirements, including NNAI aspects, for current and evolving telecommunication/ICT architectures, capabilities, applications, networks and services. This includes reviewing the output of other ITU-T study groups where such output is the responsibility of ITU-T Study Group 2, or impacts the responsibilities of ITU-T Study Group 2, as identified in part 2 of Annex A to this resolution.

ITU-T Study Group 2 is responsible for studying, developing and recommending:

- general principles of NNAI;
- routing for all types of future and evolving telecommunication/ICT architectures, capabilities, applications and services, which encompasses operational aspects relating to end-to-end routing for all types of current and future networks;
- general principles and operational aspects related to interworking, number portability and carrier switching;
- services and capabilities 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, taking due account of national sovereignty;
- development of requirements for registrars and operating agencies (operators) which maintain NNAI resource databases and coordination with international registrars and operators of such databases;
- measures to be taken to ensure operational performance of all networks (including network management) to meet the requisite in-service network performance and quality of service;
- identify service-provider and network-operator requirements and priorities for fault, configuration, accounting, performance and security management (FCAPS) interfaces between network elements and management systems, and between management systems; transmission interfaces between network elements;

- priorities for telecommunication/ICT network management, including management framework currently based on telecommunication management network (TMN), next-generation network (NGN), software-defined networking (SDN) and network function virtualization (NFV), and IMT-2020 and beyond concepts, and addressing the management of NGN;
- priorities for operational aspects of new and emerging telecommunication/ICT architectures, capabilities, applications and services, including cloud computing and distributed ledger technology (DLT);
- FCAPS interface solutions that 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; and
- 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.

ITU-T Study Group 2 will work on relevant identification and operational aspects in collaboration with other ITU-T study groups as per the mandate of each study group and will strengthen the collaborative relationships with standards-development organizations, forums, consortia and other experts as appropriate in support of activity on telecommunication/ICT management.

The chair of ITU-T Study Group 2 (or, if necessary, the chair's delegated representative), and the designated advisers through the Numbering Coordination Team (NCT), shall provide technical advice to the Director of the Telecommunication Standardization Bureau (TSB) concerning general principles for NNAI, allocation, assignment, reassignment, management and/or reclamation of international NNAI assigned resources and routing, and the effect on the allocation of NNAI resources. Such advice will be in accordance with the relevant ITU-T e- and F-series Recommendations, taking into account the results of any ongoing studies, or requests raised by NCT.

ITU-T Study Group 3

ITU-T Study Group 3 should study, review and/or develop ITU-T Recommendations and technical reports/papers, handbooks and other non-normative publications for members to respond positively and proactively to the development of international telecommunication/ICT markets, to ensure that policy and regulatory frameworks remain supportive of innovation, competition and investment, for the inclusive benefit of users and the global economy.

In particular, ITU-T Study Group 3 should ensure that tariffs, economic policies and regulatory frameworks related to international telecommunication/ICT services and networks are forward-looking and serve to encourage service uptake and use, as well as industry innovation and investment. Furthermore, these frameworks need to be adequately flexible to adjust to rapidly evolving markets, distinct circumstances of individual Member States, technologies and business models, while ensuring the necessary competitive safeguards and the protection of consumers.

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

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

All study groups shall notify ITU-T 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 ITU-T Recommendations, supplements and other publications to:

- study the environmental performance of new and emerging telecommunications/ICTs and their effects on climate change and biodiversity and other environmental impacts;
- accelerate climate-change adaptation and mitigation actions through the use of telecommunications/ICTs (including new and emerging technologies);
- study the environmental aspects of new and emerging telecommunications/ICTs, including issues related to electromagnetic fields (EMF), electromagnetic compatibility (EMC), energy feeding and efficiency, and resistibility;
- play an active role in reducing the volume of e-waste and facilitate its management, in order to enhance the transition to a circular economy;
- study lifecycle and rare-metal recycling approaches for ICT equipment to minimize the environmental and health impact of e-waste;
- achieve energy efficiency and sustainable clean energy use in new and emerging telecommunications/ICTs, including, but not limited to, labelling, procurement practices, standardized power supplies/connectors and eco-rating schemes;
- build resilient and sustainable ICT infrastructures in urban and rural areas, as well as in cities and communities;
- study the role of ICTs and new and emerging telecommunications/ICTs in climate-change adaptation and mitigation;
- reduce the volume of e-waste and its environmental impacts (including the environmental impact of counterfeit devices);
- study the transition to a circular economy and implementing circular actions in cities;
- study the role of new and emerging telecommunications/ICTs to achieve Net Zero within the ICT sector and other sectors, as well as in cities;
- develop methodologies for assessing the environmental impact of new and emerging telecommunications/ICTs;
- develop standards and guidelines for using new and emerging telecommunications/ICTs in an eco-friendly way and enhancing rare-metal recycling and energy efficiency of ICTs, including infrastructures/facilities;
- develop standards, guidelines and metrics/key performance indicators (KPIs) for aligning the environmental performance of the ICT sector and new and emerging telecommunications/ICTs with the United Nations 2030 Agenda for Sustainable Development, the Paris Agreement under the United Nations Framework Convention on Climate Change and the Connect 2030 Agenda;
- develop energy efficiency/performance metrics/KPIs and related measurement methodologies for new and emerging telecommunications/ICTs, including infrastructures and facilities;
- develop tools and guidance on proper, effective and simple communication to reach out to the general public on environmental issues, including EMF, EMC, resistibility, climate-change adaptation and mitigation, etc.;

