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ITU-T Y Suppl. 59 (11/2022)

SERIES Y: Global information infrastructure, Internet protocol aspects, next-generation networks, Internet of Things and smart cities

ITU-T Y.3100-series – IMT-2020 standardization roadmap

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Supplement 59 to ITU-T Y-series Recommendations

ITU-T Y.3100-series – IMT-2020 standardization roadmap

Summary

Supplement 59 to ITU-T Y-series Recommendations provides the standardization roadmap for IMT-2020 area in the telecommunication sector. It addresses the following subjects:

- The collection/pointers to the standards and publications of IMT-2020 deliverables in ITU-T study groups (SGs) and other standards development organizations (SDOs);
- Responsible group (owner);
- Status;
- Subject;
- Topics.

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FOREWORD

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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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ITU-T Y.3100-series – IMT-2020 standardization roadmap

1 Scope

This revised Supplement provides the standardization roadmap for IMT-2020 in the telecommunication sector. It addresses the following subjects:

- The collection/pointers to the standards and publications of IMT-2020 deliverables in ITU-T study groups (SGs) and other standards development organisations (SDOs);
- Responsible group (owner);
- Status;
- Subject;
- Topics.

2 References

[ITU-T Y.3101] Recommendation ITU-T Y.3101 (2018), *Requirements of the IMT-2020 network.*

3 Definitions

3.1 Terms defined elsewhere

This Supplement uses the following terms defined elsewhere:

3.1.1 backhaul [b-ITU-T Y.3100]: A network path between base station systems and a core network.

3.1.2 fixed mobile convergence [b-ITU-T Y.3100]: In the context of IMT-2020, the capabilities that provide services and applications to end users regardless of the fixed or mobile access technologies being used and independently of the users' location.

3.1.3 fronthaul [b-ITU-T Y.3100]: A network path between centralized radio controllers and remote radio units of a base station function.

3.1.4 functional architecture [b-ITU-T Y.4406]: A set of functional entities used to describe the structure of an NGN. These functional entities are separated by reference points, and thus, they define the distribution of functions. The functional entities can be used to describe a set of reference configurations. These reference configurations identify which reference points are visible at the boundaries of equipment implementations and between administrative domains.

3.1.5 IMT-2020 [b-ITU-T Y.3100]: (Based on [ITU-R M.2083-0]) Systems, system components, and related technologies that provide far more enhanced capabilities than those described in [b-ITU-R M.1645].

NOTE – [b-ITU-R M.1645] defines the framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000 for the radio access network.

3.1.6 management [b-ITU-T Y.3100]: In the context of IMT-2020, the processes aiming at fulfilment, assurance, and billing of services, network functions, and resources in both physical and virtual infrastructure including compute, storage, and network resources.

3.1.7 network function [b-ITU-T Y.3100]: In the context of IMT-2020, a processing function in a network.

NOTE 1 – Network functions include but are not limited to network node functionalities, e.g., session management, mobility management and transport functions, whose functional behaviour and interfaces are defined.

NOTE 2 – Network functions can be implemented on a dedicated hardware or as virtualized software functions.

NOTE 3 – Network functions are not regarded as resources, but rather any network functions can be instantiated using the resources.

3.1.8 network slice [b-ITU-T Y.3100]: A logical network that provides specific network capabilities and network characteristics.

NOTE 1 – Network slices enable the creation of customized networks to provide flexible solutions for different market scenarios which have diverse requirements, with respect to functionalities, performance and resource allocation.

NOTE 2 – A network slice may have the ability to expose its capabilities.

NOTE 3 – The behaviour of a network slice is realized via network slice instance(s).

3.1.9 network slice blueprint [b-ITU-T Y.3100]: A complete description of the structure, configuration and work flows on how to create and control a network slice instance during its life cycle.

NOTE – A network slice template can be used synonymously with a network slice blueprint.

3.1.10 network slice instance [b-ITU-T Y.3100]: An instance of network slice, which is created based on a network slice blueprint.

NOTE 1 – A network slice instance is composed of a set of managed run-time network functions, and physical/logical/virtual resources to run these network functions, forming a complete instantiated logical network to meet certain network characteristics required by the service instance(s).

NOTE 2 – A network slice instance may also be shared across multiple service instances provided by the network operator. A network slice instance may be composed of none, one or more sub-network slice instances which may be shared with another network slice instance.

3.1.11 network softwarization [b-ITU-T Y.3100]: An overall approach for designing, implementing, deploying, managing and maintaining network equipment and/or network components by software programming.

NOTE – Network softwarization exploits the nature of software such as flexibility and rapidity all along the lifecycle of network equipment and/or components, for the sake of creating conditions that enable the re-design of network and services architectures, the optimization of costs and processes, self-management and bring added values in network infrastructures.

3.1.12 network virtualization [b-ITU-T Y.3011]: A technology that enables the creation of logically isolated network partitions over shared physical networks so that heterogeneous collection of multiple virtual networks can simultaneously coexist over the shared networks. This includes the aggregation of multiple resources in a provider and appearing as a single resource.

3.1.13 orchestration [b-ITU-T Y.3100]: In the context of IMT-2020, the processes aiming at the automated arrangement, coordination, instantiation and use of network functions and resources for both physical and virtual infrastructures by optimization criteria.

3.1.14 service instance [b-ITU-T Y.3100]: An instance of a service that is realized within a network slice.

NOTE 1 – A service may be represented by one or more service instances.

NOTE 2 – A service instance may be provided by the network slice operator or a third party.

3.1.15 software-defined networking [b-ITU-T Y.3300]: A set of techniques that enables to directly program, orchestrate, control and manage network resources, which facilitates the design, delivery and operation of network services in a dynamic and scalable manner.

3.1.16 user plane [b-ITU-T Y.1714]: Refers to the set of traffic forwarding components through which traffic flows.

NOTE – "User plane" is referred to as "transport plane" in other ITU-T Recommendations.

3.1.17 virtualized network function [b-ITU-T Y.3321]: A network function whose functional software is decoupled from hardware, and runs on virtual machine(s).

3.2 Terms defined in this Supplement

None.

4 Abbreviations and acronyms

This Supplement uses the following abbreviations and acronyms:

3GPP	3rd Generation Partnership Project
5GCN	5G Core Network
5GS	5G System
AGF	Aggregator Gateway Function
AMS	Analog/Mixed-Signal
API	Application Programming Interface
BBF	Broadband Forum
BNG	Broadband Network Gateway
CM	Configuration Management
CT	Core network and Terminals
CUPS	Control and User Plane Separation
D2D	Device to Device
E2E	End to End
EE	Energy Efficiency
eMBB	Enhanced Mobile Broadband
EMC	Electromagnetic Compatibility
EMF	Electromagnetic field
ENNI	External Network Network Interface
EPS	Evolved Packet System
ETSI	European Telecommunications Standards Institute
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
EVC	Ethernet Virtual Connection
FlexE	Flexible Ethernet
FM	Fault Management
FMC	Fixed-Mobile Convergence
FMIF	Fixed Mobile Interworking Function
FTTdp	Fibre To The distribution point

GPRS	General Packet Radio Service
ICNIRP	International Commission for Non-Ionizing Radiation Protection
ICT	Information and Communication Technologies
IEEE	Institute of Electrical and Electronics Engineers
IMT	International Mobile Telecommunications
IMT-Advanced	International Mobile Telecommunications-Advanced
IoT	Internet of Things
IP	Intellectual Property
ITS	Intelligent Transportation Systems
KPI	Key Performance Indicator
LAN	Local Area Network
LCM	Life Cycle Management
LCS	Location Services
LR-WPAN	Low-Rate Wireless Personal Area Network
MAC	Medium Access Control
MAN	Metro Area Network
MANO	Management and Orchestration
MEC	Mobile Edge Computing
MEF	Metro Ethernet Forum
MPLS	Multiprotocol Label Switching
MTC	Massive Machine Type Communications
NaaS	Network as a Service
NAS	Non-Access-Stratum
NFV	Network Functions Virtualisation
NFVI	Network Function Virtualization Infrastructure
NGMN	Next Generation Mobile Networks
NGSON	Next Generation Service Overlay Network
NRM	Network Resource Model
NSA	Non-standalone
OTN	Optical Transport Network
PAC	Peer Aware Communication
PHY	Physical Layer
PICS	Protocol Implementation Conformance Statement
PM	Performance Management
PON	Passive Optical Network
QoS	Quality of Service
RAN	Radio Access Network

REST	Representational state transfer
RF-EMF	Radio Frequency Electromagnetic Field
RFID	Radio Frequency Identification
ROOF	Real-time Onsite Operations Facilitation
SA	Standalone
SA	Services and systems Aspects
SAR	Specific Absorption Rate
SDN	Software Defined Networking
SOAM FM IA	Service OAM Fault Management Implementation Agreement
SOAM	Service OAM
SoC	System on Chip
TEDS	Transducer Electronic Data Sheet
TM Forum	TeleManagement Forum
TSG	Technical Specification Groups
UE	User Equipment
ULI	Upper Layer Interface
UML	Unified Modelling Language
URLLC	Ultra-Reliable Low Latency Communications
V2X	Vehicle to Everything
VHDL	VHSIC Hardware Description Language
vNID	Virtual NID
WAVE	Wireless Access in Vehicular Environments
WLAN	Wireless Local Area Network
WPAN	Wireless Personal Area Networks
WRAN	Wireless Regional Area Networks
YANG	Yet Another Next Generation

5 Conventions

None.

6 IMT-2020 network overview

The IMT-2020 network will enable a variety of services, including enhanced mobile broadband (eMBB) services, massive machine type communications (MTC) based services and ultra-reliable low latency communications (URLLC) based services [ITU-T Y.3101], on an infrastructure of network and computing resources.

Among the numerous features of the IMT-2020 network, the following are specific key features that characterize the IMT-2020 network:

– Distributed architecture based on softwarized network functions,

– Access network agnostic common core network,

– Network slicing.

The following requirements constitute design considerations for the IMT-2020 network architecture:

– Support of network slicing,
– Support of network capability exposure,
– Common interface to support access network agnostic common core network,
– Separation of control plane and user plane,
– Efficient support of different mobility requirements,
– Support of low latency requirements,
– Leveraging existing techniques including NFV/SDN.

7 IMT-2020 standards roadmap

7.1 3GPP

The 3rd Generation Partnership Project (3GPP) unites seven telecommunications standard development organizations (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC), known as "Organizational Partners" and provides their members with a stable environment to produce the Reports and Specifications that define 3GPP technologies.

The project covers cellular telecommunication network technologies, including radio access, the core transport network, and service capabilities – including work on codecs, security, and quality of service – and thus provides complete system specifications. The specifications also provide hooks for non-radio access to the core network (CN), and for interworking with Wi-Fi networks.

There are three Technical Specification Groups (TSG) in 3GPP: Radio Access Networks (RAN), Services and Systems Aspects (SA), and Core Network and Terminals (CT).

The current main focus of 3GPP is specifications for IMT-2020/5G.

Table 7-1 provides a list of 3GPP deliverables associated with IMT-2020 networks.

Table 7-1 – 3GPP deliverables

Name	Responsible group	Status	Subject	Topics
3GPP TS 22.261	3GPP TSG SA	Under change control	Service requirements for the 5G system; Stage 1	IMT-2020
3GPP TS 23.273	3GPP TSG SA	Under change control	5G System (5GS) Location Services (LCS); Stage 2	IMT-2020
3GPP TS 23.278	3GPP TSG CT	Under change control	Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 4; Stage 2; IM CN Interworking	IMT-2020
3GPP TS 23.288	3GPP TSG SA	Under change control	Architecture enhancements for 5G System (5GS) to support network data analytics services	IMT-2020
3GPP TS 23.316	3GPP TSG SA	Under change control	Wireless and wireline convergence access support for the 5G System (5GS)	IMT-2020

Table 7-1 – 3GPP deliverables

Name	Responsible group	Status	Subject	Topics
3GPP TS 23.401	3GPP TSG SA	Under change control	General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access	IMT-2020
3GPP TS 23.501	3GPP TSG SA	Under change control	System Architecture for the 5G System; Stage 2	IMT-2020
3GPP TS 23.502	3GPP TSG SA	Under change control	Procedures for the 5G System (5GS): Stage 2	IMT-2020
3GPP TS 23.503	3GPP TSG SA	Under change control	Policy and Charging Control Framework for the 5G System (5GS); Stage 2	IMT-2020
3GPP TS 24.501	3GPP TSG CT	Under change control	Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3	IMT-2020
3GPP TS 24.502	3GPP TSG CT1	Under change control	Access to the 3GPP 5G Core Network (5GCN) via non-3GPP access networks	IMT-2020
3GPP TS 24.526	3GPP TSG CT	Under change control	User Equipment (UE) policies for 5G System (5GS); Stage 3	IMT-2020
3GPP TS 28.310	3GPP TSG SA	Under change control	Management and orchestration; Energy efficiency (EE) of 5G	IMT-2020
3GPP TS 28.500	3GPP TSG SA	Under change control	Telecommunication management; Management concept, architecture and requirements for mobile networks that include virtualized network functions	IMT-2020
3GPP TS 28.510	3GPP TSG SA	Under change control	Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Requirements	IMT-2020
3GPP TS 28.511	3GPP TSG SA	Under change control	Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Procedures	IMT-2020
3GPP TS 28.515	3GPP TSG SA	Under change control	Telecommunication management; Fault Management (FM) for mobile	IMT-2020

Table 7-1 – 3GPP deliverables

Name	Responsible group	Status	Subject	Topics
			networks that include virtualized network functions; Requirements	
3GPP TS 28.516	3GPP TSG SA	Under change control	Telecommunication management; Fault Management (FM) for mobile networks that include virtualized network functions; Procedures	IMT-2020
3GPP TS 28.517	3GPP TSG SA	Under change control	Telecommunication management; Fault Management (FM) for mobile networks that include virtualized network functions; Stage 2	IMT-2020
3GPP TS 28.518	3GPP TSG SA	Under change control	Telecommunication management; Fault Management (FM) for mobile networks that include virtualized network functions; Stage 3	IMT-2020
3GPP TS 28.520	3GPP TSG SA	Under change control	Performance Management (PM) for mobile networks that include virtualized network functions; Requirements	IMT-2020
3GPP TS 28.521	3GPP TSG SA	Under change control	Performance Management (PM) for mobile networks that include virtualized network functions; Procedures	IMT-2020
3GPP TS 28.523	3GPP TSG SA5	Under change control	Telecommunication management; Performance Management (PM) for mobile networks that include virtualized network functions; Stage 3	IMT-2020
3GPP TS 28.525	3GPP TSG SA5	Under change control	Telecommunication management; Life Cycle Management (LCM) for mobile networks that include virtualized network functions; Requirements	IMT-2020
3GPP TS 28.526	3GPP TSG SA5	Under change control	Telecommunication management; Life Cycle Management (LCM) for mobile networks that include	IMT-2020

Table 7-1 – 3GPP deliverables

Name	Responsible group	Status	Subject	Topics
			virtualized network functions; Procedures	
3GPP TS 28.527	3GPP TSG SA5	Under change control	Life Cycle Management (LCM) for mobile networks that include virtualized network functions; Stage 2	IMT-2020
3GPP TS 28.528	3GPP TSG SA5	Under change control	Telecommunication management; Life Cycle Management (LCM) for mobile networks that include virtualized network functions; Stage 3	IMT-2020
3GPP TS 28.530	3GPP TSG SA5	Under change control	Management and orchestration; Concepts, use cases and requirements	IMT-2020
3GPP TS 28.531	3GPP TSG SA	Under change control	Management and orchestration; Provisioning	IMT-2020
3GPP TS 28.532	3GPP TSG SA5	Under change control	Management and orchestration; Generic management services	IMT-2020
3GPP TS 28.533	3GPP TSG SA5	Under change control	Management and orchestration; Architecture framework	IMT-2020
3GPP TS 28.541	3GPP TSG SA5	Under change control	Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3	IMT-2020
3GPP TS 29.500	3GPP TSG CT4	Under change control	5G System; Technical Realization of Service Based Architecture; Stage 3	IMT-2020
3GPP TS 29.501	3GPP TSG CT4	Under change control	5G System; Principles and Guidelines for Services Definition; Stage 3	IMT-2020
3GPP TS 29.502	3GPP TSG CT4	Under change control	5G System; Session Management Services; Stage 3	IMT-2020
3GPP TS 29.503	3GPP TSG CT4	Under change control	5G System; Unified Data Management Services; Stage 3	IMT-2020
3GPP TS 29.507	3GPP TSG CT3	Under change control	5G System; Access and Mobility Policy Control Service; Stage 3	IMT-2020
3GPP TS 29.508	3GPP TSG CT3	Under change control	5G System; Session Management Event Exposure Service; Stage 3	IMT-2020

