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Supplement

ITU-T Y Suppl. 59 (11/2023)

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

Supplements to the Y-series Recommendations

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 and beyond in the information and communication technologies area. This revised Supplement 59 to ITU-T Y.3100-series Recommendations IMT-2020 and beyond standardization roadmap has been developed to assist in the development of IMT-2020 and beyond related standards in the ICT fields by providing information about existing and under developing standards in key standards development organizations (SDOs).

History *

Edition	Recommendation	Approval	Study Group	Unique ID
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IMT-2020, standardization roadmap.

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FOREWORD

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

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

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

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

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

1 Scope

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

- The collection/pointers to the standards and publications of IMT-2020 and beyond 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
ONAP	Open Network Automation Platform
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
TSDSI	Telecommunications Standards Development Society, India
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 and beyond network overview

The IMT-2020 and beyond 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 and beyond network, the following are specific key features thatcharacterize the IMT-2020 and beyond 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 and beyond 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 and beyond 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 and beyond/5G.

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

Table 7-1 – 3GPP deliverables

Name	Responsible group	Status	Subject	Topics
3GPP TS 22.261	3GPP TSG SA	Draft	Service requirements for the 5G system; Stage 1	IMT-2020 and beyond
3GPP TS 23.273	3GPP TSG SA	Draft	5G System (5GS) Location Services (LCS); Stage 2	IMT-2020 and beyond
3GPP TS 23.278	3GPP TSG CT	Draft	Service requirements for the Evolved Packet System (EPS)	IMT-2020 and beyond
3GPP TS 23.288	3GPP TSG SA	Draft	Architecture enhancements for 5G System (5GS) to support network data analytics services	IMT-2020 and beyond

Table 7-1 – 3GPP deliverables

Name	Responsible group	Status	Subject	Topics
3GPP TS 23.316	3GPP TSG SA	Draft	Wireless and wireline convergence access support for the 5G System (5GS)	IMT-2020 and beyond
3GPP TS 23.401	3GPP TSG SA	Draft	General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access	IMT-2020 and beyond
3GPP TS 23.501	3GPP TSG SA	Draft	System Architecture for the 5G System; Stage 2	IMT-2020 and beyond
3GPP TS 23.502	3GPP TSG SA	Draft	Procedures for the 5G System: Stage 2	IMT-2020 and beyond
3GPP TS 23.503	3GPP TSG SA	Draft	Policy and Charging Control Framework for the 5G System; Stage 2	IMT-2020 and beyond
3GPP TS 24.501	3GPP TSG CT	Draft	Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3	IMT-2020 and beyond
3GPP TS 24.502	3GPP TSG CT1	Draft	Access to the 3GPP 5G Core Network (5GCN) via non-3GPP access networks	IMT-2020 and beyond
3GPP TS 24.526	3GPP TSG CT	Draft	User Equipment (UE) policies for 5G System (5GS); Stage 3	IMT-2020 and beyond
3GPP TS 28.310	3GPP TSG SA	Draft	Management and orchestration; Energy Efficiency (EE) of 5G; Concepts, use cases and requirements	IMT-2020 and beyond
3GPP TS 28.500	3GPP TSG SA	Draft	Telecommunication management; Management concept, architecture and requirements for mobile networks that include virtualized network functions	IMT-2020 and beyond
3GPP TS 28.510	3GPP TSG SA	Draft	Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Requirements	IMT-2020 and beyond
3GPP TS 28.511	3GPP TSG SA	Draft	Telecommunication management; Configuration Management (CM) for mobile networks that include	IMT-2020 and beyond