- study methodologies for assessing the environmental impact of ICTs, in terms of both its own emissions and power usage and the savings created through ICT applications in other industry sectors;
- study power-feeding methodologies that effectively reduce power consumption and resource usage, increase safety and increase global standardization for economic gains;
- set up a low-cost sustainable ICT infrastructure to connect the unconnected;
- study 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;
- assess the sustainability impact of ICTs to promote the Sustainable Development Goals (SDGs);
- study the protection of ICT networks and equipment from interference, lightning and power faults;
- develop standards related to the assessment of human exposure to EMF produced by ICT installations and devices;
- develop standards related to safety and implementation aspects related to ICT powering and to powering through networks and sites;
- develop standards related to components and application references for protection of ICT equipment and the telecommunication network;
- develop standards related to EMC, particle radiation effects, and assessment of human exposure to EMF produced by ICT installations and devices, including cellular phones, IoT devices and radio base stations;
- develop standards on the re-utilization of the existing copper network outside plant and related indoor installations; and
- develop standards to guarantee good reliability and low latency for high-speed network services by providing requirements on resistibility and EMC.

The meetings of ITU-T 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 SDGs.

ITU-T Study Group 11

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

- network signalling and control architectures in existing and emerging telecommunication environments (e.g. software-defined networking (SDN), network function virtualization (NFV), future networks (FN), cloud computing, VoLTE/ViLTE/VoNR/ViNR, International Mobile Telecommunications (IMT) systems, including IMT-2030 networks (non-radio part), quantum key distribution networks (QKDN) and related technologies, etc.);
- signalling requirements and protocols for services and applications;
- security of signalling 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, including those for metaverse;
- 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/VoNR/ViNR-based networks, IMT systems including IMT-2030 networks (non-radio part);
- test methodologies and test suites as well as monitoring of parameters set for emerging network technologies and their applications, including cloud computing, SDN, NFV, Internet of Things, VoLTE/ViLTE, IMT systems, including IMT-2030 networks (non-radio part), etc., to enhance interoperability;
- conformance, interoperability testing and network/system/service/device 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 and tampering of ICT devices; and
- combating the use of stolen ICT devices.

ITU-T Study Group 11 is to lend assistance to developing countries⁵ 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, including those for metaverse;
- 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 to avoid duplication and for necessary enhancements or extensions;
- study existing open-source codes from open-source communities 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/VoNR/ViNR-based networks, IMT systems including IMT-2030 networks (non-radio part); and
- develop test methodologies and test suites for the relevant signalling protocols.

ITU-T Study Group 11 will collaborate with ITU-T Study Group 17 on security matters.

ITU-T Study Group 11 is to work on enhancements to existing ITU-T Recommendations on signalling protocols of legacy networks and new networks to ensure signalling security. The objective is to satisfy business needs of member organizations that wish to offer new features and services using networks based on existing ITU-T Recommendations.

ITU-T Study Group 11 is to continue coordination with the International Laboratory Accreditation Cooperation (ILAC) on the ITU Testing Laboratories recognition procedure and establishing collaboration with existing conformance assessment programmes.

⁵ These include the least developed countries, small island developing states, landlocked developing countries and countries with economies in transition.

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

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

ITU-T Study Group 11 is to continue its work in developing ITU-T Recommendations, technical reports and guidelines to assist ITU Member States in combating counterfeiting, tampering and theft of ICT equipment and the adverse implications thereof.