Table 7-1 – 3GPP deliverables

Name	Responsible group	Status	Subject	Topics
3GPP TS 29.509	3GPP TSG CT4	Under change control	5G System; Authentication Server Services; Stage 3	IMT-2020
3GPP TS 29.510	3GPP TSG CT4	Under change control	5G System; Network function repository services; Stage 3	IMT-2020
3GPP TS 29.511	3GPP TSG CT4	Under change control	5G System; Equipment Identity Register Services; Stage 3	IMT-2020
3GPP TS 29.512	3GPP TSG CT3	Under change control	5G System; Session Management Policy Control Service; Stage 3	IMT-2020
3GPP TS 29.513	3GPP TSG CT3	Under change control	5G System; Policy and Charging Control signalling flows and QoS parameter mapping; Stage 3	IMT-2020
3GPP TS 29.514	3GPP TSG CT3	Under change control	5G System; Policy Authorization Service; Stage 3	IMT-2020
3GPP TS 29.519	3GPP TSG CT3	Under change control	5G System; Usage of the Unified Data Repository Service for Policy Data, Application Data and Structured Data for Exposure; Stage 3	IMT-2020
3GPP TS 29.520	3GPP TSG CT3	Under change control	5G System; Network Data Analytics Services; Stage 3	IMT-2020
3GPP TS 29.531	3GPP TSG CT4	Under change control	5G System; Network Slice Selection Services; Stage 3	IMT-2020
3GPP TS 29.540	3GPP TSG CT4	Under change control	5G System; SMS Services; Stage 3	IMT-2020
3GPP TS 29.561	3GPP TSG CT3	Under change control	5G System; Interworking between 5G Network and external Data Networks; Stage 3	IMT-2020
3GPP TS 29.571	3GPP TSG CT4	Under change control	5G System; Common Data Types for Service Based Interfaces; Stage 3	IMT-2020
3GPP TS 32.972	3GPP TSG SA5	Under change control	Telecommunication management; Study on system and functional aspects of energy efficiency in 5G networks	IMT-2020
3GPP TS 33.501	3GPP TSG SA3	Under change control	Security architecture and procedures for 5G System	IMT-2020

Table 7-1 – 3GPP deliverables

Name	Responsible group	Status	Subject	Topics
3GPP TS.28.522	3GPP TSG SA5	Under change control	Telecommunication management; Performance Management (PM) for mobile networks that include virtualized network functions; Stage 2	IMT-2020
3GPP TS 22.261	3GPP TSG SA	Under change control	Service requirements for the 5G system	IMT-2020
3GPP TS 23.501	3GPP TSG SA2	Under change control	System architecture for the 5G System (5GS)	IMT-2020
3GPP TS 23.502	3GPP TSG SA2	Under change control	Procedures for the 5G System (5GS)	IMT-2020
3GPP TS 23.503	3GPP TSG SA2	Under change control	Policy and charging control framework for the 5G System (5GS); Stage 2	IMT-2020
3GPP TS 24.501	3GPP TSG CT1	Under change control	Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3	IMT-2020
3GPP TS 24.502	3GPP TSG CT1	Under change control	Access to the 3GPP 5G System (5GS) via non-3GPP access networks	IMT-2020
3GPP TS 28.500	3GPP TSG SA5	Under change control	Telecommunication management; Management concept; architecture and requirements for mobile networks that include virtualized network functions	IMT-2020
3GPP TS 28.510	3GPP TSG SA5	Under change control	Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Requirements	IMT-2020
3GPP TS 28.511	3GPP TSG SA5	Under change control	Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Procedures	IMT-2020
3GPP TS 28.512	3GPP TSG SA5	Under change control	Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Stage 2	IMT-2020

Table 7-1 – 3GPP deliverables

Name	Responsible group	Status	Subject	Topics
3GPP TS 28.513	3GPP TSG SA5	Under change control	Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Stage 3	IMT-2020
3GPP TS 28.515	3GPP TSG SA5	Under change control	Telecommunication management; Fault Management (FM) for mobile networks that include virtualized network functions; Requirements	IMT-2020
3GPP TS 28.516	3GPP TSG SA5	Under change control	Telecommunication management; Fault Management (FM) for mobile networks that include virtualized network functions; Procedures	IMT-2020
3GPP TS 28.517	3GPP TSG SA5	Under change control	Telecommunication management; Fault Management (FM) for mobile networks that include virtualized network functions; Stage 2	IMT-2020
3GPP TS 28.518	3GPP TSG SA5	Under change control	Telecommunication management; Fault Management (FM) for mobile networks that include virtualized network functions; Stage 3	IMT-2020
3GPP TS 28.520	3GPP TSG SA5	Under change control	Telecommunication management; Performance Management (PM) for mobile networks that include virtualized network functions; Requirements	IMT-2020
3GPP TS 28.523	3GPP TSG SA5	Under change control	Telecommunication management; Performance Management (PM) for mobile networks that include virtualized network functions; Stage 3	IMT-2020
3GPP TS 28.525	3GPP TSG SA5	Under change control	Telecommunication management; Life Cycle Management (LCM) for mobile networks that include	IMT-2020

Table 7-1 – 3GPP deliverables

Name	Responsible group	Status	Subject	Topics
			virtualized network functions; Requirements	
3GPP TS 28.526	3GPP TSG SA5	Under change control	Telecommunication management; Life Cycle Management (LCM) for mobile networks that include virtualized network functions; Procedures	IMT-2020
3GPP TS 28.527	3GPP TSG SA5	Under change control	Telecommunication management; Life Cycle Management (LCM) for mobile networks that include virtualized network functions; Stage 2	IMT-2020
3GPP TS 28.528	3GPP TSG SA5	Under change control	Telecommunication management; Life Cycle Management (LCM) for mobile networks that include virtualized network functions; Stage 3	IMT-2020
3GPP TS 28.530	3GPP TSG SA5	Under change control	Management and orchestration; Concepts, use cases and requirements	IMT-2020
3GPP TS 28.531	3GPP TSG SA5	Under change control	Management and orchestration; Provisioning	IMT-2020
3GPP TS 29.500	3GPP TSG CT4	Under change control	5G System; Technical Realization of Service Based Architecture; Stage 3	IMT-2020
3GPP TS 29.501	3GPP TSG CT4	Under change control	5G System; Principles and Guidelines for Services Definition; Stage 3	IMT-2020
3GPP TS 29.502	3GPP TSG CT4	Under change control	5G System; Session Management Services; Stage 3	IMT-2020
3GPP TS 29.503	3GPP TSG CT4	Under change control	5G System; Unified Data Management Services; Stage 3	IMT-2020
3GPP TS 29.507	3GPP TSG CT4	Under change control	5G System; Access and Mobility Policy Control Service; Stage 3	IMT-2020
3GPP TS 29.508	3GPP TSG CT3	Under change control	5G System; Session Management Event Exposure Service; Stage 3	IMT-2020
3GPP TS 29.509	3GPP TSG CT4	Under change control	5G System; Authentication Server Services; Stage 3	IMT-2020

Table 7-1 – 3GPP deliverables

Name	Responsible group	Status	Subject	Topics
3GPP TS 29.510	3GPP TSG CT4	Under change control	5G System; Network function repository services; Stage 3	IMT-2020
3GPP TS 29.511	3GPP TSG CT4	Under change control	5G System; Equipment Identity Register Services; Stage 3	IMT-2020
3GPP TS 29.512	3GPP TSG CT3	Under change control	5G System; Session Management Policy Control Service; Stage 3	IMT-2020
3GPP TS 29.513	3GPP TSG CT3	Under change control	5G System; Policy and Charging Control signalling flows and QoS parameter mapping; Stage 3	IMT-2020
3GPP TS 29.514	3GPP TSG CT3	Under change control	5G System; Policy Authorization Service; Stage 3	IMT-2020
3GPP TS 29.518	3GPP TSG CT4	Under change control	5G System; Access and Mobility Management Services; Stage 3	IMT-2020
3GPP TS 29.519	3GPP TSG CT3	Under change control	5G System; Usage of the Unified Data Repository Service for Policy Data, Application Data and Structured Data for Exposure; Stage 3	IMT-2020
3GPP TS 29.520	3GPP TSG CT3	Under change control	5G System; Network Data Analytics Services; Stage 3	IMT-2020
3GPP TS 29.531	3GPP TSG CT4	Under change control	5G System; Network Slice Selection Services; Stage 3	IMT-2020
3GPP TS 29.540	3GPP TSG CT4	Under change control	5G System; SMS Services; Stage 3	IMT-2020
3GPP TS 29.561	3GPP TSG CT3	Under change control	5G System; Interworking between 5G Network and external Data Networks; Stage 3	IMT-2020
3GPP TS 29.571	3GPP TSG CT4	Under change control	5G System; Common Data Types for Service Based Interfaces; Stage 3	IMT-2020
3GPP TS 33.501	3GPP TSG SA3	Under change control	Security Architecture and Procedures for 5G System	IMT-2020
3GPP TS.28.522	3GPP TSG SA5	Under change control	Telecommunication management; Performance Management (PM) for mobile networks that include	IMT-2020

Table 7-1 – 3GPP deliverables

Name	Responsible group	Status	Subject	Topics
			virtualized network functions; Stage 2	

7.2 Broadband Forum

The Broadband Forum, a non-profit industry organization, is focused on engineering smarter and faster broadband networks. Their work defines best practices for global networks, enables service and content delivery, establishes technology migration strategies, engineers critical device and service management tools, and is key to redefining broadband. Free technical reports and white papers can be found at broadband-forum.org.

Table 7-2 provides a list of Broadband Forum deliverables associated with IMT-2020 networks.

Table 7-2 – Broadband Forum deliverables

Name	Responsible group	Status	Subject	Topics
BBF TR-293	Broadband Forum	Published	Energy Efficient Mobile Backhaul	IMT-2020
BBF MD-342	Broadband Forum	Draft	Energy Efficient Mobile Backhaul White Paper	IMT-2020
BBF MD-343	Broadband Forum	Draft	Energy Efficient Mobile Backhaul Tutorial	IMT-2020
BBF MD-391	Broadband Forum	Draft	Evolution to 5G Mobile Backhaul Networks - White Paper	IMT-2020
BBF OD-379	Broadband Forum	Draft	Interoperability Test Plan for FTTdp PMA/DPU Management Interface	IMT-2020
BBF SD-420	Broadband Forum	Draft	R1 5G Fixed Mobile Convergence	IMT-2020
BBF MR-427	Broadband Forum	Published	5G Fixed Mobile Convergence – Marketing Report	IMT-2020
BBF MR-464	Broadband Forum	Published	Migrating Fixed Access to 5G Core	IMT-2020
BBF SD-406	Broadband Forum	Draft	End-to-End Network Slicing	IMT-2020

Table 7-2 – Broadband Forum deliverables

Name	Responsible group	Status	Subject	Topics
BBF SD-407	Broadband Forum	Draft	5G Fixed Mobile Convergence	IMT-2020
BBF TR-521	Broadband Forum	Published	5G Transport Networks	IMT-2020
BBF SDxFlexEMPLS45G	Broadband Forum	Draft	Flexible Ethernet (FlexE) use with MPLS networks	IMT-2020
BBF TR-355 Amendment 4	Broadband Forum	Published	YANG Modules for FTTdp Management	IMT-2020
BBF TR-383 Amendment 5	Broadband Forum	Published	Common YANG Modules for Access Networks	IMT-2020
BBF TR-221a2	Broadband Forum	Published	Technical Specifications for MPLS in Mobile Backhaul Networks, Amendment 2	IMT-2020
BBF WT-456	Broadband Forum	Published	AGF Functional Requirements	IMT-2020
BBF WT-458	Broadband Forum	Draft	CUPS for 5G FMC	IMT-2020
BBF MR-459	Broadband Forum	Published	Control and User Plane Separation for a Disaggregated BNG	IMT-2020
BBF WT-460	Broadband Forum	Draft	YANG Modules for Broadband Network Gateways	IMT-2020
BBF TR-521	Broadband Forum	Published	5G Transport Networks	IMT-2020
BBF WT-457	Broadband Forum	Draft	FMIF Functional Requirements	IMT-2020
MD-305 Issue 3	Broadband Forum	Draft	MPLS Mobile Backhaul Evolution - 4G and Beyond - Tutorial	IMT-2020
BBF SD-5GTransport	Broadband Forum	Draft	5G Transport - market drivers, architecture, requirements	IMT-2020

7.3 ETSI

The European Telecommunications Standards Institute (ETSI) is an independent, non-profit, standardization organization in the telecommunication industry (equipment makers and network operators) in Europe. It is headquartered in Sophia-Antipolis, France, with worldwide projection. ETSI produces standards that are globally applicable for information and communication technologies (ICT), including fixed, mobile, radio, converged, broadcast and Internet technologies.

Table 7-3 provides a list of ETSI deliverables associated with IMT-2020 networks.