Table 7-1 – 3GPP deliverables

Name	Responsible group	Status	Subject	Topics
			virtualized network functions; Procedures	
3GPP TS 28.512	3GPP TSG SA5	Draft	Configuration Management (CM) for mobile networks that include virtualized network functions; Stage 2	IMT-2020 and beyond
3GPP TS 28.513	3GPP TSG SA5	Draft	Configuration Management (CM) for mobile networks that include virtualized network functions; Stage 3	IMT-2020 and beyond
3GPP TS 28.515	3GPP TSG SA	Draft	Telecommunication management; Fault Management (FM) for mobile networks that include virtualized network functions; Requirements	IMT-2020 and beyond
3GPP TS 28.516	3GPP TSG SA	Draft	Telecommunication management; Fault Management (FM) for mobile networks that include virtualized network functions; Procedures	IMT-2020 and beyond
3GPP TS 28.517	3GPP TSG SA	Draft	Telecommunication management; Fault Management (FM) for mobile networks that include virtualized network functions; Stage 2	IMT-2020 and beyond
3GPP TS 28.518	3GPP TSG SA	Draft	Telecommunication management; Fault Management (FM) for mobile networks that include virtualized network functions; Stage 3	IMT-2020 and beyond
3GPP TS 28.520	3GPP TSG SA	Draft	Performance Management (PM) for mobile networks that include virtualized network functions; Requirements	IMT-2020 and beyond
3GPP TS 28.521	3GPP TSG SA	Draft	Performance Management (PM) for mobile networks that include virtualized network functions; Procedures	IMT-2020 and beyond
3GPP TS 28.523	3GPP TSG SA5	Draft	Telecommunication management; Performance Management (PM) for mobile networks that include	IMT-2020 and beyond

Table 7-1 – 3GPP deliverables

Name	Responsible group	Status	Subject	Topics
			virtualized network functions; Stage 3	
3GPP TS 28.525	3GPP TSG SA5	Draft	Telecommunication management; Life Cycle Management (LCM) for mobile networks that include virtualized network functions; Requirements	IMT-2020 and beyond
3GPP TS 28.526	3GPP TSG SA5	Draft	Telecommunication management; Life Cycle Management (LCM) for mobile networks that include virtualized network functions; Procedures	IMT-2020 and beyond
3GPP TS 28.527	3GPP TSG SA5	Draft	Life Cycle Management (LCM) for mobile networks that include virtualized network functions; Stage 2	IMT-2020 and beyond
3GPP TS 28.528	3GPP TSG SA5	Draft	Telecommunication management; Life Cycle Management (LCM) for mobile networks that include virtualized network functions; Stage 3	IMT-2020 and beyond
3GPP TS 28.530	3GPP TSG SA5	Draft	Management and orchestration; Concepts, use cases and requirements	IMT-2020 and beyond
3GPP TS 28.531	3GPP TSG SA	Draft	Performance Management (PM) for mobile networks that include virtualized network functions; Procedures	IMT-2020 and beyond
3GPP TS 28.532	3GPP TSG SA5	Draft	Management and orchestration; Generic management services	IMT-2020 and beyond
3GPP TS 28.533	3GPP TSG SA5	Draft	Management and orchestration; Architecture framework	IMT-2020 and beyond
3GPP TS 28.541	3GPP TSG SA5	Draft	Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3	IMT-2020 and beyond
3GPP TS 29.500	3GPP TSG CT4	Draft	5G System; Technical Realization of Service Based Architecture; Stage 3	IMT-2020 and beyond