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, 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), ITU-T Study Group 12 coordinates QoS and QoE activities not only within ITU-T, but also with other standards-development organizations and forums, and develops frameworks to improve collaboration.

ITU-T Study Group 12 is the parent group for the Quality of Service Development Group (QSDG); the Regional Group of ITU-T Study Group 12 on QoS for the Africa region (SG12RG-AFR) and the Regional Group of ITU-T Study Group 12 for the Americas (SG12RG-AMR).

Examples of the work ITU-T Study Group 12 plans to undertake:

- QoS and QoE assessment for multimedia services, applications and technologies (e.g. video streaming, video gaming, telemeetings, metaverse, extended reality (XR), virtual reality (VR) and augmented reality (AR));
- 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, multiprotocol label switching (MPLS)) performance guidance;
- application-specific (e.g. smart grid, Internet of Things (IoT), machine-to-machine (M2M), home network (HN), over-the-top (OTT)) performance guidance;
- definition of QoE requirements, influencing factors and performance targets, and associated evaluation methodologies, for multimedia services;
- definition of objective prediction models based on subjective assessment methodologies, data collection via crowdsourcing and customer surveys;
- definition of crowdsourcing-based methodologies for the assessment of QoS and QoE;
- subjective quality assessment methodologies for existing and emerging technologies (e.g. telepresence, XR, VR and AR);
- quality modelling (psychophysical models, parametric models, intrusive and non-intrusive methods, opinion models) for multimedia and speech;
- speech-based services involving vehicle terminals;
- speech terminal characteristics and electro-acoustic measurement methods;
- definition of QoS parameters and assessment methods related to artificial intelligence (AI) and machine learning;

- development of test specifications for ITU-T Recommendations on performance, QoS and QoE;
- perceptual and field assessment principles for QoS and QoE of digital financial services (DFS); and
- development, validation and adaptation of subjective and objective speech quality assessment techniques for systems and applications where AI-based speech processing techniques (e.g. coding, noise reduction) are applied.

ITU-T Study Group 13

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

- IMT-2030 network aspects: Studies on the requirements and capabilities for the non-radio part of networks based on the service scenarios of IMT-2030. This includes development of ITU-T Recommendations on the framework and architecture design, including also network-related aspects of reliability, performance and security. Furthermore, it includes interworking with current networks including IMT-Advanced, IMT-2020, etc.
- Application of artificial intelligence (AI) technology including machine learning aspects for future networks: Studies on how to incorporate network intelligence into IMT-2030; and development of ITU-T Recommendations on overall requirements, functional architecture and application support capabilities for networks, which include artificial intelligence (AI) and machine learning mechanisms.
- Software-defined networking (SDN), network slicing and orchestration, computing and networking integration aspects: Studies on SDN and 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, and on the integration of computing and networking over various types of future networks. Development of ITU-T 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.
- Information-centric networking (ICN) aspects: Studies related to analysis of ICN applicability to IMT-2030 networks; development of new ITU-T Recommendations on the requirements, functional architecture and mechanisms of ICN networking and use-case specific mechanisms and architectures, including deployment of corresponding identifiers; development of ITU-T Recommendations on the enhancement of ICN for incorporating emerging technologies.
- Fixed, mobile and satellite convergence aspects: Studies related to access-agnostic core, which integrates fixed, mobile and satellite, and the application of innovative technologies to enhance such convergence, such as AI/machine learning, etc. This also includes the development of ITU-T Recommendations on full connectivity for various types of user equipment.
- Knowledge-centric trustworthy networking and service aspects: Studies related to requirements and functions to support the building of trusted ICT infrastructures, including digital asset treatment.
- Quantum networks and relevant technologies: Studies related to quantum networks, including networking aspect of quantum key distribution networks (QKDN); and, furthermore, development of new ITU-T Recommendations related to user networks interacting with quantum networks.

- Aspects related to future computing, including cloud computing and data handling in telecommunication networks: Studies of the requirements, functional architectures and their capabilities, mechanisms and deployment models of future computing, including cloud computing and data handling, covering inter- and intra-cloud scenarios as well as the applications of future computing in vertical domains. Studies include the development of technologies from the network side to support end-to-end awareness, control and management of future computing, including cloud, cloud security and data handling.

ITU-T Study Group 13 activities will also cover regulatory implications, including deep packet inspection, and lower energy consumption networks. Furthermore, it includes activities related to innovative service scenarios, deployment models and migration issues based on future networks.