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
ETSI DGR/NFV-EVE018	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV); Evolution and Ecosystem; Report on Multi-tenancy in NFV	IMT-2020
ETSI DGR/NFV-EVE019	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 4; Architectural Framework; Report on VNF generic OAM functions	IMT-2020
ETSI DGR/NFV-IFA 035	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 4; Architectural Framework Report on network connectivity integration and operationalization for NFV	IMT-2020
ETSI DGR/NFV-IFA 037	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 4; Architectural Framework; Report on further NFV support for 5G	IMT-2020
ETSI DGR/NFV-IFA 038	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 4; Architectural Framework; Report on network connectivity for container based VNF	IMT-2020
ETSI DGR/NFV-IFA 039	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 4; Architectural Framework Report on Service Based Architecture (SBA) design	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
ETSI DGR/NFV-IFA 041	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV); Release 4 Management and Orchestration; Report on enabling autonomous management in NFV-MANO	IMT-2020
ETSI DGR/NFV-REL 012	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Reliability Report on availability and reliability under failure and overload conditions in NFV-MANO	IMT-2020
ETSI DGR/NFV-SOL017	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3 Protocols and Data Models Report on protocol and data model solutions for Multi-site Connectivity Services	IMT-2020
ETSI DGS/MEC-0028WlanAPI	ETSI ISG MEC	Draft	Multi-access Edge Computing (MEC); WLAN Information API	IMT-2020
ETSI DGS/NFV-IFA 036	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 4; Management and Orchestration; Specification of requirements for the management and orchestration of container cluster nodes	IMT-2020
ETSI DGS/NFV-SEC 023	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 4; Security; Container Security Specification	IMT-2020
ETSI DGS/NFV-SEC 024	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 4 Security; Security Management Specification	IMT-2020
ETSI DGS/NFV-SOL011 (GS)	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			protocols specification for the Or-Or Reference Point	
ETSI DMI/MEC-DEC34	ETSI ISG MEC	Draft	Multi-access Edge Computing (MEC) MEC Sandbox	IMT-2020
ETSI DMI/NFV-SOL008 (MI)	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV); Protocol and Data Models; Creation and Management of the OpenAPI Work Programme	IMT-2020
ETSI GS NFV-TST 009	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Testing; Specification of Networking Benchmarks and Measurement Methods for NFVI	IMT-2020
ETSI GR MEC 017	ETSI ISG MEC	Published	Mobile Edge Computing (MEC); Deployment of Mobile Edge Computing in an NFV environment	IMT-2020
ETSI GR MEC 018	ETSI ISG MEC	Published	Mobile Edge Computing (MEC); End to End Mobility Aspects	IMT-2020
ETSI GR MEC 022	ETSI ISG MEC	Published	Multi-access Edge Computing (MEC); Study on MEC Support for V2X Use Cases	IMT-2020
ETSI GR MEC 024	ETSI ISG MEC	Published	Multi-access Edge Computing (MEC); Support for network slicing	IMT-2020
ETSI GR MEC 027	ETSI ISG MEC	Published	Multi-access Edge Computing (MEC); Study on MEC support for alternative virtualization technologies	IMT-2020
ETSI GR MEC 031	ETSI ISG MEC	Draft	Multi-access Edge Computing (MEC) MEC 5G Integration	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
ETSI GR MEC-DEC 023	ETSI ISG MEC	Draft	Multi-access Edge Computing (MEC); Describing ETSI MEC RESTful APIs using the OpenAPI specification	IMT-2020
ETSI GR MEC-DEC 025	ETSI ISG MEC	Published	Multi-access Edge Computing (MEC); MEC Testing Framework	IMT-2020
ETSI GR mWT 012	ETSI ISG mWT	Published	5G Wireless Backhaul/X-Haul	IMT-2020
ETSI GR mWT 016	ETSI ISG mWT	Published	Applications and use cases of Software Defined Networking (SDN) as related to microwave and millimetre wave transmission	IMT-2020
ETSI GR NFV 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Use Cases	IMT-2020
ETSI GR NFV-EVE 008	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Charging; Report on Usage Metering and Charging Use Cases and Architectural Study	IMT-2020
ETSI GR NFV-EVE 010	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Licensing Management; Report on License Management for NFV	IMT-2020
ETSI GR NFV-EVE 012	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Evolution and Ecosystem; Report on Network Slicing Support with ETSI NFV Architecture Framework	IMT-2020
ETSI GR NFV-EVE 013	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV); Connection Based Virtual Services; Report on Connection Based Virtual Services Support	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			with ETSI NFV Architecture Framework	
ETSI GR NFV-EVE 016	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV); Connection Based Virtual Services; Report on Connection Based Virtual Services Support with ETSI NFV Architecture Framework	IMT-2020
ETSI GR NFV-EVE 017	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV); Management and Orchestration; Report on the support of real-time/ultra-low latency aspects in NFV related to service and network handling	IMT-2020
ETSI GR NFV-IFA 012	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Report on Os-Ma-Nfvo reference point – application and service management use cases and recommendations	IMT-2020
ETSI GR NFV-IFA 015	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Report on NFV Information Model	IMT-2020
ETSI GR NFV-IFA 016	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Information Modeling; Papyrus Guidelines	IMT-2020
ETSI GR NFV-IFA 017	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Information Modeling; UML Modeling Guidelines	IMT-2020
ETSI GR NFV-IFA 021	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Management	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			and Orchestration; Report on management of NFV-MANO and automated deployment of EM and other OSS functions	
ETSI GR NFV-IFA 022	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Report on Management and Connectivity for Multi-Site Services	IMT-2020
ETSI GR NFV-IFA 023	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Management and Orchestration; Report on Policy Management in MANO; Release 3	IMT-2020
ETSI GR NFV-IFA 024	ETSI ISG NFV	Published	Network Function Virtualisation (NFV) Release 2; Information Modeling; Report on External Touchpoints related to NFV Information Model	IMT-2020
ETSI GR NFV-IFA 025	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV); Management and Orchestration; Report on the support of real-time/ultra-low latency aspects in NFV related to service and network handling [Release 3]	IMT-2020
ETSI GR NFV-IFA 028	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Report on architecture options to support multiple administrative domains	IMT-2020
ETSI GR NFV-IFA 029	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Architecture; Report on the	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			Enhancements of the NFV architecture towards "Cloud-native" and "PaaS"	
ETSI GR NFV-IFA 034	ETSI ISG NFV	Draft	Network Function Virtualization (NFV) Release 3; Management and Orchestration; Report on Architectural enhancement for VNF License Management support and use of VNF licenses	IMT-2020
ETSI GR NFV-REL 007	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Reliability; Report on the resilience of NFV-MANO critical capabilities	IMT-2020
ETSI GR NFV-REL 008	ETSI ISG NFV	Draft -stopped	Network Functions Virtualisation (NFV); Reliability; Report on Error Handling: Detection, Correlation, Notification	IMT-2020
ETSI GR NFV-REL 010	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Reliability; Report on NFV Resiliency for the Support of Network Slicing	IMT-2020
ETSI GR NFV-REL 011	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 4; Management and Orchestration; Report on NFV-MANO software modification	IMT-2020
ETSI GR NFV-SEC 005	ETSI ISG NFV	Published	Network Functions Virtualization (NFV); Trust; Report on Certificate Management	IMT-2020
ETSI GR NFV-SEC 007	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Trust; Report on Attestation Technologies	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			and Practices for Secure Deployments	
ETSI GR NFV-SEC 011	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Security; Report on NFV LI Architecture	IMT-2020
ETSI GR NFV-SEC 016	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV); Security; Report on location, timestamping of VNFs	IMT-2020
ETSI GR NFV-SEC 017	ETSI ISG NFV	Draft -stopped	Network Functions Virtualisation (NFV); Security; Security Policy Guidelines Report	IMT-2020
ETSI GR NFV-TST 004	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Testing; Guidelines for Test Plan on Path Implementation through NFVI	IMT-2020
ETSI GR NFV-TST 005	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Continuous Development and Integration; Report on use cases and recommendations for VNF Snapshot	IMT-2020
ETSI GR NFV-TST 006	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Testing; Report on CICD and Devops	IMT-2020
ETSI GR NFV-TST 007	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Testing; Guidelines on Interoperability Testing for MANO	IMT-2020
ETSI GR NFV-TST 011	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Testing; Test Domain and Description Language Recommendations	IMT-2020
ETSI GR NFV-TST 012	ETSI ISG NFV	Draft	Network Function Virtualisation (NFV);	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			Testing; VIM & NFVI Control and Management Performance Evaluation	
ETSI GS MEC 001	ETSI ISG MEC	Published	Multi-access Edge Computing (MEC); Terminology	IMT-2020
ETSI GS MEC 002	ETSI ISG MEC	Published	Multi-access Edge Computing (MEC); Phase 2: Use Cases and Requirements	IMT-2020
ETSI GS MEC 003	ETSI ISG MEC	Published	Multi-access Edge Computing (MEC); Framework and Reference Architecture	IMT-2020
ETSI GS MEC 009	ETSI ISG MEC	Published	Multi-access Edge Computing (MEC); General principles for MEC Service APIs	IMT-2020
ETSI GS MEC 010-1	ETSI ISG MEC	Published	Mobile Edge Computing (MEC); Mobile Edge Management; Part 1: System, host and platform management	IMT-2020
ETSI GS MEC 010-2	ETSI ISG MEC	Published	Multi-access Edge Computing (MEC); MEC Management; Part 2: Application lifecycle, rules and requirements management	IMT-2020
ETSI GS MEC 011	ETSI ISG MEC	Published	Multi-access Edge Computing (MEC); Edge Platform Application Enablement	IMT-2020
ETSI GS MEC 012	ETSI ISG MEC	Published	Multi-access Edge Computing (MEC); Radio Network Information API	IMT-2020
ETSI GS MEC 013	ETSI ISG MEC	Published	Multi-access Edge Computing (MEC); Location API	IMT-2020
ETSI GS MEC 014	ETSI ISG MEC	Published	Mobile Edge Computing (MEC); UE Identity API	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
ETSI GS MEC 015	ETSI ISG MEC	Published	Mobile Edge Computing (MEC); Bandwidth Management API	IMT-2020
ETSI GS MEC 016	ETSI ISG MEC	Published	Multi-access Edge Computing (MEC); UE application interface	IMT-2020
ETSI GS MEC 021	ETSI ISG MEC	Published	Multi-access Edge Computing (MEC); MEC Application Mobility Service API	IMT-2020
ETSI GS MEC 026	ETSI ISG MEC	Published	Multi-access Edge Computing (MEC); Support for regulatory requirements	IMT-2020
ETSI GS MEC 028	ETSI ISG MEC	Draft	Multi-access Edge Computing (MEC); WLAN Information API	IMT-2020
ETSI GS MEC 029	ETSI ISG MEC	Published	Multi-access Edge Computing (MEC); Fixed Access Information API	IMT-2020
ETSI GS MEC 030	ETSI ISG MEC	Draft	Multi-access Edge Computing (MEC); V2X Information Service API	IMT-2020
ETSI GS MEC 033	ETSI ISG MEC	Draft	Multi-access Edge Computing (MEC) IoT API	IMT-2020
ETSI GS MEC-DEC 032-1	ETSI ISG MEC	Draft	Multi-access Edge Computing (MEC); API Conformance Test Specification Part 1: Test Requirements and Implementation Conformance Statement (ICS)	IMT-2020
ETSI GS MEC-DEC 032-2	ETSI ISG MEC	Draft	Multi-access Edge Computing (MEC); API Conformance Test Specification Part 2: Test Purposes (TP)	IMT-2020
ETSI GS MEC-DEC 032-3	ETSI ISG MEC	Draft	Multi-access Edge Computing (MEC); API Conformance Test Specification; Part 3:	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			Abstract Test Suite (ATS)	
ETSI GS MEC-IEG 004	ETSI ISG MEC	Published	Mobile-Edge Computing (MEC); Service Scenarios	IMT-2020
ETSI GS MEC-IEG 005	ETSI ISG MEC	Published	Mobile-Edge Computing (MEC); Proof of Concept Framework	IMT-2020
ETSI GS MEC-IEG 006	ETSI ISG MEC	Published	Mobile Edge Computing; Market Acceleration; MEC Metrics Best Practice and Guidelines	IMT-2020
ETSI GS NFV 002	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Architectural Framework	IMT-2020
ETSI GS NFV 003	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Terminology for Main Concepts in NFV	IMT-2020
ETSI GS NFV 004	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Virtualisation Requirements	IMT-2020
ETSI GS NFV 006	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Architectural Framework Specification	IMT-2020
ETSI GS NFV-EVE 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Virtualisation Technologies; Hypervisor Domain Requirements specification; Release 3	IMT-2020
ETSI GS NFV-EVE 003	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Ecosystem; Report on NFVI Node Physical Architecture Guidelines for Multi-Vendor Environment	IMT-2020
ETSI GS NFV-EVE 004	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV);	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			Virtualisation Technologies; Report on the application of Different Virtualisation Technologies in the NFV Framework	
ETSI GS NFV-EVE 005	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Ecosystem; Report on SDN Usage in NFV Architectural Framework	IMT-2020
ETSI GS NFV-EVE 007	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; NFV Evolution and Ecosystem; Hardware Interoperability Requirements Specification	IMT-2020
ETSI GS NFV-EVE 011	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Virtualised Network Function; Specification of the Classification of Cloud Native VNF implementations	IMT-2020
ETSI GS NFV-IFA 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Acceleration Technologies; Report on Acceleration Technologies & Use Cases	IMT-2020
ETSI GS NFV-IFA 002	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Acceleration Technologies; VNF Interfaces Specification	IMT-2020
ETSI GS NFV-IFA 003	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Acceleration Technologies; vSwitch Benchmarking and Acceleration Specification	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
ETSI GS NFV-IFA 004	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Acceleration Technologies; Management Aspects Specification	IMT-2020
ETSI GS NFV-IFA 005	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Or-Vi reference point – Interface and Information Model Specification	IMT-2020
ETSI GS NFV-IFA 006	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Vi-Vnfm reference point – Interface and Information Model Specification	IMT-2020
ETSI GS NFV-IFA 007	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Or-Vnfm reference point – Interface and Information Model Specification	IMT-2020
ETSI GS NFV-IFA 008	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Ve-Vnfm reference point – Interface and Information Model Specification	IMT-2020
ETSI GS NFV-IFA 009	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Management and Orchestration; Report on Architectural Options	IMT-2020
ETSI GS NFV-IFA 010	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Functional requirements specification	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
ETSI GS NFV-IFA 011	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; VNF Descriptor and Packaging Specification	IMT-2020
ETSI GS NFV-IFA 013	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Os-Ma-Nfvo reference point – Interface and Information Model Specification	IMT-2020
ETSI GS NFV-IFA 014	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Network Service Templates Specification	IMT-2020
ETSI GS NFV-IFA 018	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Acceleration Technologies; Network Acceleration Interface Specification; Release 3	IMT-2020
ETSI GS NFV-IFA 019	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Acceleration Technologies; Acceleration Resource Management Interface Specification; Release 3	IMT-2020
ETSI GS NFV-IFA 026	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Architecture enhancement for Security Management Specification	IMT-2020
ETSI GS NFV-IFA 027	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Performance	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			Measurements Specification	
ETSI GS NFV-IFA 030	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Multiple Administrative Domain Aspect Interfaces Specification	IMT-2020
ETSI GS NFV-IFA 031	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Requirements and interfaces specification for management of NFV-MANO	IMT-2020
ETSI GS NFV-IFA 032	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Interface and Information Model Specification for Multi-Site Connectivity Services	IMT-2020
ETSI GS NFV-IFA 033	ETSI ISG NFV	Draft	Network Functions Virtualization (NFV) Release 4; Management and Orchestration; Sc-Or, Sc-Vnfm, Sc-Vi reference points – Interface and Information Model Specification	IMT-2020
ETSI GS NFV-IFA012	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Report on Os-Ma-Nfvo reference point – application and service management interface and information Model Specification	IMT-2020
ETSI GS NFV-INF 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Infrastructure Overview	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
ETSI GS NFV-INF 003	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Infrastructure; Compute Domain	IMT-2020
ETSI GS NFV-INF 004	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Infrastructure; Hypervisor Domain	IMT-2020
ETSI GS NFV-INF 005	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Infrastructure; Network Domain	IMT-2020
ETSI GS NFV-INF 007	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Infrastructure; Methodology to describe Interfaces and Abstractions	IMT-2020
ETSI GS NFV-INF 010	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Service Quality Metrics	IMT-2020
ETSI GS NFV-MAN 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Management and Orchestration	IMT-2020
ETSI GS NFV-PER 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); NFV Performance & Portability Best Practises	IMT-2020
ETSI GS NFV-PER 002	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Proofs of Concept; Framework	IMT-2020
ETSI GS NFV-REL 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Resiliency Requirements	IMT-2020
ETSI GS NFV-REL 002	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Reliability; Report on Scalable Architectures for Reliability Management	IMT-2020
ETSI GS NFV-REL 003	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Reliability; Report on	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			Models and Features for End-to-End Reliability	
ETSI GS NFV-REL 004	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Assurance; Report on Active Monitoring and Failure Detection	IMT-2020
ETSI GS NFV-REL 005	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Accountability; Report on Quality Accountability Framework	IMT-2020
ETSI GS NFV-REL 006	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Reliability; Maintaining Service Availability and Continuity Upon Software Modification	IMT-2020
ETSI GS NFV-REL 009	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV); Reliability; Specification of Requirements to Support NFV Reliability and Availability	IMT-2020
ETSI GS NFV-SEC 002	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); NFV Security; Cataloguing security features in management software	IMT-2020
ETSI GS NFV-SEC 003	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); NFV Security; Security and Trust Guidance	IMT-2020
ETSI GS NFV-SEC 004 V1.1.1	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); NFV Security; Privacy and Regulation; Report on Lawful Interception Implications	Lawful interception; Network security; Privacy; IMT-2020
ETSI GS NFV-SEC 006 V1.1.1	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Security Guide; Report	Security management standards and guidance

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			on Security Aspects and Regulatory Concerns	documents; IMT-2020
ETSI GS NFV-SEC 009 V1.1.1	NFV ISG NFV	Published	Network Functions Virtualisation (NFV); NFV Security; Report on use cases and technical approaches for multi-layer host administration	Network security; Security Architectures, Models and Frameworks; IMT-2020
ETSI GS NFV-SEC 010 V1.1.1	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); NFV Security; Report on Retained Data problem statement and requirements	Sector-specific security standards; IMT-2020
ETSI GS NFV-SEC 012 V3.1.1	NFV ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Security; System architecture specification for execution of sensitive NFV components	Security Architectures, Models and Frameworks; Security mechanisms; IMT-2020
ETSI GS NFV-SEC 013 V3.1.1	NFV ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Security; Security Management and Monitoring specification	Security Architectures, Models and Frameworks; Security management standards and guidance documents; IMT-2020
ETSI GS NFV-SEC 014	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; NFV Security; Security Specification for MANO Components and Reference points	IMT-2020
ETSI GS NFV-SEC 015	ETSI ISG NFV	Draft -stopped	Network Function Virtualization (NFV) Release 3; NFV Security; Security Specification for other MANO reference points	IMT-2020
ETSI GS NFV-SEC 020	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3; Security;	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			Identity Management and Security Specification	
ETSI GS NFV-SEC021	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Security; VNF Package Security Specification	IMT-2020
ETSI GS NFV-SOL 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; NFV descriptors based on TOSCA specification	IMT-2020
ETSI GS NFV-SOL 002	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Ve-Vnfm Reference Point	IMT-2020
ETSI GS NFV-SOL 003	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Or-Vnfm Reference Point	IMT-2020
ETSI GS NFV-SOL 004	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; VNF Package specification	IMT-2020
ETSI GS NFV-SOL 005	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Os-Ma-nfvo Reference Point	IMT-2020
ETSI GS NFV-SOL 006	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; NFV descriptors based on YANG Specification	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
ETSI GS NFV-SOL 007	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; Network Service Descriptor File Structure Specification	IMT-2020
ETSI GS NFV-SOL 009	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models: RESTful protocols specification for the management of NFV-MANO	IMT-2020
ETSI GS NFV-SOL 010	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; VNF Snapshot Package specification	IMT-2020
ETSI GS NFV-SOL 012	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Policy Management Interface	IMT-2020
ETSI GS NFV-SOL 013	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; Specification of common aspects for RESTful NFV MANO APIs	IMT-2020
ETSI GS NFV-SOL 014	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; YAML data model specification for descriptor-based virtualised resource management	IMT-2020
ETSI GS NFV-SOL 016	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; NFV-MANO procedures specification	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
ETSI GS NFV-SWA 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Virtual Network Functions Architecture	IMT-2020
ETSI GS NFV-TST 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Pre-deployment Testing; Report on Validation of NFV Environments and Services	IMT-2020
ETSI GS NFV-TST 002	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Testing Methodology; Report on NFV Interoperability Testing Methodology	IMT-2020
ETSI GS NFV-TST 008	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Testing; NFVI Compute and Network Metrics Specification	IMT-2020
ETSI GS NFV-TST 009	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Testing; Specification of Networking Benchmarks and Measurement Methods for NFVI	IMT-2020
ETSI GS NFV-TST 010	ETSI ISG NFV	Published	Network Function Virtualisation (NFV) Release 2; Testing; API Conformance Testing Specification	IMT-2020
ETSI MI/MEC-DEC23OpenAPI	ETSI ISG MEC	Draft	Multi-access Edge Computing (MEC); Describing ETSI MEC RESTful APIs using the OpenAPI specification	IMT-2020
ETSI RGS/NFV-IFA 040	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 4; Management and Orchestration; Requirements for service interfaces and object model for OS container management and	IMT-2020

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			orchestration specification	
ETSI White Paper No. 25	ETSI ISG mWT	Published	Microwave and Millimeter-wave for 5G Transport	IMT-2020
GS NFV-SEC 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); NFV Security; Problem Statement	IMT-2020

7.4 IEEE

The Institute of Electrical and Electronics Engineers (IEEE) is the world's largest professional association dedicated to advancing technological innovation and excellence for the benefit of humanity. IEEE and its members inspire a global community through IEEE's highly cited publications, conferences, technology standards, and professional and educational activities.