Table 7-1 – 3GPP deliverables

Name	Responsible group	Status	Subject	Topics
3GPP TS 29.501	3GPP TSG CT4	Draft	5G System; Principles and Guidelines for Services Definition; Stage 3	IMT-2020 and beyond
3GPP TS 29.502	3GPP TSG CT4	Draft	Session Management Services Stage 3	IMT-2020 and beyond
3GPP TS 29.503	3GPP TSG CT4	Draft	5G System; Unified Data Management Services; Stage 3	IMT-2020 and beyond
3GPP TS 29.507	3GPP TSG CT3	Draft	Access and Mobility Policy Control Service; Stage 3	IMT-2020 and beyond
3GPP TS 29.508	3GPP TSG CT3	Draft	Session Management Event Exposure Service; Stage 3	IMT-2020 and beyond
3GPP TS 29.509	3GPP TSG CT4	Draft	5G System; Authentication Server Services; Stage 3	IMT-2020 and beyond
3GPP TS 29.510	3GPP TSG CT4	Draft	5G System; Network function repository services; Stage 3	IMT-2020 and beyond
3GPP TS 29.511	3GPP TSG CT4	Draft	5G System; Equipment Identity Register Services; Stage 3	IMT-2020 and beyond
3GPP TS 29.512	3GPP TSG CT3	Draft	5G System; Session Management Policy Control Service; Stage 3	IMT-2020 and beyond
3GPP TS 29.513	3GPP TSG CT3	Draft	5G System; Policy and Charging Control signalling flows and QoS parameter mapping; Stage 3	IMT-2020 and beyond
3GPP TS 29.514	3GPP TSG CT3	Draft	5G System; Policy Authorization Service; Stage 3	IMT-2020 and beyond
3GPP TS 29.518	3GPP TSG CT4	Published	5G System; Access and Mobility Management Services; Stage 3	IMT-2020 and beyond
3GPP TS 29.519	3GPP TSG CT3	Draft	5G System; Usage of the Unified Data Repository Service for Policy Data, Application Data and Structured Data for Exposure; Stage 3	IMT-2020 and beyond
3GPP TS 29.520	3GPP TSG CT3	Draft	5G System; Network Data Analytics Services; Stage 3	IMT-2020 and beyond
3GPP TS 29.531	3GPP TSG CT4	Draft	5G System; Network Slice Selection Services; Stage 3	IMT-2020 and beyond
3GPP TS 29.540	3GPP TSG CT4	Draft	5G System; SMS Services; Stage 3	IMT-2020 and beyond

Table 7-1 – 3GPP deliverables

Name	Responsible group	Status	Subject	Topics
3GPP TS 29.561	3GPP TSG CT3	Draft	5G System; Interworking between 5G Network and external Data Networks; Stage 3	IMT-2020 and beyond
3GPP TS 29.571	3GPP TSG CT4	Draft	5G System; Common Data Types for Service Based Interfaces; Stage 3	IMT-2020 and beyond
3GPP TS 32.972	3GPP TSG SA5	Draft	Telecommunication management; Study on system and functional aspects of energy efficiency in 5G networks	IMT-2020 and beyond
3GPP TS 33.501	3GPP TSG SA3	Draft	Security Architecture and Procedures for 5G System	IMT-2020 and beyond
3GPP TS.28.522	3GPP TSG SA5	Draft	Telecommunication management; Performance Management (PM) for mobile networks that include virtualized network functions; Stage 2	IMT-2020 and beyond

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 and beyond networks.

Table 7-2 – Broadband Forum deliverables

Name	Responsible group	Status	Subject	Topics
BBF MD-305i3	BROADBAND FORUM	Draft	MPLS Mobile Backhaul Evolution - 4G and Beyond – Tutorial	IMT-2020 and beyond
BBF MD-342	BROADBAND FORUM	Draft	Energy Efficient Mobile Backhaul White Paper	IMT-2020 and beyond