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-2030 and other innovative technologies, ITU-T 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 provided through an appropriate activity conducted in conjunction with ITU-D.

Joint rapporteur group activities of different ITU-T study groups 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.

Particular emphasis is given to providing global standards for a high-capacity (terabit) optical transport network (OTN) infrastructure, and for high-speed (multi-Gbit/s) network access and home networking. This includes the related work on modelling for network, system and equipment management (including the use of open-source tools), transport network architectures, support of network slicing (including orchestration and capability exposure), layer interworking and the application of artificial intelligence (AI)/machine learning (ML) to move towards self-managed autonomous networks.

Special consideration is being given to the changing telecommunication environment, for example, supporting the evolving needs of mobile communication networks (e.g. support of IMT-2020/5G and the evolution to IMT-2030/6G), data centres, cloud computing and metaverse.

Access network technologies addressed by the study group include passive optical network (PON), point-to-point optical, and copper-based digital subscriber line (DSL) technologies. 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, wireless narrowband, optical fibre and free-space optical communications. Both access and home networking for smart-grid applications are supported.

Network, system and equipment features covered include: routing, switching, interfaces, multiplexers; secure transport; network synchronization (including frequency, time and phase); cross-connect (including optical cross-connect (OXC)), add/drop multiplexers (including fixed or reconfigurable optical add/drop multiplexers (ROADM)), amplifiers, transceivers, repeaters, regenerators; multilayer network protection switching and restoration; operations, administration and maintenance (OAM); 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, together with enabling the use of AI/ML to support the automation of transport network operations). Many of these topics are addressed for various media and transport technologies, such as metallic and terrestrial/submarine optical fibre cables, dense and coarse wavelength-division multiplexing (DWDM and CWDM) optical systems for fixed and flex-grid networks, OTN, including the evolution of OTN beyond 1 Tbit/s rates, Ethernet and other packet-based data services.

The study group will handle the entire range of fibre and cable performance (including test methods), 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, construction, maintenance and management of the physical infrastructure will take into account the advantages of emerging technologies. Approaches that improve network resilience and recovery from disasters will be studied.

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

ITU-T Study Group 15 should develop standards on networks, technologies and infrastructures for transport, access and home related to Action Line C2 (Information and communication infrastructure) of the World Summit on the Information Society and United Nations Sustainable Development Goal 9 (Industry, innovation and infrastructure).

ITU-T Study Group 17

ITU-T Study Group 17 is responsible for developing international standards in supporting building confidence, security and trust in the use of telecommunications/ICTs.

To this end, this includes studies relating to security, including cybersecurity, countering spam, wholistic security approaches spanning development, deployment and operation phases, managed security services and security automation, identity and authentication management. It also includes security architecture, model, and framework, security management, supply chain security concerning software and security of end-devices, networks, applications and services, such as endpoint security, including endpoint detection and response, smart devices including smart phones, Internet of Things (IoT), intelligent transport systems (ITS), secure application services, cloud computing, distributed ledger technology (DLT) and telebiometrics.

ITU-T Study Group 17 is also responsible for the application of open systems interconnection (OSI), including directory and object identifiers, and for technical languages such as Abstract Syntax Notation One (ASN.1) and use of JavaScript Object Notation (JSON), the method for their usage and other issues related to the software aspects of telecommunication systems, and for conformance testing to improve the quality of ITU-T Recommendations.

The role of ITU-T Study Group 17 is to provide technical solutions for addressing security for ICTs and ensuring security by ICTs. Studies focus especially on security for new emerging areas, such as security for IMT-2020/5G and beyond, IMT-2030/6G, IoT, smart cities, in-network computing, converged networks, metaverse, digital twin, DLT, big data analytics, ITS including V2X communication and autonomous driving, security for artificial intelligence (AI) used in telecommunications/ICTs, AI to improve security capabilities, the implications of generative AI on the threat landscape for telecommunications/ICTs and quantum-related technologies, such as QKD, and use of PQC. Its study areas also include use of cryptographic algorithms and protocols such as homomorphic algorithms, zero-knowledge proofing and multiparty secret sharing, safeguarding sensitive data and the management of personally identifiable information (PII), such as technical and operational aspects of data protection with respect to ensuring confidentiality, integrity and availability of PII, using federated machine learning, synthetic data generation, differential privacy and data masking techniques.

In the area of security, ITU-T Study Group 17 is responsible for developing the core international standards on ICT security, such as new security architecture/frameworks/models, zero trust for network infrastructure; the fundamentals related to cybersecurity, including threats, vulnerabilities and risks, and incident handling/response; and security management.