Table 7-4 provides a list of IEEE deliverables associated with IMT-2020 networks.

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
IEEE 1076-2008	IEEE	Published	IEEE Standard VHDL Language Reference Manual	IMT-2020
IEEE 1076.1-2017	IEEE	Published	IEEE Standard VHDL Analog and Mixed-Signal Extensions	IMT-2020
IEEE 1451.1-1999	IEEE	Published	IEEE Standard for a Smart Transducer Interface for Sensors and Actuators – Network Capable Application Processor Information Model	IMT-2020
IEEE 1451.5-2007	IEEE	Published	IEEE Standard for a Smart Transducer Interface for Sensors and Actuator – Wireless Communication Protocols and Transducer Electronic Data Sheet (TEDS) Formats	IMT-2020
IEEE 1528-2013	IEEE	Published	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head	IMT-2020

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			from Wireless Communications Devices: Measurement Techniques	
IEEE 1609.2a-2017 (Amendment to IEEE Std 1609.2-2016)	IEEE	Published	IEEE Standard for Wireless Access in Vehicular Environments– Security Services for Applications and Management Messages – Amendment 1	IMT-2020
IEEE 1647-2016	IEEE	Published	IEEE Standard for the Functional Verification Language e	IMT-2020
IEEE 1666-2011	IEEE	Published	IEEE Standard System C(R) Language Reference Manual	IMT-2020
IEEE 1666.1-2016	IEEE	Published	IEEE Standard for for Standard SystemC(R) Analog/Mixed-Signal Extensions Language Reference Manual	IMT-2020
IEEE 1685-2014	IEEE	Published	IEEE Standard for IP-XACT, Standard Structure for Packaging, Integrating, and Reusing IP within Tool Flows	IMT-2020
IEEE 1720-2012	IEEE	Published	IEEE Recommended Practice for Near-Field Antenna Measurements	IMT-2020
IEEE 1734-2011	IEEE	Published	IEEE Standard for Quality of Electronic and Software Intellectual Property Used in System and System on Chip (SoC) Designs	IMT-2020
IEEE 1735-2014	IEEE	Published	IEEE Recommended Practice for Encryption and Management of Electronic Design Intellectual Property (IP)	IMT-2020
IEEE 1735-2014/Cor 1-2015	IEEE	Published	IEEE Recommended Practice for Encryption and Management of Electronic Design Intellectual Property (IP) – Corrigendum 1: Correction	IMT-2020

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			to Rights Digest Description	
IEEE 1785.2-2016	IEEE	Published	IEEE Standard for Rectangular Metallic Waveguides and Their Interfaces for Frequencies of 110 GHz and Above – Part 2: Waveguide Interfaces	Security protocol standards; IMT-2020
IEEE 1800-2017	IEEE	Published	IIEEE Standard for SystemVerilog–Unified Hardware Design, Specification, and Verification Language	IMT-2020
IEEE 1800.2-2017	IEEE	Published	IEEE Standard for Universal Verification Methodology Language Reference Manual	IMT-2020
IEEE 1801-2015	IEEE	Published	IEEE Standard for Design and Verification of Low Power, Energy Aware Electronic Systems	IMT-2020
IEEE 1903-2011	IEEE	Published	IEEE Standard for the Functional Architecture of Next Generation Service Overlay Networks	IMT-2020
IEEE 802.11-2016	IEEE 802	Published	IEEE Standard for Information Technology–Telecommunications and Information Exchange Between Systems Local and Metropolitan Area Networks – Specific Requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications	IMT-2020
IEEE 802.11ac-2013	IEEE 802	Published	IEEE Standard for Information Technology – Telecommunications and Information Exchange Between Systems – Local and Metropolitan Area Networks – Specific Requirements – Part 11: Wireless LAN Medium	IMT-2020

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			Access Control (MAC) and Physical Layer (PHY) Specifications	
IEEE 802.11ad-2012	IEEE	Published	(adopted as ISO/IEC/IEEE 8802-11:2012/Amd 3:2014)	IoT; IMT-2020; IoT & Smart Sustainable Cities Standards
IEEE 802.11ah-2016	IEEE 802	Published	IEEE Standard for Information Technology – Telecommunications and Information Exchange Between Systems – Local and Metropolitan Area Networks – Specific Requirements – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications	IMT-2020
IEEE 802.15.11	IEEE 802.15	Draft	New activity to develop a standard supporting Multi-Gigabit/sec Optical Wireless Communications	IMT-2020
IEEE 802.15.3-2016	IEEE 802.15	Published	IEEE Standard for High Data Rate Wireless Multi-Media Networks	IMT-2020
IEEE 802.15.3e-2017	IEEE 802.15	Published	IEEE Standard for High Data Rate Wireless Multi-Media Networks – Amendment 1: High -Rate Close Proximity Point-to-Point Communications	IMT-2020
IEEE 802.15.4-2015	IEEE	Published	IEEE Standard for Local and metropolitan area networks – Part 15.4: Low-Rate Wireless Personal Area Networks (LR-WPANs)	IoT; IMT-2020; IoT & Smart Sustainable Cities Standards
IEEE 802.15.7-2011	IEEE	Published	IEEE Standard for Local and Metropolitan Area Networks – Part 15.7: Short-Range Wireless Optical Communication Using Visible Light	IoT; IMT-2020; IoT & Smart Sustainable Cities Standards
IEEE 802.16-2012	IEEE	Published	IEEE Standard for Air Interface for Broadband Wireless Access Systems	IoT; IMT-2020; IoT & Smart Sustainable Cities Standards

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
IEEE 802.16-Conformance04-2006	IEEE 802.16	Published	Conformance to IEEE 802.16 – Part 4: Protocol Implementation Conformance Statement (PICS) Proforma for Frequencies below 11 GHz.	IMT-2020
IEEE 802.16.1-2012	IEEE 802.16	Published	IEEE Standard for Wireless MAN-Advanced Air Interface for Broadband Wireless Access Systems	IMT-2020; IEEE 802.16 Wireless MAN / WiMAX
IEEE 802.16.1a-2013	IEEE 802.16	Published	IEEE Standard for Wireless MAN-Advanced Air Interface for Broadband Wireless Access Systems – Amendment 2: Higher Reliability Networks	IMT-2020; IEEE 802.16 Wireless MAN / WiMAX
IEEE 802.16.1b-2012	IEEE	Published	IEEE Standard for Wireless MAN-Advanced Air Interface for Broadband Wireless Access Systems – Amendment 1: Enhancements to Support Machine-to-Machine Applications	IoT; IMT-2020; IoT & Smart Sustainable Cities Standards; IEEE 802.16 Wireless MAN / WiMAX
IEEE 802.16.2-2004	IEEE 802.16	Published	IEEE Recommended Practice for Local and Metropolitan Area Networks –Coexistence of Fixed Broadband Wireless Access Systems	IMT-2020; IEEE 802.16 Wireless MAN / WiMAX
IEEE 802.16n-2013	IEEE	Published	IEEE Standard for Air Interface for Broadband Wireless Access Systems– Amendment 2: Higher Reliability Networks	IoT; IMT-2020; IoT & Smart Sustainable Cities Standards
IEEE 802.16p-2012	IEEE	Published	IEEE Standard for Air Interface for Broadband Wireless Access Systems Amendment 1: Enhancements to Support Machine-to-Machine Applications	IoT; IMT-2020; IoT & Smart Sustainable Cities Standards

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
IEEE 802.16q-2015	IEEE 802.16	Published	IEEE Standard for Air Interface for Broadband Wireless Access Systems – Amendment 3: Multi-tier Networks	IMT-2020
IEEE 802.19.1-2014	IEEE 802	Published	IEEE Standard for Information Technology – Telecommunications and Information Exchange Between Systems – Local and Metropolitan Area Networks – Specific Requirements – Part 19: TV White Space Coexistence Methods	IMT-2020
IEEE 802.1CB	IEEE 802.1	Published	IEEE Standard for Local and metropolitan area networks–Frame Replication and Elimination for Reliability	IMT-2020
IEEE 802.1Qbv	IEEE 802.1	Published	IEEE Standard for Local and metropolitan area networks – Bridges and Bridged Networks – Amendment 25: Enhancements for Scheduled Traffic	IMT-2020
IEEE 802.1Qbv Enhancements for Scheduled Traffic	IEEE 802.1	Published	This standard specifies Media Access Control (MAC) Bridges that interconnect individual Local Area Networks (LANs), each supporting the IEEE 802 MAC service using a different or identical media access control method, to provide Bridged Local Area Networks	IMT-2020
IEEE 802.1Qch-2017	IEEE 802.1	Published	IEEE Standard for Local and metropolitan area networks–Bridges and Bridged Networks – Amendment 29: Cyclic Queuing and Forwarding	IMT-2020
IEEE 802.1Qci Per-	IEEE 802.1	Published	IEEE Standard for Local and metropolitan area	IMT-2020

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			networks–Bridges and Bridged Networks – Amendment 28: Per-Stream Filtering and Policing	
IEEE 802.21-2017	IEEE	Published	802.21-2017 – IEEE Standard for Local and metropolitan area networks – Part 21: Media Independent Services Framework	Multimedia; Network security; IMT-2020
IEEE 802.21.1-2017	IEEE 802	Published	IEEE Standard for Local and metropolitan area networks – Part 21.1: Media Independent Services	IMT-2020
IEEE 802.22-2011	IEEE	Published	(adopted as ISO/IEC/IEEE 8802-22:2015)	IoT; IMT-2020; IoT & Smart Sustainable Cities Standards
IEEE 802.22.1-2010	IEEE	Published	IEEE Standard for Information Technology–Telecommunications and information exchange between systems–Local and metropolitan area networks – Specific requirements Part 22.1: Standard to Enhance Harmful Interference Protection for Low-Power Licensed Devices Operating in TV Broadcast Bands	IoT; IMT-2020; IoT & Smart Sustainable Cities Standards
IEEE 802.22.2-2012	IEEE	Published	IEEE Standard for Information Technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements Part 22.2: Installation and Deployment of IEEE 802.22 Systems	IoT; IMT-2020; IoT & Smart Sustainable Cities Standards
IEEE 802.22a-2014	IEEE 802	Published	IEEE Standard for Information Technology – Telecommunications and	IMT-2020

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			information exchange between systems Wireless Regional Area Networks (WRAN) – Specific Requirements – Part 22: Cognitive Wireless RAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications: Policies and Procedures for Operation in the TV Bands Amendment 1:	
IEEE 802.22b-2015	IEEE	Published	IEEE Standard for Information Technology– Telecommunications and information exchange between systems – Wireless Regional Area Networks (WRAN) – Specific requirements – Part 22: Cognitive Wireless RAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications: Policies and Procedures for Operation in the TV Bands – Amendment 2:	Security mechanisms; Network Management; Security protocol standards; Wireless; IMT-2020; IoT & Smart Sustainable Cities Standards
IEEE 802.3 – 2018 – 1000BASE-LX10 and 1000BASE-BX10	IEEE 802.3	Published	IEEE Standard for Ethernet – 1000BASE-LX10 and 1000BASE-BX10: Physical Layer specification for point-to-point 1 Gb/s Ethernet links over single-mode optical fiber and multimode optical fiber- IEEE Std 802.3, Clause 56, Clause 59 and Clause 66	IMT-2020
IEEE 802.3 – 2018 – 100BASE-LX10 and 100BASE-BX10	IEEE 802.3	Published	IEEE Standard for Ethernet – 100BASE-LX10 and 100BASE-BX10: Physical Layer specification for point-to-point 100 Mb/s Ethernet links over single-mode optical fiber – IEEE Std 802.3, Clause 56, Clause 58 and Clause 66	IMT-2020

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
IEEE 802.3 – 2018 – 10GBASE-PR and 10/1GBASE-PRX	IEEE 802.3	Published	IEEE Standard for Ethernet – 10GBASE-PR and 10/1GBASE-PRX: Physical Layer specification for point-to-multipoint 10 Gb/s connections over Ethernet-based passive optical networks (10G-EPON) – IEEE Std 802.3, Clause 56, Clause 75, Clause 76 and Clause 77	IMT-2020
IEEE 802.3.1-2013	IEEE	Published	IEEE Standard for Management Information Base (MIB) Definitions for Ethernet	IoT; IoT & Smart Sustainable Cities Standards; IMT-2020
IEEE 802.3.2-2019 YANG Data Model	IEEE 802.3	Published	IEEE Standard for Ethernet – YANG Data Model Definitions	YANG data models; YANG models for PtP systems; YANG models for PON systems; IMT-2020
IEEE 802.3cd – 2018	IEEE 802.3 Working Group	Published	IEEE Standard for Ethernet – Amendment 3: Media Access Control Parameters for 50 Gb/s and Physical Layers and Management Parameters for 50 Gb/s, 100 Gb/s, and 200 Gb/s Operation	IMT-2020
IEEE P1451-99	IEEE	Draft	Standard for Harmonization of Internet of Things (IoT) Devices and Systems	IMT-2020
IEEE P1451.4a	IEEE	Draft	IEEE Draft Standard for A Smart Transducer Interface for Sensors and Actuators--Mixed-Mode Communication Protocols and Transducer Electronic Data Sheet (TEDS) Formats – Amendment	IoT; IMT-2020; IoT & Smart Sustainable Cities Standards
IEEE P1451.8	IEEE	Draft	Standard for Wind Turbine Health Monitoring System Wireless Communication Protocols and Transducer Electronic Data Sheet (TEDS) Format	IMT-2020

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
IEEE P149	IEEE	Draft	IEEE Draft Recommended Practice for Antenna Measurements	IMT-2020
IEEE P1609.2.1	IEEE	Draft	Wireless Access in Vehicular Environments (WAVE) – Certificate Management Interfaces for End-Entities	IMT-2020
IEEE P1609.2b	IEEE	Draft	IEEE Standard for Wireless Access in Vehicular Environments – Security Services for Applications and Management Messages – Amendment 2 PDU Functional Types and Encryption Key Management	IMT-2020
IEEE P1765	IEEE	Draft	Trial-Use Recommended Practice for Estimating the Uncertainty in Error Vector Magnitude of Measured Digitally Modulated Signals for Wireless Communications	IMT-2020
IEEE P1770	IEEE	Draft	Recommended Practice for The Usage of Terms Commonly Employed In the Field of Large-Signal Vector Network Analysis	IMT-2020
IEEE P1857.6	IEEE	Published	IEEE Standard for Digital Media Content Description	IMT-2020
IEEE P1857.9	IEEE	Draft	IEEE Draft Standard for Immersive Visual Content Coding	IMT-2020
IEEE P1903.1-2017	IEEE	Published	IEEE Standard for Content Delivery Protocols of Next Generation Service Overlay Network	IMT-2020
IEEE P1903.2-2017	IEEE	Published	IEEE Standard for Service Composition Protocols of Next Generation Service Overlay Network	IMT-2020
IEEE P1903.3-2017	IEEE	Published	IEEE Standard for Self-Organizing Management	IMT-2020