Table 7-2 – Broadband Forum deliverables

Name	Responsible group	Status	Subject	Topics
BBF MD-343	BROADBAND FORUM	Draft	Energy Efficient Mobile Backhaul Tutorial	IMT-2020 and beyond
BBF MD-391	BROADBAND FORUM	Draft	Evolution to 5G Mobile Backhaul Networks – White Paper	IMT-2020 and beyond
BBF MD-427	BROADBAND FORUM	Draft	5G Fixed Mobile Convergence – white paper	IMT-2020 and beyond
BBF MD-464	BROADBAND FORUM	Draft	Migrating Fixed Access to 5G	IMT-2020 and beyond
BBF MD-521	BROADBAND FORUM	Draft	Whitepaper for 5G Transport Networks	IMT-2020 and beyond
BBF OD-379	BROADBAND FORUM	Draft	Interoperability Test Plan for FTTdp PMA/DPU Management Interface	IMT-2020 and beyond
BBF Open Source	BROADBAND FORUM	Draft	WWC Reference Implementation for 5G-RG	IMT-2020 and beyond
BBF SD-406	BROADBAND FORUM	Draft	End-to-End Network Slicing	IMT-2020 and beyond
BBF SD-407	BROADBAND FORUM	Draft	5G Fixed Mobile Convergence	IMT-2020 and beyond
BBF SD-420	BROADBAND FORUM	Draft	R1 5G Fixed Mobile Convergence	IMT-2020 and beyond
BBF SD-521	BROADBAND FORUM	Draft	Study Document for 5G Transport Networks	IMT-2020 and beyond
BBF SD-5GTransport	BROADBAND FORUM	Draft	5G Transport - market drivers, architecture, requirements	IMT-2020 and beyond
BBF SDxFlexEMPLS45G	BROADBAND FORUM	Draft	Flexible Ethernet (FlexE) use with MPLS networks	IMT-2020 and beyond

Table 7-2 – Broadband Forum deliverables

Name	Responsible group	Status	Subject	Topics
BBF TR-124 Issue 8 (12/2022)	BROADBAND FORUM	Published	Functional Requirements for Broadband Residential Gateway Devices	Cable-based video services and IPTV; Home gateways; IMT-2020 and beyond
BBF TR-355	BROADBAND FORUM	Published	YANG Modules for FTTdp Management	IMT-2020 and beyond
BBF TR-370 Issue 2 (04/2020)	BROADBAND FORUM	Published	Fixed Access Network Sharing – Architecture and Nodal Requirements	Fixed Access Network Sharing; IMT-2020 and beyond
BBF TR-383	BROADBAND FORUM	Published	Common YANG Modules for Access Networks	IMT-2020 and beyond
BBF TR-384 (01/2018)	BROADBAND FORUM	Published	Cloud Central Office Reference Architectural Framework	General on Access Network Architecture and Functions; IMT-2020 and beyond
BBF TR-386 (01/2019)	BROADBAND FORUM	Published	Fixed Access Network Sharing – Access Network Sharing Interfaces	Fixed Access Network Sharing; IMT-2020 and beyond
BBF TR-411	BROADBAND FORUM	Published	Definition of interfaces between CloudCO Functional Modules	IMT-2020 and beyond
BBF TR-413	BROADBAND FORUM	Published	SDN Management and Control Interfaces for CloudCO Network Functions	IMT-2020 and beyond
BBF TR-436 (02/2021)	BROADBAND FORUM	Published	Access & Home Network O&M Automation/Intelligence	Systems management and control; Management of Home Network devices; IMT-2020 and beyond

Table 7-2 – Broadband Forum deliverables

Name	Responsible group	Status	Subject	Topics
BBF TR-456 Issue 2 (03/2022)	BROADBAND FORUM	Published	AGF Functional Requirements	Wireline-Wireless Convergence; Home gateways; IMT-2020 and beyond
BBF TR-470 Issue 2 (03/2022)	BROADBAND FORUM	Published	5G Wireless Wireline Convergence Architecture	Wireline-Wireless Convergence; IMT-2020 and beyond
BBF TR-484 (09/2022)	BROADBAND FORUM	Published	Access Network Abstraction	General on Access Network Architecture and Functions; IMT-2020 and beyond
BBF TR-522	BROADBAND FORUM	Published	Mobile-transport network slice instance Management Interfaces	IMT-2020 and beyond
BBF WT-221 Amendment 2	BROADBAND FORUM	Draft	Technical Specifications for MPLS in Mobile Backhaul Networks, Amendment 2	IMT-2020 and beyond
BBF WT-221a2	BROADBAND FORUM	Draft	Technical Specifications for MPLS in Mobile Backhaul Networks, Amendment 2	IMT-2020 and beyond
BBF WT-355a1	BROADBAND FORUM	Draft	YANG Modules for FTTdp Management – Amendment 1	IMT-2020 and beyond
BBF WT-383a1	BROADBAND FORUM	Draft	Common YANG Modules	IMT-2020 and beyond
BBF WT-386 Issue 2	BROADBAND FORUM	Draft	Fixed Access Network Sharing - Access Network Sharing Interfaces	IMT-2020 and beyond
BBF WT-456	BROADBAND FORUM	Draft	AGF Functional Requirements	IMT-2020 and beyond