ITU-T Study Group 17 provides overall coordination of security work in ITU-T in its capacity as lead study group on security, on identity management, and on directory, public key infrastructure (PKI), formal languages and object identifiers.

In addition, ITU-T Study Group 17 is responsible for developing the core ITU-T Recommendations on security for DLT, security for ITS including V2X communication and autonomous driving, security aspects of applications and services in the areas of IPTV, various kinds of networks, including IMT-2020/5G and beyond and IMT-2030/6G, smart entities including smart grid, smart factory and digital health, ICS, IoT and smart cities, terrestrial-satellite and satellite-satellite network convergence, RNSS, AIS, software-defined networking (SDN), network function virtualization (NFV), metaverse, digital twin, cloud computing, in-network computing, big data analytics, smartphones, digital financial services (DFS) and telebiometrics.

ITU-T Study Group 17 is also responsible for developing the core ITU-T Recommendations on a generic identity and authentication 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 PII; and the development of mechanisms to ensure that access to PII is only authorized when appropriate. Additionally, this work also includes studying appropriate technical standardization solutions for child online protection.

In the area of OSI, Study Group 17 is responsible for ITU-T Recommendations in the following areas:

- directory services and systems, including PKI and DPKI (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);
- OSI, including 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, ITU-T Study Group 17 is responsible for studies on modelling, specification and description techniques, which includes languages such as ASN.1, Specification and Description Language (SDL), Message Sequence Chart (MSC), User Requirements Notification (URN) and Testing and Test Control Notation version 3 (TTCN-3).

ITU-T Study Group 17 coordinates security work across all study groups in ITU-T. This work will be developed in line with the requirements of, and in cooperation with, the relevant study groups such as ITU-T Study Groups 2, 3, 11, 13, 15, 20 and 21.

ITU-T Study Group 17 will work on relevant identity management aspects in collaboration with ITU-T Study Group 20 and ITU-T 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 the Internet of Things (IoT), machine-to-machine (M2M) communications, ubiquitous sensor networks and relevant emerging digital technologies, which will be done in close cooperation with relevant ITU-T, ITU Radiocommunication Sector (ITU-R) and ITU Telecommunication Development Sector (ITU-D) study groups and other regional and international standards organizations and industry forums;
- guidelines, methodologies and best practices related to standards to help cities, communities and rural areas deliver solutions and services using emerging digital technologies –also known as smart sustainable cities and communities (SSC&C), which will be done in close cooperation with relevant ITU-T, ITU-R and ITU-D study groups and other regional and international standards organizations and industry forums;
- requirements and capabilities of IoT and SSC&C, including verticals;
- definitions and terminology for IoT and SSC&C;
- IoT and SSC&C infrastructure (in collaboration with ITU-T Study Group 13, as appropriate), connectivity and devices, and digital services and applications, including architectures and frameworks of IoT and SSC&C;
- decentralized/distributed IoT;
- the evaluation, assessment, service analysis and infrastructure of emerging digital technologies (e.g. digital twins, AI, metaverse, decentralized/distributed IoT) for SSC&C, including verticals;
- identification aspects of IoT and SSC&C in collaboration with other study groups, as appropriate;
- protocols and interfaces of IoT and SSC&C systems, services and applications;
- IoT and SSC&C platforms including digital twins;
- metaverse for SSC&C (citiverse);
- interoperability of IoT and SSC&C systems, services and applications;
- quality of IoT and SSC&C systems, services and applications;
- security, privacy⁶ and trustworthiness⁶ of IoT and SSC&C systems, services and applications;
- data processing and management, including data analytics, big data aspects and AI-enabled applications of IoT and SSC&C;

⁶ 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.

- datasets, data models and semantics-based capabilities of IoT and SSC&C, including verticals; and
- database maintenance of IoT and SSC&C standards.