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			Protocols of Next Generation Service Overlay Network	
IEEE P1912	IEEE	Draft	Standard for Privacy and Security Architecture for Consumer Wireless Devices	IMT-2020
IEEE P1913	IEEE	Draft	Draft Standard for Software-Defined Quantum Communication	IMT-2020
IEEE P1914.1-2019	IEEE	Published	IEEE Standard for Packet-based Fronthaul Transport Networks	IMT-2020
IEEE P1914.3-2018	IEEE	Published	IEEE Standard for Radio Over Ethernet Encapsulations and Mappings	IMT-2020
IEEE P1915.1	IEEE	Draft	IEEE Draft Standard for Software Defined Networking and Network Function Virtualization Security	IMT-2020
IEEE P1916.1	IEEE	Draft	IEEE Draft Standard for Software Defined Networking and Network Function Virtualization Performance	IMT-2020
IEEE P1917.1	IEEE	Draft	IEEE Draft Standard for Software Defined Networking and Network Function Virtualization Reliability	IMT-2020
IEEE P1918.1	IEEE	Draft	IEEE Draft Standard for Tactile Internet: Application Scenarios, Definitions and Terminology, Architecture, Functions, and Technical Assumptions	IMT-2020
IEEE P1918.1.1	IEEE	Draft	IEEE Draft Standard for Haptic Codecs for the Tactile Internet	IMT-2020

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
IEEE P1920.1	IEEE	Draft	IEEE Draft Standard for Aerial Communications and Networking Standards	IMT-2020
IEEE P1921.1	IEEE	Draft	IEEE Draft Standard for Software-Defined Networking (SDN) Bootstrapping Procedures	IMT-2020
IEEE P1930.1	IEEE	Draft	IEEE Draft Recommended Practice for Software Defined Networking (SDN) based Middleware for Control and Management of Wireless Networks	IMT-2020
IEEE P1931.1	IEEE	Draft	IEEE Draft Standard for an Architectural Framework for Real-time Onsite Operations Facilitation (ROOF) for the Internet of Things	IMT-2020
IEEE P211	IEEE	Draft	Standard Definitions of Terms for Radio Wave Propagation	IMT-2020
IEEE P2413	IEEE	Draft	IEEE Draft Standard for an Architectural Framework for the Internet of Things (IoT)	IoT; IMT-2020; IoT & Smart Sustainable Cities Standards
IEEE P287.1	IEEE	Draft	Standard for Precision Coaxial Connectors at RF, Microwave and Millimeter-wave Frequencies. Part 1 General requirements, definitions, and detailed Specifications	IMT-2020
IEEE P3333.2.4	IEEE	Draft	IEEE Draft Standard for Three-Dimensional (3D) Medical Simulation	IMT-2020
IEEE P802.11ax	IEEE 802	Draft	IEEE Draft Standard for Information Technology–Telecommunications and Information Exchange Between Systems Local and Metropolitan Area Networks–Specific Requirements Part 11:	IMT-2020

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications Amendment Enhancements for High Efficiency WLAN	
IEEE P802.11ay	IEEE 802	Draft	IEEE Draft Standard for Information Technology – Telecommunications and Information Exchange Between Systems Local and Metropolitan Area Networks – Specific Requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications – Amendment: Enhanced Throughput for Operation in License-Exempt Bands above 45 GHz	IMT-2020
IEEE P802.15.12	IEEE 802.15	Draft	IEEE Draft Standard for Upper Layer Interface (ULI) for IEEE 802.15.4 Low-Rate Wireless Networks	IMT-2020
IEEE P802.15.3d	IEEE 802.15	Draft	IEEE Draft Standard for Information technology – Local and metropolitan area networks – Specific requirements – Part 15.3: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for High Rate Wireless Personal Area Networks (WPAN) – Amendment for a 100 Gb/s wireless switched point-to-point physical layer	IMT-2020
IEEE P802.15.8	IEEE	Draft	IEEE Draft Standard for Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Peer	IoT; IMT-2020; IoT & Smart Sustainable Cities Standards

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			Aware Communications (PAC)	
IEEE P802.16s	IEEE 802.16	Published	IEEE Draft Standard for Air Interface for Broadband Wireless Access Systems – Amendment 4: Fixed and Mobile Wireless Access in Channel Bandwidth up to 1.25 MHz	IMT-2020
IEEE P802.19.1a-2017	IEEE 802	Published	IEEE Draft Standard for Information Technology – Telecommunications and Information Exchange Between Systems – Local and Metropolitan Area Networks – Specific Requirements – Part 19: TV White Space Coexistence Methods – Amendment: Coexistence Methods for Geo-location Capable Devices Operating under General Authorization	IMT-2020
IEEE P802.19.1b	IEEE 802	Draft	New activity to develop a recommended practice with the purpose of identifying performance enhancement settings that provide improvements for IEEE 802 wireless devices in automotive environments.	IMT-2020
IEEE P802.1CF	IEEE 802.1	Draft	IEEE Draft Recommended Practice for Network Reference Model and Functional Description of IEEE 802(R) Access Network	IMT-2020
IEEE P802.1CM	IEEE 802.1	Draft	IEEE Draft Standard for Local and Metropolitan Area Networks – Time-Sensitive Networking for Fronthaul	IMT-2020
IEEE P802.21-2017/Cor 1	IEEE 802	Draft	IEEE Standard for Local and Metropolitan Area	IMT-2020

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			Networks – Part 21: Media Independent Services Framework – Corrigendum 1: Clarification of Parameter Definition in Group Session Key Derivation	
IEEE P802.22.3	IEEE 802	Draft	IEEE Draft Standard for Spectrum Characterization and Occupancy Sensing	IMT-2020
IEEE P802.3bs	IEEE 802.1	Published	IEEE Draft Standard for Ethernet – Amendment 10: Media Access Control Parameters, Physical Layers and Management Parameters for 200 Gb/s and 400 Gb/s Operation	IMT-2020
IEEE P802.3ca	IEEE 802.3 Working Group	Draft	IEEE Draft Standard for Ethernet – Amendment: Physical Layer Specifications and Management Parameters for 25 Gb/s and 50 Gb/s, Passive Optical Networks	IMT-2020
IEEE P802.3cc	IEEE 802.3 Working Group	Draft	IEEE Draft Standard for Ethernet – Amendment 11: Physical Layer and Management Parameters for Serial 25 Gb/s Ethernet Operation Over Single-Mode Fiber	IMT-2020
IEEE P802.3cd	IEEE 802.3 Working Group	Draft	IEEE Draft Standard for Ethernet – Amendment 3: Media Access Control Parameters for 50 Gb/s and Physical Layers and Management Parameters for 50 Gb/s, 100 Gb/s, and 200 Gb/s Operation	IMT-2020
ISO/IEC/IEEE 21450:2010 (adoption of IEEE 1451.0-2007)	IEEE	Published	Information technology – Smart Transducer Interface for Sensors and Actuators – Common Functions	Sensor and Actuator; IMT-2020; IoT & Smart Sustainable Cities Standards
ISO/IEC/IEEE 21451-2:2010	IEEE	Published	Information technology – Smart Transducer Interface for Sensors and	Sensor and Actuator; IMT-2020; IoT & Smart

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
(adoption of IEEE 1451.2-1997)			Actuators – Transducer to Microprocessor Communication Protocols and Transducer Electronic Data Sheet (TEDS) Formats	Sustainable Cities Standards
ISO/IEC/IEEE 21451-4:2010 (adoption of IEEE 1451.4-2004)	IEEE	Published	Information technology – Smart Transducer Interface for Sensors and Actuators – Mixed-Mode Communication Protocols and Transducer Electronic Data Sheet (TEDS) Formats	Sensor and Actuator; IMT-2020; IoT & Smart Sustainable Cities Standards
ISO/IEC/IEEE 21451-7:2011	IEEE	Published	Information technology – Smart transducer interface for sensors and actuators – Part 7: Transducers to radio frequency identification (RFID) systems communication protocols and Transducer Electronic Data Sheet (TED) formats	Sensor and Actuator; IMT-2020; IoT & Smart Sustainable Cities Standards
ISO/IEC/IEEE P21451-1-4	IEEE	Draft	Information technology – Smart transducer interface for sensors and actuators – Part 4: Mixed-mode communication protocols and Transducer Electronic Data Sheet (TEDS) formats	IoT; IMT-2020; IoT & Smart Sustainable Cities Standards
P802.1CF	IEEE 802.1	Draft	IEEE Recommended Practice for Network Reference Model and Functional Description of IEEE 802(R)Access Network This Recommended Practice specifies an access network, which connects terminals to their access routers, utilizing technologies based on the family of IEEE 802 Standards by providing an access network reference	IMT-2020

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			model, including entities and reference	
P802.1CM	IEEE 802.1	Draft	Time-Sensitive Networking for Fronthaul The purpose of this standard is to enable the transport of time sensitive fronthaul streams in Ethernet bridged networks.	IMT-2020
IEEE 1914.1	IEEE 1914	Draft	Standard for Packet-based Fronthaul Transport Networks	IMT-2020
IEEE P1914.3-2018	IEEE 1914	Draft	Standard for Radio Over Ethernet Encapsulations and Mappings	IMT-2020

7.5 ISO/IEC

The International Organization for Standardization (ISO) is an international standard-setting body composed of representatives from various national standards organizations. The organization promotes worldwide proprietary, industrial, and commercial standards. The International Electrotechnical Commission (IEC) is the world's leading organization that prepares and publishes International Standards for all electrical, electronic and related technologies. When appropriate, IEC cooperates with ISO or ITU to ensure that International Standards fit together seamlessly and complement each other. Joint committees ensure that International Standards combine all relevant knowledge of experts working in related areas.

Table 7-5 provides a list of ISO/IEC deliverables associated with IMT-2020 networks.

Table 7-5 – ISO/IEC deliverables

Name	Responsible group	Status	Subject	Topics
ISO/IEC/IEEE 21450:2010 (adoption of IEEE 1451.0-2007)	IEEE	Published	Information technology – Smart Transducer Interface for Sensors and Actuators – Common Functions	Sensor and Actuator; IMT-2020; IoT & Smart Sustainable Cities Standards
ISO/IEC/IEEE 21451-2:2010 (adoption of IEEE 1451.2-1997)	IEEE	Published	Information technology – Smart Transducer Interface for Sensors and Actuators – Transducer to Microprocessor Communication Protocols and Transducer Electronic	Sensor and Actuator; IMT-2020; IoT & Smart Sustainable Cities Standards

Table 7-5 – ISO/IEC deliverables

Name	Responsible group	Status	Subject	Topics
			Data Sheet (TEDS) Formats	
ISO/IEC/IEEE 21451-4:2010 (adoption of IEEE 1451.4-2004)	IEEE	Published	Information technology – Smart Transducer Interface for Sensors and Actuators – Mixed-Mode Communication Protocols and Transducer Electronic Data Sheet (TEDS) Formats	Sensor and Actuator; IMT-2020; IoT & Smart Sustainable Cities Standards
ISO/IEC/IEEE 21451-7:2011	IEEE	Published	Information technology –Smart transducer interface for sensors and actuators – Part 7: Transducers to radio frequency identification (RFID) systems communication protocols and Transducer Electronic Data Sheet (TEDS) formats	Sensor and Actuator; IMT-2020; IoT & Smart Sustainable Cities Standards

7.6 ITU-R

The ITU Radiocommunication Sector (ITU-R) is one of the three sectors of the International Telecommunication Union (ITU) and is responsible for radio communication. Its role is to manage the international radio-frequency spectrum and satellite orbit resources and to develop standards for radiocommunication systems with the objective of ensuring the effective use of the spectrum.

Table 7-6 provides a list of ITU-R deliverables associated with IMT-2020 networks.

Table 7-6 – ITU-R deliverables

Name	Responsible group	Status	Subject	Topics
ITU-R M.2440-0	ITU-R WP 5D	Published	The use of the terrestrial component of International Mobile Telecommunications for narrowband and broadband machine-type communications	IMT-2020
ITU-R M.2012-3	ITU-R WP 5D	Published	Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-Advanced (IMT-Advanced)	IMT-2020

Table 7-6 – ITU-R deliverables

Name	Responsible group	Status	Subject	Topics
ITU-R M.2070-1	ITU-R WP 5D	Published	Generic unwanted emission characteristics of base stations using the terrestrial radio interfaces of IMT-Advanced	IMT-2020
ITU-R M.2071-1	ITU-R WP 5D	Published	Generic unwanted emission characteristics of mobile stations using the terrestrial radio interfaces of IMT-Advanced	IMT-2020
ITU-R M.2083-0	ITU-R WP 5D	Published	IMT Vision – Framework and overall objectives of the future development of IMT for 2020 and beyond	IMT-2020
ITU-R M.2090-0	ITU-R WP 5D	Published	Specific unwanted emission limit of IMT mobile stations operating in the frequency band 694-790 MHz to facilitate protection of existing services in Region 1 in the frequency band below 470-694 M	IMT-2020
ITU-R M.2101-0	ITU-R WP 5D	Published	Modelling and simulation of IMT networks and systems for use in sharing and compatibility studies	IMT-2020
ITU-R M.2410-0	ITU-R WP 5D	Published	Minimum requirements related to technical performance for IMT-2020 radio interface(s)	IMT-2020
ITU-R M.2411-0	ITU-R WP 5D	Published	Requirements, evaluation criteria and submission templates for the development of IMT-2020	IMT-2020
ITU-R M.2412-0	ITU-R WP 5D	Published	Guidelines for evaluation of radio interface technologies for IMT-2020	IMT-2020
ITU-R M.2441-0	ITU-R WP 5D	Published	Emerging usage of the terrestrial component of International Mobile Telecommunication (IMT)	IMT-2020

7.7 ITU-T SG2

ITU-T Study Group 2 is responsible for studies relating to: continued deployment of numbering, naming, addressing and identification (NNAI) requirements and resource assignment, including criteria and procedures for reservation, assignment and reclamation; evolution of and specification of use of NNAI requirements and resource assignment, including criteria and procedures for reservation, assignment and reclamation for future telecommunication/ICT architectures, capabilities, technologies, applications and services; principles of administering global NNAI resources;

principles and operational aspects of routing, interworking, number portability and carrier switching; principles of service provision, definition and operational requirements for current and future telecommunication/ICT architectures, capabilities, technologies, applications and services; 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 and emerging telecommunication/ICT architectures, capabilities, technologies, applications and services; evaluation of feedback from operators, manufacturing companies and users on different aspects of network operation; management of future telecommunication/ICT architectures, capabilities, technologies, applications and services; evolution of the management interface specification methodology; 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 future services, such as over-the-top (OTT), on international telecommunication services and networks.

Table 7-7 provides a list of ITU-T SG2 deliverables associated with IMT-2020 networks.

Table 7-7 – ITU-T SG2 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T M.3041	ITU-T SG2	Published	Framework of smart operation, management and maintenance	IMT-2020
ITU-T M.3080	ITU-T SG2	Published	Framework of AI enhanced Telecom Operation and Management (AITOM)	IMT-2020
ITU-T M.inomsa (under study)	ITU-T SG2	Draft	Integrated network operation and management system architecture to support SDN/NFV management	IMT-2020
ITU-T M.3381	ITU-T SG2	Published	Requirements for energy saving management of 5G RAN system with AI	IMT-2020

7.8 ITU-T SG5

ITU-T Study Group 5 is responsible for the development of standards on the environmental aspects of ICT and digital technologies and protection of the environment, including electromagnetic phenomena and climate change. Study Group 5 study how the digital transformation can be shaped to ensure it supports transitions towards more sustainable societies. Study Group 5 also study issues related to resistibility, human exposure to electromagnetic fields (EMF), circular economy, energy efficiency and climate-change adaptation and mitigation. 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. Study Group 5 is responsible for studies on how to use ICTs and digital technologies to tackle environmental challenges in line with the Sustainable Development Goals (SDGs).

Table 7-8 provides a list of ITU-T SG5 deliverables associated with IMT-2020 networks.