Table 7-2 – Broadband Forum deliverables

Name	Responsible group	Status	Subject	Topics
BBF WT-457	BROADBAND FORUM	Draft	FMIF Functional Requirements	IMT-2020 and beyond
BBF WT-458	BROADBAND FORUM	Draft	CUPS for 5G FMC	IMT-2020 and beyond
BBF WT-459	BROADBAND FORUM	Draft	Control and User Plane Separation for a Disaggregated BNG	IMT-2020 and beyond
BBF WT-460	BROADBAND FORUM	Draft	YANG Modules for Broadband Network Gateways	IMT-2020 and beyond
BBF WT-486	BROADBAND FORUM	Draft	Interfaces for Automated Intelligent Management (AIM)	IMT-2020 and beyond
BBF WT-493	BROADBAND FORUM	Draft	IMS for 5G-RG Architecture	IMT-2020 and beyond
BBF WT-494	BROADBAND FORUM	Draft	IMS for 5G-RG Residential Voice Requirements	IMT-2020 and beyond
BBF WT-521	BROADBAND FORUM	Draft	5G Transport Networks	IMT-2020 and beyond

7.3 ETSI

The European Telecommunications Standards Institute (ETSI) is an independent, non-profit, standardization organization in the telecommunications 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 and beyond 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 and beyond
ETSI DGR/NFV-EVE019	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 4; Architectural	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			Framework; Report on VNF generic OAM functions	
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 and beyond
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 and beyond
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 and beyond
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 and beyond
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 and beyond
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 and beyond
ETSI DGR/NFV-SOL017	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3 Protocols and	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			Data Models Report on protocol and data model solutions for Multi-site Connectivity Services	
ETSI DGS/MEC-0028WlanAPI	ETSI ISG	Draft	Multi-access Edge Computing (MEC); WLAN Information API	IMT-2020 and beyond
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 and beyond
ETSI DGS/NFV-SEC 023	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 4; Security; Container Security Specification	IMT-2020 and beyond
ETSI DGS/NFV-SEC 024	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 4 Security; Security Management Specification	IMT-2020 and beyond
ETSI DGS/NFV-SOL011 (GS)	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Or-Or Reference Point	IMT-2020 and beyond
ETSI DMI/MEC-DEC34	ETSI ISG	Draft	Multi-access Edge Computing (MEC) MEC Sandbox	IMT-2020 and beyond
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 and beyond
ETSI ETSI GS NFV-TST 009	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Testing;	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			Specification of Networking Benchmarks and Measurement Methods for NFVI	
ETSI GR MEC 017	ETSI ISG	Published	Mobile Edge Computing (MEC); Deployment of Mobile Edge Computing in an NFV environment	IMT-2020 and beyond
ETSI GR MEC 018	ETSI ISG	Published	Mobile Edge Computing (MEC); End to End Mobility Aspects	IMT-2020 and beyond
ETSI GR MEC 022	ETSI ISG	Published	Multi-access Edge Computing (MEC); Study on MEC Support for V2X Use Cases	IMT-2020 and beyond
ETSI GR MEC 024	ETSI ISG	Published	Multi-access Edge Computing (MEC); MEC support for network slicing	IMT-2020 and beyond
ETSI GR MEC 027	ETSI ISG	Published	Multi-access Edge Computing (MEC); Study on MEC support for containers alternative virtualization technologies	IMT-2020 and beyond
ETSI GR MEC 031	ETSI ISG	Draft	Multi-access Edge Computing (MEC) MEC 5G Integration	IMT-2020 and beyond
ETSI GR MEC-DEC 023	ETSI ISG	Draft	Multi-access Edge Computing (MEC); Describing ETSI MEC RESTful APIs using the OpenAPI specification	IMT-2020 and beyond
ETSI GR MEC-DEC 025	ETSI ISG	Published	Multi-access Edge Computing (MEC); MEC Testing Framework	IMT-2020 and beyond
ETSI GR mWT 012	ETSI ISG	Draft	Millimetre Wave Transmission Scenarios for 5G	IMT-2020 and beyond
ETSI GR mWT 016	ETSI ISG	Published	Applications and use cases of Software Defined Networking (SDN) as related to microwave and	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			millimetre wave transmission	
ETSI GR NFV 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Use Cases	IMT-2020 and beyond