ITU-T Study Group 21

ITU-T Study Group 21 will work on the following items:

- terminology for various multimedia services;
- operation of multimedia systems and applications, including interoperability, scalability and interworking over different networks;
- ubiquitous multimedia services and applications;
- multimedia aspects of digital services;
- development of multimedia end-to-end architectures, including vehicle gateway for intelligent transport systems;
- high-layer protocols and middleware for multimedia systems and applications, including Internet Protocol (IP)-based television services (managed and non-managed networks), Internet-based streaming media services and digital signage;
- media and signal coding;
- multimedia and multimode terminals;
- human-machine interaction;
- signal processing network equipment and terminals, gateway implementations and characteristics;
- quality of multimedia technology applications and of content delivery multimedia systems;
- security and trust of multimedia systems and services;
- secured audiovisual content contribution and distribution, for example conditional access (CA) systems and digital rights management (DRM), over cable networks;
- multimedia aspects of distributed ledger technology (DLT) and its applications;
- digital multimedia services and applications in various vertical industries;
- multimedia aspects of metaverse technologies, applications, systems and services, including functional architecture and platform interoperability;
- audiovisual content systems for contribution and distribution, including broadcasting, over telecommunication networks, e.g. coaxial cable, optical fibre, hybrid fibre-coaxial (HFC) cable, IP networks, which could be applied also to satellite and/or terrestrial content distribution;
- interconnection between cable networks and other types of networks, such as fixed wireless access networks (e.g. radio local access networks, private IMT-2020 networks and beyond);
- the use of IP or other appropriate protocols, middleware and operating systems to provide time-critical services, services on demand, interactive services or service migrations from radio frequency to IP over cable distribution networks;
- procedures for the operation of audiovisual content delivery over cable networks;
- AI-enabled multimedia systems and applications, including AI-assisted delivery and transmission for audiovisual content and other data services, taking into account responsible/trustworthy/explainable AI principles;
- cable network terminals and related interfaces (e.g. interfaces to home network devices, such as Internet of Things devices, interfaces to the cloud);
- end-to-end integrated platforms for cable networks;

- advanced, interactive, time-critical and other services and applications over cable networks;
- cloud-based systems for audiovisual content services and control over cable networks;
- multimedia content processing and delivery, including extended reality (e.g. augmented reality, virtual reality and mixed reality), immersive environments, virtual worlds and metaverse;
- multimedia system, service and application accessibility for digital inclusion;
- common user profile and participation taxonomy for broadband cable-television accessibility.

ITU-T Study Group 21 will work collaboratively with all stakeholders working in the standardization areas within its mandate, in particular with other ITU study groups, other United Nations agencies, international and regional standards-development organizations, industry forums and consortia.

ITU-T Study Group 21 will coordinate with ITU-T Study Group 17 on security aspects of the multimedia domain.

ITU-T Study Group 21 will develop and maintain implementation guidelines to support the deployment of its Recommendations in developing countries.

ITU-T Study Group 21 is responsible for coordination with the ITU Radiocommunication Sector on broadcasting matters.

Inter-Sector rapporteur group activities of different Sectors and/or joint rapporteur group activities of different study groups shall be seen as complying with the WTSA expectations for collaboration and coordination.

ANNEX C
(to Resolution 2 (Rev. New Delhi, 2024))

List of Recommendations under the responsibility of the respective study groups of the ITU Telecommunication Standardization Sector and the Telecommunication Standardization Advisory Group in the 2025-2028 study period

ITU-T Study Group 2

ITU-T E-series, except those in conjunction with ITU-T Study Group 17 or under the responsibility of ITU-T Study Groups 3, 12 and 21

ITU-T F-series, except those under the responsibility of ITU-T Study Groups 13, 17 and 21

ITU-T G.850-series

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 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 D.103/E.231

ITU-T D.104/E.232

ITU-T D.1140/X.1261

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 11

ITU-T Q-series, except those under the responsibility of ITU-T Study Groups 2, 13, 15, 20 and 21

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.1550- and 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 ITU-T 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 ITU-T Study Groups 12, 15, 20 and 21

ITU-T Study Group 15

ITU-T G-series, except those under the responsibility of ITU-T Study Groups 2, 12, 13 and 21

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.185, ITU-T J.186, ITU-T J.190 and ITU-T J.192

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

ITU-T O-series (including ITU-T O.41/ITU-T P.53), except those under the responsibility of ITU-T 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 17

ITU-T D.267 (in conjunction with ITU-T Study Group 3)

ITU-T E.104, ITU-T E.115, ITU-T E.409 (in conjunction with ITU-T 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 ITU-T Study Groups 2, 3, 11, 13, 15 and 21

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 L.1600, ITU-T L.1601, ITU-T L.1602, ITU-T L.1603

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 ITU-T study groups have double numbers in the Y.4000-series.

ITU-T Study Group 21

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 ITU-T 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 ITU-T Study Group 20

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

ITU-T N-series

ITU-T T-series

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

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

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

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ITU-T A-series Recommendations