Table 7-8 – ITU-T SG5 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T K Suppl. 10	ITU-T SG5	Published	Analysis of electromagnetic compatibility aspects and definition of requirements for 5G mobile systems	IMT-2020
ITU-T K Suppl. 14	ITU-T SG5	Published	The impact of RF-EMF exposure limits stricter than the ICNIRP or IEEE guidelines on 4G and 5G mobile network deployment	IMT-2020
ITU-T K Suppl. 16	ITU-T SG5	Published	Electromagnetic field compliance assessments for 5G wireless networks	IMT-2020
ITU-T K Suppl. 8	ITU-T SG5	Published	Resistibility analysis of 5G systems	IMT-2020
ITU-T K Suppl. 9	ITU-T SG5	Published	5G technology and human exposure to radiofrequency electromagnetic fields	IMT-2020
ITU-T K.116	ITU-T SG5	Published	Electromagnetic compatibility requirements and test methods for radio telecommunication terminal equipment	IMT-2020
ITU-T K.136	ITU-T SG5	Published	Electromagnetic compatibility requirements for radio telecommunication equipment	IMT-2020 and beyond
ITU-T K.5G-Lightning	ITU-T SG5	Draft (under study)	Practical guide for lightning protection, earthing and bonding, and safety consideration of 5G radio base station	IMT-2020
K Suppl. 26: ITU-T K.114	ITU-T SG5	Published	Analysis of electromagnetic compatibility requirements and test methods of 5G active antenna system	IMT-2020 and beyond
ITU-T L Suppl. 36	ITU-T SG5	Published	Study on methods and metrics to evaluate	IMT-2020

Table 7-8 – ITU-T SG5 deliverables

Name	Responsible group	Status	Subject	Topics
			energy efficiency for future 5G systems	
ITU-T L.1022	ITU-T SG5	Published	Circular Economy: Definitions and concepts for material efficiency for Information and Communication Technology	IMT-2020 and beyond
ITU-T L.1210	ITU-T SG5	Published	Sustainable power-feeding solutions for 5G networks	IMT-2020
ITU-T L.1220	ITU-T SG5	Published	Innovative energy storage technology for stationary use – Part 1: Overview of energy storage	Cloud Computing; IMT-2020; Energy management and power supply
ITU-T L.1221	ITU-T SG5	Published	Innovative energy storage technology for stationary use – Part 2: Battery	IMT-2020; Energy management and power supply; IoT & Smart Sustainable Cities Standards
ITU-T L.1222	ITU-T SG5	Published	Innovative energy storage technology for stationary use – Part 3: Supercapacitor technology	IMT-2020; Energy management and power supply; IoT & Smart Sustainable Cities Standards
ITU-T L.1310	ITU-T SG5	Published	Energy efficiency metrics and measurement methods for telecommunication equipment	IMT-2020

Table 7-8 – ITU-T SG5 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T L.1320	ITU-T SG5	Published	Energy efficiency metrics and measurement for power and cooling equipment for telecommunications and data centres	Cloud Computing; IMT-2020
ITU-T L.1325	ITU-T SG5	Published	Green ICT solutions for telecom network facilities	IMT-2020; Energy management and power supply
ITU-T L.1331	ITU-T SG5	Published	Assessment of mobile network energy efficiency	IMT-2020
ITU-T L.1333	ITU-T SG5	Published	Carbon data intensity for network energy performance monitoring	IMT-2020
ITU-T L.1350	ITU-T SG5	Published	Energy efficiency metrics of a base station site	IMT-2020
ITU-T L.1351	ITU-T SG5	Published	Energy efficiency measurement methodology for base station sites	Security assessment and evaluation criteria; Security policy and policy mechanisms; IMT-2020
ITU-T L.1380	ITU-T SG5	Published	Smart energy solution for telecom sites	IMT-2020
ITU-T L.1382	ITU-T SG5	Published	Smart energy solution for telecommunication rooms	IMT-2020
ITU-T L.1383	ITU-T SG5	Published	Smart energy solution for home and city application	IMT-2020
ITU-T L.1410	ITU-T SG5	Published	Methodology for environmental life cycle assessments of information and communication technology goods, networks and services	Cloud Computing; IMT-2020; Environment and power supply of Home Network equipment

Table 7-8 – ITU-T SG5 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T L.1470	ITU-T SG5	Published	GHG emissions trajectories for the ICT sector compatible with the UNFCCC Paris Agreement	IMT-2020
ITU-T L.1471	ITU-T SG5	Published	Guidance and criteria for information and communication technology organizations on setting Net Zero targets and strategies	IMT-2020 and beyond 5G ICN FMC
ITU-T L.1480	ITU-T SG5	Consented	Enabling the Net Zero transition: Assessing how the use of ICT solutions impacts GHG emissions of other sectors	IMT-2020 and beyond 5G ICN FMC
ITU-T L.1390	ITU-T SG5	Published	Energy saving technologies and best practices for 5G RAN equipment	IMT-2020
ITU-T L.1316	ITU-T SG5	Published	Energy efficiency framework	IMT-2020
ITU-T L.1036	ITU-T SG5	Published	Scheduled waste management for a base station (inclusive of e-waste)	IMT-2020
ITU-T L.GHGintensities	ITU-T SG5	Draft	GHG emissions intensity indicators for telecom network operators	IMT-2020 and beyond
ITU-T L.1023 (9/2020)	ITU-T SG5	Published	Assessment method for circular scoring. ICT response to circular economy	IMT-2020; IoT & Smart Sustainable Cities Standards
ITU-T L.1050 (01/2022)	ITU-T SG5	Published	Methodology to assess the environmental impact of the different proposed architectures	IMT-2020; IoT & Smart Sustainable Cities Standards

7.9 ITU-T SG9

ITU-T Study Group 9 is responsible for studies relating to use of telecommunication systems for contribution, primary distribution and secondary distribution of audiovisual content, e.g. television programmes and related data services, including interactive services and applications, providing advanced capabilities, e.g. ultra-high definition and high-dynamic range, 3D, virtual reality, augmented reality and multiview; use of cable networks, e.g. coaxial cable, optical fibre, hybrid fibre

coaxial (HFC), etc., to also provide integrated broadband services. The cable network, primarily designed for audiovisual content delivery to the home, also carries time-critical services like voice, gaming, video-on-demand, interactive and multiscreen services, etc. to customer premises equipment (CPE) in the home or enterprise; use of cloud computing, artificial intelligence (AI) and other advanced technologies to enhance audiovisual content contribution and distribution as well as integrated broadband services over the cable networks; use of accessibility services (like captioning, audio caption) and new interaction technologies (like haptic, gesture, eye tracking and so on) to enhance accessibility of audiovisual content and related data services for people with different ranges of abilities.

Table 7-9 provides a list of ITU-T SG9 deliverables associated with IMT-2020 networks.

Table 7-9 – ITU-T SG9 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T J.cable-5G	ITU-T SG9	Draft	Functional requirements for integrated broadband cable television services to use 5G radio system	IMT-2020

7.10 ITU-T SG11

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 such as future networks (FN), cloud-computing networks, VoLTE/ViLTE-based network interconnection, virtual networks, multimedia, next-generation networks (NGN), signalling for legacy network interworking, satellite-terrestrial networks, software-defined networking (SDN) technologies, network function virtualization (NFV) technologies, IMT-2020 networks and beyond, quantum key distribution network (QKDN) and related technologies, and augmented reality. Study Group 11 is also responsible for studies to combat counterfeit telecommunication/ICT devices and mobile device theft. Study Group 11 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, Study Group 11 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).

Table 7-10 provides a list of ITU-T SG11 deliverables associated with IMT-2020 networks.

Table 7-10 – ITU-T SG11 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Q.3054	ITU-T SG11	Published	Signalling architecture for virtualization of control network entities	Security Architectures, Models and Frameworks; Security protocol standards; IMT-2020
ITU-T Q.3714	ITU-T SG11	Published	Signalling requirements of SDN-based access networks with media-independent management capabilities	IMT-2020
ITU-T Q.3715	ITU-T SG11	Published	Signalling requirements for dynamic bandwidth adjustment on demand on broadband network gateway implemented by software-defined networking technologies	IMT-2020
ITU-T Q.3716	ITU-T SG11	Published	Signalling requirements for mapping between physical and virtual networks	IMT-2020
ITU-T Q.3740	ITU-T SG11	Published	Signalling requirements for software-defined networking and network function virtualization- based central office services	IMT-2020
ITU-T Q.3741	ITU-T SG11	Published	Signalling requirements for SD-WAN service	IMT-2020
ITU-T Q.4061	ITU-T SG11	Published	Framework of software-defined network controller testing	IMT-2020
ITU-T Q.5001	ITU-T SG11	Published	Signalling requirements and architecture of intelligent edge computing	IMT-2020
ITU-T Q.5002	ITU-T SG11	Published	Signalling requirements and architecture for media service entity attachment	IMT-2020 and beyond
ITU-T Q.5003	ITU-T SG11	Published	Signalling requirement and architecture for	IMT-2020 and beyond

Table 7-10 – ITU-T SG11 deliverables

Name	Responsible group	Status	Subject	Topics
			federated multi-access edge computing	
ITU-T Q.5020	ITU-T SG11	Published	Protocol requirements and procedures for network slice lifecycle management	IMT-2020
ITU-T Q.5021	ITU-T SG11	Published	Protocol for managing capability exposure APIs in IMT-2020 network	IMT-2020
ITU-T Q. 5022	ITU-T SG11	Published	Signalling procedure of energy efficient device-to-device communication for IMT-2020 network	IMT-2020
ITU-T Q.5023	ITU-T SG11	Published	Protocol for managing intelligent network slicing with AI-assisted analysis in IMT-2020 network	IMT-2020 and beyond
ITU-T Q.5024	ITU-T SG11	Published	Protocol for providing intelligent analysis services in IMT-2020 network	IMT-2020 and beyond
ITU-T Q.5025	ITU-T SG11	Published	Protocol for managing User Plane function in IMT-2020 network	IMT-2020 and beyond
ITU-T Q.BNG-INC	ITU-T SG11	Draft (under study)	Requirements and signalling of intelligence control for the border network gateway in computing power network	Software-Defined Networking (SDN)
ITU-T Q.CPN	ITU-T SG11	Draft (under study)	Signalling requirements for computing power network	Software-Defined Networking (SDN)
ITU-T Q.DIVS-IMT2020	ITU-T SG11	Draft (under study)	Signalling Requirements and Protocol for Providing Network-oriented Data Integrity Verification Service based on Blockchain in IMT-2020 network	IMT-2020 and beyond

Table 7-10 – ITU-T SG11 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Q.hns	ITU-T SG11	Draft	Signalling requirements for hierarchical network slicing service	Software-Defined Networking (SDN)
ITU-T Q.IEC-PRO	ITU-T SG11	Draft (under study)	Protocols for microservices based intelligent edge computing	IMT-2020 and beyond
ITU-T Q.IITSN	ITU-T SG11	Draft (under study)	Protocol for IMT-2020 network Integration with Time Sensitive Network	IMT-2020 and beyond
ITU-T Q.IMT2020-PFW	ITU-T SG11	Draft (under study)	Protocol Framework for IMT-2020	IMT-2020
ITU-T Q.LiteIMS-SA	ITU-T SG11	Draft (under study)	Signalling architecture of Lite IMS for IMT-2020 advanced network	IMT-2020
ITU-T Q.PCNC-FMSC	ITU-T SG11	Draft (under study)	Protocol for supporting computing and network convergence in fixed, mobile and satellite convergence in IMT-2020 network and beyond	IMT-2020 and beyond
ITU-T Q.PMMC	ITU-T SG11	Draft (under study)	Protocol for traffic flow coordination of multi-modality communication	IMT-2020 and beyond
ITU-T Q.3745	ITU-T SG11	Published	Protocol for time constraint Internet of things-based applications over software-defined networking	IMT-2020
ITU-T Q. 3963	ITU-T SG11	Published	The compatibility testing of SDN-based equipment using OpenFlow protocol	IMT-2020
ITU-T Q.3406	ITU-T SG11	Published	Signalling requirements for telemetry of virtual broadband network services	IMT-2020
ITU-T Q.4066	ITU-T SG11	Published	Testing procedures of Augmented Reality applications	IMT-2020

Table 7-10 – ITU-T SG11 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Q.4067	ITU-T SG11	Published	Signalling requirements for VNF lifecycle management under testing environment	IMT-2020
ITU-T Q.WLAN5G-REQ	ITU-T SG11	Draft	Signalling requirements of WLAN access network for interworking with 5G network	IMT-2020

7.11 ITU-T SG12

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.

Table 7-11 provides a list of ITU-T SG12 deliverables associated with IMT-2020 networks.

Table 7-11 – ITU-T SG12 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T G.1035	ITU-T SG12	Published	Influencing factors on quality of experience for virtual reality services	IMT-2020 and beyond
ITU-T G.1036	ITU-T SG12	Published	Quality of experience (QoE) influencing factors for augmented reality (AR) services	IMT-2020 and beyond
ITU-T Y.1550	ITU-T SG12	Published	Considerations for realizing virtual measurement systems	IMT-2020
ITU-T G.Sup73	ITU-T SG12	Published	Influencing factors on quality of experience (QoE) for multiview video (MVV) services	IMT-2020 and beyond

Table 7-11 – ITU-T SG12 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T G.Sup77	ITU-T SG12	Published	Influencing factors on quality of experience (QoE) for video customized alerting tone (CAT) and video customized ringing signal (CRS) services	IMT-2020 and beyond
ITU-T GSTR-5GQoE	ITU-T SG12	Published	QoE requirements for real-time multimedia services over 5G networks	IMT-2020 and beyond
ITU-T P.1320 (ex QXM): QoE	ITU-T SG12	Published	Assessment of extended reality (XR) meetings	IMT-2020 and beyond

7.12 ITU-T SG13

ITU-T Study Group 13 is responsible for studies relating to the requirements, architectures, capabilities and application programming interfaces (APIs) as well as softwarization and orchestration aspects of converged future networks (FN), including the application of machine learning technologies. It develops standards related to information-centric networking (ICN) and content-centric networking (CCN). Regarding IMT-2020 and beyond, it particularly focuses on non-radio related parts. Study Group 13's responsibility also includes IMT-2020 and beyond project management coordination across all ITU-T study groups, and release planning. It 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 computing-aware networking, as well as end-to-end awareness, control and management of future computing, including cloud, cloud security and data handling. Study Group 13 studies aspects relating to fixed, mobile and satellite convergence for multi-access networks, mobility management, and enhancements to existing ITU-T Recommendations on mobile communications, including the energy-saving aspects. It develops standards for quantum key distribution networks (QKDN) and related technologies. It further studies the 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.

Table 7-12 provides a list of ITU-T SG13 deliverables associated with IMT-2020 networks.

Table 7-12 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y. FMSC-MEC	ITU-T SG13	Draft (under study)	Multi-access Edge Computing for fixed, mobile and satellite convergence in IMT-2020 networks and beyond	IMT-2020 and beyond

Table 7-12 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y. FMSC-MM	ITU-T SG13	Draft (under study)	Mobility Management for fixed mobile, NGSO-satellite convergence in IMT-2020 networks	IMT-2020 and beyond
ITU-T Y. FMSC-NS	ITU-T SG13	Draft (under study)	Network slicing for fixed, mobile and satellite convergence in IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y. FMSC-SMSB	ITU-T SG13	Draft (under study)	Session Management for fixed mobile and satellite convergence with satellite backhaul in IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y. FMSC-TS	ITU-T SG13	Draft (under study)	Requirements and framework of Traffic Scheduling for fixed, mobile and satellite convergence in IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.3070-series Supplement 48	ITU-T SG13	Published	Proof-of-concept for data service using information centric networking in IMT-2020	IMT-2020 and beyond
ITU-T Y.3071	ITU-T SG13	Published	Data aware networking (information centric networking) – Requirements and capabilities	IMT-2020; Cloud Computing
ITU-T Y.3072	ITU-T SG13	Published	Requirements and Capabilities of Name Mapping and Resolution for Information Centric Networking in IMT-2020	IMT-2020 and beyond
ITU-T Y.3074	ITU-T SG13	Published	Framework for directory service for management of huge number of heterogeneously named objects in IMT-2020	IMT-2020 and beyond

Table 7-12 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.3075	ITU-T SG13	Published	Requirements and capabilities of Information Centric Networking routing and forwarding based on control and user plane separation in IMT-2020	IMT-2020 and beyond
ITU-T Y.3076	ITU-T SG13	Published	Architecture of ICN-enabled Edge Network in IMT-2020	IMT-2020 and beyond
ITU-T Y.3077	ITU-T SG13	Published	Framework for interworking of heterogeneous application domain connected objects through information-centric networking in IMT-2020	IMT-2020 and beyond
ITU-T Y.3078	ITU-T SG13	Published	Information centric networking for IMT-2020 and beyond - Requirements and capabilities of data object segmentation	IMT-2020 and beyond
ITU-T Y.3079	ITU-T SG13	Published	Information-Centric Networking in networks beyond IMT-2020: Framework of locally enhanced name mapping and resolution	IMT-2020 and beyond
ITU-T Y.3080	ITU-T SG13	Published	Information-Centric Networking in networks beyond IMT-2020: Requirements and Mechanisms of Transport Layer	IMT-2020 and beyond
ITU-T Y.3081	ITU-T SG13	Published	Self-Controlled Identity based on Blockchain: Requirements and Framework	IMT-2020 and beyond
ITU-T Y.3090	ITU-T SG13	Published	Digital twin network - Requirements and architecture	IMT-2020 and beyond
ITU-T Y.3100	ITU-T SG13	Published	Terms and definitions for IMT-2020 network	IMT-2020

Table 7-12 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.3100-series Supplement 59	ITU-T SG13	Published	IMT-2020 standardization roadmap	IMT-2020 and beyond
ITU-T Y.3100-series Supplement 44	ITU-T SG13	Published	Standardization and open source activities related to network softwarization of IMT-2020	IMT-2020 and beyond
ITU-T Y.3100-series Supplement 64	ITU-T SG13	Published	Awareness on Use Cases and Migration Aspects of IMT-2020	IMT-2020 and beyond
ITU-T Y.3101	ITU-T SG13	Published	Requirements of IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3102	ITU-T SG13	Published	Framework of the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3103	ITU-T SG13	Published	Business Role-based Models in IMT-2020	IMT-2020 and beyond
ITU-T Y.3104	ITU-T SG13	Published	Architecture of the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3105	ITU-T SG13	Published	Requirements of capability exposure in the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3106	ITU-T SG13	Published	QoS functional requirements for the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3107	ITU-T SG13	Published	Functional architecture for QoS assurance management in the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3108	ITU-T SG13	Published	Capability exposure function in the IMT-2020 networks	IMT-2020 and beyond
ITU-T Y.3109	ITU-T SG13	Published	QoS assurance-related requirements and framework for virtual reality delivery using mobile edge computing supported by IMT-2020	IMT-2020 and beyond
ITU-T Y.3110	ITU-T SG13	Published	IMT-2020 network management and orchestration requirements	IMT-2020

Table 7-12 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.3111	ITU-T SG13	Published	IMT-2020 Network Management and Orchestration Framework	IMT-2020
ITU-T Y.3112 revision1	ITU-T SG13	Published	Framework for the support of network slicing in the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3113	ITU-T SG13	Published	Requirements and framework for latency guarantee in large scale networks including IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3114	ITU-T SG13	Published	Future networks including IMT-2020: requirements and functional architecture of lightweight core for dedicated networks	IMT-2020 and beyond
ITU-T Y.3115	ITU-T SG13	Published	AI enabled cross-domain network architectural requirements and framework for future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3116	ITU-T SG13	Published	Traffic typization IMT-2020 management based on an artificial intelligent approach	IMT-2020 and beyond
ITU-T Y.3117	ITU-T SG13	Published	Quality of service assurance-related requirements and framework for smart education supported by IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.3118	ITU-T SG13	Published	Requirements and framework for jitter guarantee in large scale networks including IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.3130	ITU-T SG13	Published	Requirements of IMT-2020 fixed mobile convergence	IMT-2020

Table 7-12 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.3131	ITU-T SG13	Published	Functional architecture for supporting fixed mobile convergence in IMT-2020 networks	IMT-2020
ITU-T Y.3132	ITU-T SG13	Published	Mobility management for fixed mobile convergence in IMT-2020 networks	IMT-2020
ITU-T Y.3133	ITU-T SG13	Published	Capability Exposure enhancement for supporting FMC in IMT-2020 networks	IMT-2020 and beyond
ITU-T Y.3134	ITU-T SG13	Published	IMT-2020 FMC functional requirements for management and orchestration	IMT-2020
ITU-T Y.3135	ITU-T SG13	Published	Service scheduling for supporting FMC in IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3136	ITU-T SG13	Published	Session management for fixed mobile convergence in IMT-2020 networks	IMT-2020 and beyond
ITU-T Y.3137	ITU-T SG13	Published	Technical requirements for supporting application addressing in edge computing for future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3138	ITU-T SG13	Published	Unified multi-access edge computing for supporting fixed mobile convergence in IMT-2020 networks	IMT-2020 and beyond
ITU-T Y.3139	ITU-T SG13	Published	Fixed mobile convergence enhancements to support IMT-2020 based software-defined wide area networking service	IMT-2020 and beyond
ITU-T Y.IMT-2020.qos-mon	ITU-T SG13	Draft (under study)	IMT-2020 network monitoring functional architectural for QoS assurance	IMT-2020

Table 7-12 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.3150 Rev1	ITU-T SG13	Published	High-level technical characteristics of network softwarization for IMT-2020	IMT-2020 and beyond
ITU-T Y.3151	ITU-T SG13	Published	High-level technical characteristics of network softwarization for IMT-2020 - part: SDN	IMT-2020 and beyond
ITU-T Y.3152	ITU-T SG13	Published	Advanced data plane programmability for IMT-2020	IMT-2020 and beyond
ITU-T Y.3153	ITU-T SG13	Published	Network slice orchestration and management for providing network services to 3rd party in the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3154	ITU-T SG13	Published	Resource pooling for scalable network slice service management and orchestration in the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3155	ITU-T SG13	Published	Enhanced SDN Data Plane for IMT-2020	IMT-2020 and beyond
ITU-T Y.3156	ITU-T SG13	Published	Framework of network slicing with AI-assisted analysis in IMT-2020 networks	IMT-2020 and beyond
ITU-T Y.3157	ITU-T SG13	Published	IMT-2020 network slice configuration	IMT-2020 and beyond
ITU-T Y.3158	ITU-T SG13	Published	Local shunting for multi-access edge computing in IMT-2020 networks	IMT-2020 and beyond
ITU-T Y.3170	ITU-T SG13	Published	Requirements for machine learning-based quality of service assurance for the IMT-2020 network	IMT-2020
ITU-T Y.3170-series Supplement 55	ITU-T SG13	Published	ITU-T Y.3170-series – Machine learning in future networks including IMT-2020: use cases	IMT-2020 and beyond

Table 7-12 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.3172	ITU-T SG13	Published	Architectural framework for machine learning in future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3173	ITU-T SG13	Published	Framework for evaluating intelligence levels of future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3174	ITU-T SG13	Published	Framework for data handling to enable machine learning in future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3175	ITU-T SG13	Published	Functional architecture of machine learning-based quality of service assurance for the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3176	ITU-T SG13	Published	Machine learning marketplace integration in future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3177	ITU-T SG13	Published	Architectural framework for artificial intelligence-based network automation for resource and fault management in future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3178	ITU-T SG13	Published	Functional framework of AI-based network service provisioning in future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3179	ITU-T SG13	Published	Architectural framework for machine learning model serving in future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3181	ITU-T SG13	Published	Architectural framework for Machine Learning Sandbox in future networks including IMT-2020	IMT-2020 and beyond

Table 7-12 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.3182	ITU-T SG13	Published	Machine learning based end-to-end multi-domain network slice management and orchestration	IMT-2020 and beyond
ITU-T Y.3200	ITU-T SG13	Published	Fixed, mobile and satellite convergence - Requirements for IMT-2020 network and beyond	IMT-2020 and beyond
ITU-T Y.3324	ITU-T SG13	Published	Requirements and Architectural Framework for Autonomic Management and Control of IMT-2020 Networks	IMT-2020 and beyond
ITU-T Y.DL-AINW-fra	ITU-T SG13	Draft (under study)	Framework for high-level AI-based management communicating with external management systems	IMT-2020 and beyond
ITU-T Y.DTN-CapLevel	ITU-T SG13	Draft (under study)	Digital twin network - Capability level and evaluation methods	IMT-2020 and beyond
ITU-T Y.FMC-AAEC	ITU-T SG13	Draft (under study)	Application addressing in edge computing in IMT-2020 network and beyond	IMT-2020 and beyond
ITU-T Y.FMSC-ABC-req	ITU-T SG13	Draft (under study)	Fixed, mobile and satellite convergence – Requirements of supporting airborne broadband communication in IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.FMSC-CE	ITU-T SG13	Draft (under study)	Capability exposure for fixed, mobile and satellite convergence in IMT-2020 network and beyond	IMT-2020 and beyond

Table 7-12 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.FMSC-CM	ITU-T SG13	Draft (under study)	Connection Management for fixed, mobile and satellite convergence in IMT-2020 network and beyond	IMT-2020 and beyond
ITU-T Y.FMSC-DLT	ITU-T SG13	Draft (under study)	Distributed ledger technology for fixed, mobile and satellite convergence in IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.FMSC-frame	ITU-T SG13	Draft (under study)	Framework of fixed, mobile and satellite convergence in IMT-2020 network and beyond	IMT-2020 and beyond
ITU-T Y.FMSC-HAP-req	ITU-T SG13	Draft (under study)	Fixed, mobile and satellite convergence – Requirements of supporting High Altitude Platform in IMT-2020 network and beyond	IMT-2020 and beyond
ITU-T Y.FMSC-IUSU-req	ITU-T SG13	Draft (under study)	Requirements of integrated user-centric service units for fixed, mobile and satellite convergence in IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.FMSC-LDS	ITU-T SG13	Draft (under study)	Fixed, mobile and satellite convergence – Local data switching for IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.FMSC-P2P	ITU-T SG13	Draft (under study)	Fixed, mobile and satellite convergence – Peer-to-Peer services for IMT-2020 network and beyond	IMT-2020 and beyond
ITU-T Y.FMSC-PC	ITU-T SG13	Draft (under study)	Fixed, mobile and satellite convergence - Policy control for IMT-2020 and beyond	IMT-2020 and beyond

Table 7-12 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.FMSC-SC	ITU-T SG13	Draft (under study)	Service continuity for fixed, mobile and satellite convergence in IMT-2020 network and beyond	IMT-2020 and beyond
ITU-T Y.FMSC-SFC	ITU-T SG13	Draft (under study)	Fixed, mobile and satellite convergence – Service Function Chaining for IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.ICN-core-arch	ITU-T SG13	Draft (under study)	Architecture of information centric core network	IMT-2020 and beyond
ITU-T Y.ICN-DLT	ITU-T SG13	Draft (under study)	Requirements and Functional Framework of Information Centric Networking for supporting Distributed Ledger Technology in IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.ICN-inc-arch	ITU-T SG13	Draft (under study)	Architecture of in-network computing in information centric networking	IMT-2020 and beyond
ITU-T Y.ICN-INP	ITU-T SG13	Draft (under study)	Information-centric networking in networks beyond IMT-2020: Requirements and capabilities of node to support in-network processing	IMT-2020 and beyond
ITU-T Y.ICN-pubsub-arch	ITU-T SG13	Draft (under study)	Architecture of distributed broker-based publish/subscribe in information centric networking	IMT-2020 and beyond
ITU-T Y.ICN-SEAN	ITU-T SG13	Draft (under study)	Architecture and functional framework for on-site, elastic and autonomous ICN network	IMT-2020 and beyond

Table 7-12 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.ICN-UP	ITU-T SG13	Draft (under study)	Information-centric networking in networks beyond IMT-2020: Requirements and functional framework of ICN-enabled user plane	IMT-2020 and beyond
ITU-T Y.IMT2020-AINDO-req-frame	ITU-T SG13	Draft (under study)	Requirements and framework for AI-based network design optimization in future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.IMT2020-arch	ITU-T SG13	Draft (under study)	Architecture of IMT-2020 network	IMT-2020
ITU-T Y.IMT2020-CE-Req	ITU-T SG13	Draft (under study)	Requirements of network capability exposure in IMT-2020 networks	IMT-2020
ITU-T Y.IMT2020-CEF	ITU-T SG13	Draft (under study)	Network capability exposure function in IMT-2020 networks	IMT-2020
ITU-T Y.IMT2020-CEFEC	ITU-T SG13	Draft (under study)	Framework of capability exposure function in edge computing for IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.IMT2020-CNC-req	ITU-T SG13	Draft (under study)	Requirements of computing and network convergence in IMT2020 network and beyond	IMT-2020 and beyond
ITU-T Y.IMT2020-DCN	ITU-T SG13	Draft (under study)	Future networks including IMT-2020: requirements and functional architecture of distributed core network	IMT-2020 and beyond
ITU-T Y.IMT2020-det-qos-reqts-lan	ITU-T SG13	Draft (under study)	QoS requirements and framework for supporting deterministic communication services in local area network for IMT-2020	IMT-2020 and beyond

Table 7-12 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.IMT2020-DJLML	ITU-T SG13	Draft (under study)	Requirements and framework for distributed joint learning to enable machine learning in future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.IMT2020-DN-CCF	ITU-T SG13	Draft (under study)	Future networks including IMT-2020: capability classification framework for dedicated networks	IMT-2020 and beyond
ITU-T Y.IMT2020-EIL	ITU-T SG13	Draft (under study)	Evaluating intelligence capability for network slice management and orchestration in IMT-2020	IMT-2020 and beyond
ITU-T Y.IMT2020-fa-lg-lsn	ITU-T SG13	Draft (under study)	Functional Architecture for latency guarantee in large scale networks including IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.IMT2020-IBNMO	ITU-T SG13	Draft (under study)	Intent-based network management and orchestration for network slicing in IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.IMT2020-NFC-req	ITU-T SG13	Draft (under study)	Use cases and requirements for network function communication between 5G Public Networks and Non Public Networks in IMT-2020	IMT-2020 and beyond
ITU-T Y.IMT2020-QoS-II-req	ITU-T SG13	Draft (under study)	Quality of service assurance-related requirements and framework for Industrial Internet supported by IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.IMT2020-qos-lstn-req	ITU-T SG13	Draft (under study)	Requirements and framework of Deterministic QoS in large-scale	IMT-2020 and beyond

Table 7-12 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
			telecommunications networking for IMT-2020 networks and beyond	
ITU-T Y.IMT2020-qos-map	ITU-T SG13	Draft (under study)	QoS mapping mechanisms for IMT-2020 network	IMT-2020 and beyond
ITU-T Y.IMT2020-qos-req-cg	ITU-T SG13	Draft (under study)	QoS requirements for cloud gaming supported by IMT-2020	IMT-2020 and beyond
ITU-T Y.IMT2020-qos-req-sg	ITU-T SG13	Draft (under study)	QoS assurance-related requirements and framework for smart grid supported by IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.IMT2020-qos-req-sh	ITU-T SG13	Draft (under study)	QoS requirements for smart healthcare supported by IMT-2020	IMT-2020 and beyond
ITU-T Y.IMT2020-qos-req-tcn	ITU-T SG13	Draft (under study)	Quality of service assurance-related requirements and framework for train communication network supported by IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.IMT2020-qos-req-ti	ITU-T SG13	Draft (under study)	Quality of service assurance requirements for the tactile internet	IMT-2020 and beyond
ITU-T Y.IMT2020-REEM	ITU-T SG13	Draft (under study)	Energy efficiency management of virtual resources in IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.IMT2020-SLOA-arch	ITU-T SG13	Draft (under study)	Architectural framework of end-to-end service level objective assurance for future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.IMT2020-SOCN-req-frame	ITU-T SG13	Draft (under study)	Future networks including IMT-2020: requirements and framework for self-organizing core network	IMT-2020 and beyond

Table 7-12 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.IMT2020-STI-NS	ITU-T SG13	Draft (under study)	Network slicing in satellite-terrestrial integration in IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.JDEVOP-req	ITU-T SG13	Draft (under study)	Requirements for joint development and operation for IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.M&O-CNC-fra	ITU-T SG13	Draft (under study)	Management and orchestration related requirements and framework for computing and network convergence in IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.MBIMT2020-Gen	ITU-T SG13	Draft (under study)	General Requirements for Migrating Existing Network Technologies (2G, 3G, 4G) to IMT 2020 and beyond	IMT-2020 and beyond
ITU-T Y.ML-IMT2020-MLFO	ITU-T SG13	Draft (under study)	Requirements and architecture for machine learning function orchestrator	IMT-2020 and beyond
ITU-T Y.ML-IMT2020-VNS	ITU-T SG13	Draft (under study)	Framework for network slicing management enabled by machine learning including input from verticals	IMT-2020 and beyond
ITU-T Y.MMC	ITU-T SG13	Draft (under study)	Requirements and framework for traffic flow coordination of multi-modality communication in IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.MNS-DLT-fr	ITU-T SG13	Draft (under study)	Mobile network sharing based on distributed ledger technology for networks beyond IMT-2020: Requirements and framework	IMT-2020 and beyond

Table 7-12 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.NAEC	ITU-T SG13	Draft (under study)	Network accelerating for edge computing in IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.NSL-fra	ITU-T SG13	Draft (under study)	Framework for classifying network slice level in future networks including IMT-2020	IMT-2020 and beyond

7.13 ITU-T SG15

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.

Table 7-13 provides a list of ITU-T SG15 deliverables associated with IMT-2020 networks.

Table 7-13 – ITU-T SG15 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T G Suppl. 66	ITU-T SG15	Published	5G wireless fronthaul requirements in a passive optical network context	IMT-2020
ITU-T G Suppl. 67	ITU-T SG15	Published	Application of optical transport network Recommendations to 5G transport	IMT-2020
ITU-T G.709.4 Corr.2	ITU-T SG15	Published	OTU 25 and OTU 50G short reach interfaces	IMT-2020
ITU-T G.7711/Y.1702	ITU-T SG15	Published	Generic protocol-neutral information model for transport resources	IMT-2020 and beyond
ITU-T G.7712/Y.1703 Amendment 1	ITU-T SG15	Published	Architecture and specification of data communication network – Amendment 1	IMT-2020 and beyond
ITU-T G.7721.1	ITU-T SG15	Published	Data model of synchronization management	IMT-2020 and beyond
ITU-T G.781.1	ITU-T SG15	Published	Synchronization layer functions for packet-based synchronization	IMT-2020 and beyond

Table 7-13 – ITU-T SG15 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T G.781.1Amd 1	ITU-T SG15	Consented	Synchronization layer functions for packet-based synchronization – Amendment 1	IMT-2020 and beyond
ITU-T G.8261/Y.1361	ITU-T SG15	Published	Timing and synchronization aspects in packet networks	IMT-2020
ITU-T G.8262.1/Y.1362.1 revision	ITU-T SG15	Consented	Timing characteristics of an enhanced synchronous equipment slave clock	IMT-2020
ITU-T G.8262.1 Amd.1	ITU-T SG15	Published	Timing characteristics of synchronous equipment slave clock – Amendment 1	IMT-2020
ITU-T G.8271.1/Y.1366.1 revision	ITU-T SG15	Consented	Network limits for time synchronization in Packet networks	IMT-2020
ITU-T G.8271.1/Y.1366.1 Amd1	ITU-T SG15	Published	Network limits for time synchronization in Packet networks – Amendment 1	IMT-2020
ITU-T G.8271.1/Y.1366.1 Amd2	ITU-T SG15	Published	Network limits for time synchronization in Packet networks – Amendment 2	IMT-2020
ITU-T G.8271.2/Y.1366.2	ITU-T SG15	Published	Network limits for time synchronization in packet networks with partial timing support from the network	IMT-2020
ITU-T G.8271.2/Y.1366.2 Amd1	ITU-T SG15	Consented	Network limits for time synchronization in packet networks with partial timing support from the network – Amendment 1	IMT-2020
ITU-T G.8272.1/Y.1367.1 Amd2	ITU-T SG15	Published	Timing characteristics of enhanced primary reference time clocks – Amendment 2	IMT-2020
ITU-T G.8273.2/Y.1368.2 (2020)	ITU-T SG15	Published	Timing characteristics of telecom boundary clocks and telecom time slave clocks	IMT-2020

Table 7-13 – ITU-T SG15 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T G.8273.2/Y.1368.2 Amd1	ITU-T SG15	Published	Timing characteristics of telecom boundary clocks and telecom time slave clocks – Amendment 1	IMT-2020
ITU-T G.8273.2/Y.1368.2 Amd2	ITU-T SG15	Consented	Timing characteristics of telecom boundary clocks and telecom time slave clocks – Amendment 2	IMT-2020
ITU-T G.8275/Y.1369	ITU-T SG15	Published	Architecture and requirements for packet-based time and phase distribution	IMT-2020
ITU-T G.8275/Y.1369 Amd1	ITU-T SG15	Published	Architecture and requirements for packet-based time and phase distribution – Amendment 1	IMT-2020
ITU-T G.8275/Y.1369 Amd2	ITU-T SG15	Published	Architecture and requirements for packet-based time and phase distribution – Amendment 2	IMT-2020
ITU-T G.8275/Y.1369 Amd3	ITU-T SG15	Consented	Architecture and requirements for packet-based time and phase distribution – Amendment 3	IMT-2020
ITU-T G.8275.1/Y.1369.1 revision	ITU-T SG15	Consented	Precision time protocol telecom profile for phase/time synchronization with full timing support from the network	IMT-2020
ITU-T G.8275.2/Y.1369.2 revision	ITU-T SG15	Consented	Precision time protocol telecom profile for phase/time synchronization with partial timing support from the network	IMT-2020
ITU-T G.8273.4/Y.1368.4	ITU-T SG15	Published	Timing characteristics of telecom boundary clocks and telecom time slave clocks for use with partial timing support from the network	IMT-2020

Table 7-13 – ITU-T SG15 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T G.8273.4/Y.1368.4 Amd1	ITU-T SG15	Published	Timing characteristics of telecom boundary clocks and telecom time slave clocks for use with partial timing support from the network – Amendment 1	IMT-2020
ITU-T G.8273.4/Y.1368.4 Amd2	ITU-T SG15	Consented	Timing characteristics of telecom boundary clocks and telecom time slave clocks for use with partial timing support from the network – Amendment 2	IMT-2020
ITU-T G.8300	ITU-T SG15	Published	Characteristics of transport networks to support IMT-2020/5G	IMT-2020
ITU-T G.8312	ITU-T SG15	Published	Interfaces for a metro transport network	IMT-2020
ITU-T G.8312 Amd1	ITU-T SG15	Published	Interfaces for a metro transport network – Amendment 1	IMT-2020
ITU-T G.8310 Corr1	ITU-T SG15	Published	Functional architecture for metro transport network	IMT-2020
ITU-T G.8321	ITU-T SG15	Consented	Characteristics of MTN equipment functional blocks	IMT-2020
ITU-T G.8350	ITU-T SG15	Consented	Management and Control for metro transport network	IMT-2020 and beyond
ITU-T G.8331	ITU-T SG15	Published	MTN linear protection	IMT-2020
ITU-T G.owdm 2	ITU-T SG15	Draft (under study)	Alternative approach for multi-channel bi-directional MWDM applications with single-channel optical interfaces in the O-band, optimized for 5 km distances.	IMT-2020 and beyond
ITU-T G.Sup.75	ITU-T SG15	Published	5G small cell backhaul/midhaul over TDM-PON	IMT-2020
ITU-T GSTR-GNSS	ITU-T SG15	Published	Considerations on the Use of GNSS as a Primary Time Reference in Telecommunications	IMT-2020

Table 7-13 – ITU-T SG15 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T GSTR-TN5G	ITU-T SG15	Published	Revision of Technical Report GSTR-TN5G (Transport network support of IMT-2020/5G) (October 2018)	IMT-2020

7.14 ITU-T SG17

ITU-T Study Group 17 is responsible for building confidence and security in the use of ICTs. Providing security by ICTs and ensuring security for ICTs are both major study areas for Study Group 17. This includes studies relating to cybersecurity, managed security services, endpoint detection and response, security management, countering spam and identity management. It also includes security architecture and framework, quantum-based security, distributed ledger technology (DLT) security, intelligent transport system (ITS) security, security aspects related to artificial intelligence (AI), and security of networks, applications and services such as Internet of things (IoT) and smart cities, various kinds of networks including IMT-2020/5G and beyond, smart grid, industrial control systems (ICS), supply chain, smartphone, software-defined networking (SDN), network function virtualization (NFV), Internet Protocol television (IPTV), web services, over-the-top (OTT), social network, cloud computing, big data analytics, digital financial system (DFS) and telebiometrics. Building confidence and security in the use of ICTs also includes protecting personally identifiable information (PII), such as technical and operational aspects of data protection with respect to ensuring confidentiality, integrity and availability of PII. 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 test specification languages in support of conformance testing to improve the quality of Recommendations.

Table 7-14 provides a list of ITU-T SG17 deliverables associated with IMT-2020 networks.

Table 7-14 – ITU-T SG17 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T X.1038	ITU-T SG17	Published	Security requirements and reference architecture for software-defined networking	IMT-2020 and beyond
ITU-T X.1042	ITU-T SG17	Published	Security services using software-defined networking	Network security; Security services; IMT-2020
ITU-T X.1043	ITU-T SG17	Published	Security framework and requirements for service function chaining based on software-defined networking	Threats and threat assessment; Network security; Security Architectures, Models and Frameworks; IMT-2020

Table 7-14 – ITU-T SG17 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T X.1047	ITU-T SG17	Published	Security requirements and architecture for network slice management and orchestration	IMT-2020 and beyond
ITU-T X.1813	ITU-T SG17	Published	Security and monitoring requirements for the operation of vertical services supporting ultra-reliability and low latency communication (URLLC) in the IMT-2020 private networks	IMT-2020 and beyond
ITU-T X.1815	ITU-T SG17	Determined	Security framework for 5G edge computing services	IMT-2020
ITU-T X.1814	ITU-T SG17	Published	Security guideline for IMT-2020 communication system	IMT-2020
ITU-T X.5Gsec-netec	ITU-T SG17	Draft (under study)	Security capabilities of network layer for 5G edge computing	IMT-2020
ITU-T X.1811	ITU-T SG17	Published	Security guidelines for applying quantum-safe algorithms in IMT-2020 systems	IMT-2020
ITU-T X.5Gsec-srocvs	ITU-T SG17	Draft (under study)	Security Requirements for the Operation of 5G Core Network to Support Vertical Services	IMT-2020 and beyond
ITU-T X.1816	ITU-T SG17	Draft (under study)	Guidelines for classifying security capabilities in 5G network slice	IMT-2020 and beyond
ITU-T X.1812	ITU-T SG17	Published	Security framework based on trust relationship for the IMT-2020 ecosystem	IMT-2020
ITU-T X.1046	ITU-T SG17	Published	Framework of software-defined security in SDN (Software-Defined Networking)/NFV (Network Function Virtualization) network	IMT-2020 and beyond

Table 7-14 – ITU-T SG17 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T X.1044	ITU-T SG17	Published	Security requirements of network virtualization	IMT-2020
ITU-T X.1045	ITU-T SG17	Published	Security service chain architecture for networks and applications	IMT-2020

7.15 ITU-T SG20

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, digital services for SC&C, and digital transformation relevant IoT and SC&C aspects.

Table 7-15 provides a list of ITU-T SG20 deliverables associated with IMT-2020 networks.

Table 7-15 – ITU-T SG20 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y Suppl. 45	ITU-T SG20	Published	ITU-T Y.4000-series – An overview of smart cities and communities and the role of information and communication technologies	IMT-2020; IoT & Smart Sustainable Cities Standards
ITU-T Y.4100/Y.2066	ITU-T SG20	Published	Common requirements of the Internet of things	IMT-2020; IoT & Smart Sustainable Cities Standards
ITU-T Y.4113	ITU-T SG20	Published	Requirements of the network for the Internet of things	IMT-2020; IoT & Smart Sustainable Cities Standards
ITU-T Y.4114	ITU-T SG20	Published	Specific requirements and capabilities of the Internet of things for big data	IMT-2020; IoT & Smart Sustainable Cities Standards
ITU-T Y.4208	ITU-T SG20	Published	IoT requirements for support of edge computing	IMT-2020
ITU-T Y4122	ITU-T SG20	Published	Requirements and capability framework of theedge computing-enabled gateway in the IoT	IMT-2020

Table 7-15 – ITU-T SG20 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.4421	ITU-T SG20	Published	Functional architecture for unmanned aerial vehicles and unmanned aerial vehicle controllers using IMT-2020 networks	IMT-2020

7.16 MEF

The Metro Ethernet Forum (MEF), founded in 2001 as the MEF, is a non-profit international industry consortium dedicated to the adoption of assured services orchestrated across a global ecosystem of automated networks. The work of MEF includes optical, carrier Ethernet, IP, SD-WAN services and cloud services, as well as the orchestration of the service lifecycle.

Table 7-16 provides a list of MEF deliverables associated with IMT-2020 networks.

Table 7-16 – MEF deliverables

Name	Responsible group	Status	Subject	Topics
MEF 10.4	MEF	Published	Subscriber Ethernet Services Attributes	IMT-2020
MEF 22.3	MEF	Published	Implementation Agreement – Transport Services for Mobile Networks	IMT-2020
MEF 23.2	MEF	Published	Carrier Ethernet Class of Service – Phase 3 Implementation Agreement	IMT-2020
MEF 23.2.1	MEF	Published	Models for Bandwidth Profiles with Token Sharing Amendment to MEF 23.2	IMT-2020
MEF 26.2	MEF	Published	External Network Network Interface (ENNI) and Operator Service Attributes	IMT-2020
MEF 30.1	MEF	Published	Service OAM Fault Management Implementation Agreement: Phase 2	IMT-2020
MEF 30.1.1	MEF	Published	Amendment to MEF 30.1 – Correction to Requirement	IMT-2020

Table 7-16 – MEF deliverables

Name	Responsible group	Status	Subject	Topics
MEF 35.1	MEF	Published	Service OAM Performance Monitoring Implementation Agreement	IMT-2020
MEF 43	MEF	Published	Virtual NID (vNID) Functionality for E-Access Services	IMT-2020
MEF 51.1	MEF	Published	Operator Ethernet Service Definitions	IMT-2020
MEF 6.2	MEF	Published	EVC Ethernet Services Definitions Phase 3	IMT-2020
MEF 61	MEF	Published	IP Service Attributes for Subscriber IP Services	IMT-2020
MEF 62	MEF	Published	Managed Access E-Line Service Implementation Agreement	IMT-2020
MEF 63	MEF	Published	Subscriber Layer 1 Service Attributes	IMT-2020

7.17 NGMN

The Next Generation Mobile Networks (NGMN) Alliance is a mobile telecommunication association of mobile operators, vendors, manufacturers and research institutes. It was founded by major mobile operators in 2006 as an open forum to evaluate candidate technologies to develop a common view of solutions for the next evolution of wireless networks. Its objective is to ensure the successful commercial launch of future mobile broadband networks through a roadmap for technology and friendly user trials. The NGMN Alliance complements and supports standards organizations by providing a coherent view of what mobile operators require.

Table 7-17 provides a list of NGMN deliverables associated with IMT-2020 networks.

Table 7-17 – NGMN deliverables

Name	Responsible group	Status	Subject	Topics
Architectural Proposal for the Handling of Network Operations Data with Specific Focus on Virtualized Networks	NGMN	Draft	Network Management & Orchestration	IMT-2020
Final Report on 5G NSA & SA IoT	NGMN	Draft	Trial & Testing	IMT-2020
Final report on 5G pre-commercial trials	NGMN	Draft	Trial & Testing	IMT-2020
First Version of Framework document to 3GPP and others	NGMN	Draft	E2E Architecture Framework	IMT-2020

Table 7-17 – NGMN deliverables

Name	Responsible group	Status	Subject	Topics
First version of pre-commercial trials framework document	NGMN	Draft	Trial & Testing	IMT-2020
Initial report on 5G pre-commercial trials	NGMN	Draft	Trial & Testing	IMT-2020
Intermediate Report on 5G NSA IoT	NGMN	Draft	Trial & Testing	IMT-2020
Position Paper on "Additional spectrum bands for 5G and the WRC-19"	NGMN	Draft	Spectrum	IMT-2020
Spectrum White Paper on "Spectrum licensing and other regulatory issues for 5G"	NGMN	Draft	Spectrum	IMT-2020
Technology Building Blocks	NGMN	Draft	Trial & Testing	IMT-2020
V2X White Paper	NGMN	Draft	V2X	IMT-2020
White Paper on 5G and IPR Related Questions	NGMN	Draft	IPR	IMT-2020
White Paper on 5G RAN CU-DU network architecture, dimensioning and performance requirements	NGMN	Draft	RAN functional split & X-haul	IMT-2020
White Paper on Active Antenna Requirements	NGMN	Draft	Base Station Antenna Requirements	IMT-2020
White Paper on Extreme 5G Requirements	NGMN	Draft	Extreme 5G Requirements	IMT-2020
White Paper on Passive Antenna Requirements	NGMN	Draft	Base Station Antenna Requirements	IMT-2020
White Paper on recommendations for RAN functional decomposition	NGMN	Draft	RAN functional split & X-haul	IMT-2020
White Paper on Service-Based Architecture in 5G	NGMN	Draft	Service-Based Architecture in 5G	IMT-2020

7.18 TM Forum

TM Forum is the global member association for digital business. It provides a platform for hundreds of global members across a wide range of industries: communications, technology, cities and municipal government, finance, healthcare and so on, to collaborate and partner to co-create, prototype, deliver, and monetize innovative digital services for their billions of customers.

Table 7-18 provides a list of TM Forum deliverables associated with IMT-2020 networks.

Table 7-18 – TM Forum deliverables

Name	Responsible group	Status	Subject	Topics
GB922 Logical and Compound Resource R19.0.1	TM Forum	Published	Network function virtualization | NaaS	IMT-2020
TM Forum GB922 Information Framework (SID) R17.0.1	TM Forum	Published	Network function virtualization | NaaS	IMT-2020
TM Forum GB922 Standards Addenda for Information Framework R17.0.1	TM Forum	Draft	Network function virtualization | NaaS	IMT-2020
TM Forum IG1139 Business Rationale and Technical Overview for Orchestration and Autonomic Control Loops R16.0.1	TM Forum	Published	Network function virtualization | NaaS	IMT-2020
TM Forum TMF070 Hybrid Environment Implementation Blueprints Suite R17.0.1	TM Forum	Draft	Network function virtualization | NaaS	IMT-2020
TM Forum TMF070B Advanced Platform Deployment Blueprints R17.5.1	TM Forum	Published	Network function virtualization | NaaS	IMT-2020
TM Forum TMF628 Performance Management API REST Specification R14.5.1	TM Forum	Published	NaaS, OpenAPIs	IMT-2020
TM Forum TMF664 Resource Function Activation and Configuration API REST Specification R17.5.1	TM Forum	Published	NaaS, OpenAPIs	IMT-2020
TM Forum TR255 Resource Function Activation and Configuration Suite R17.0.1	TM Forum	Published	Network function virtualization | NaaS	IMT-2020
TM Forum TR262 Hybrid Infrastructure Platform Blueprint R17.0.1	TM Forum	Published	NaaS	IMT-2020

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