ETSI GR NFV-EVE 008	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3; Charging; Report on Usage Metering and Charging Use Cases and Architectural Study	IMT-2020 and beyond
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 and beyond
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 and beyond
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 and beyond
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 and beyond
ETSI GR NFV-IFA 012	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Report on Os-Ma-Nfvo	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			reference point - application and service management use cases and recommendations	
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 and beyond
ETSI GR NFV-IFA 016	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Information Modeling; Papyrus Guidelines	IMT-2020 and beyond
ETSI GR NFV-IFA 017	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Information Modeling; UML Modeling Guidelines	IMT-2020 and beyond
ETSI GR NFV-IFA 021	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Report on management of NFV-MANO and automated deployment of EM and other OSS functions	IMT-2020 and beyond
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 and beyond
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 and beyond
ETSI GR NFV-IFA 024	ETSI ISG NFV	Published	Network Function Virtualisation (NFV) Release 2; Information Modeling; Report on External Touchpoints	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			related to NFV Information Model	
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 and beyond
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 and beyond
ETSI GR NFV-IFA 029	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3; Architecture; Report on the Enhancements of the NFV architecture towards "Cloud-native" and "PaaS"	IMT-2020 and beyond
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 and beyond
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 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
ETSI GR NFV-REL 008	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV); Reliability; Report on Error Handling: Detection, Correlation, Notification	IMT-2020 and beyond
ETSI GR NFV-REL 010	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV); Reliability; Report on NFV Resiliency for the Support of Network Slicing	IMT-2020 and beyond
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 and beyond
ETSI GR NFV-SEC 005	ETSI ISG NFV	Draft	Network Functions Virtualization (NFV); Trust; Report on Certificate Management	IMT-2020 and beyond
ETSI GR NFV-SEC 007	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Trust; Report on Attestation Technologies and Practices for Secure Deployments	IMT-2020 and beyond
ETSI GR NFV-SEC 011	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Security; Report on NFV LI Architecture	IMT-2020 and beyond
ETSI GR NFV-SEC 016	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV); Security; Report on location, timestamping of VNFs	IMT-2020 and beyond
ETSI GR NFV-SEC 017	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV); Security; Security Policy Guidelines Report	IMT-2020 and beyond
ETSI GR NFV-TST 004	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Testing; Guidelines for Test Plan on Path	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			Implementation through NFVI	
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 and beyond
ETSI GR NFV-TST 006	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV); Testing; Report on NFV CICD and Devops	IMT-2020 and beyond
ETSI GR NFV-TST 007	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Testing; Guidelines on Interoperability Testing for MANO	IMT-2020 and beyond
ETSI GR NFV-TST 011	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Testing; Test Domain and Description Language Recommendations	IMT-2020 and beyond
ETSI GR NFV-TST 012	ETSI ISG NFV	Draft	Network Function Virtualisation (NFV); Testing; VIM & NFVI Control and Management Performance Evaluation	IMT-2020 and beyond
ETSI GS MEC 001	ETSI ISG	Published	Multi-access Edge Computing (MEC); Terminology	IMT-2020 and beyond
ETSI GS MEC 002	ETSI ISG	Published	Multi-access Edge Computing (MEC); Phase 2: Use Cases and Requirements	IMT-2020 and beyond
ETSI GS MEC 003	ETSI ISG	Published	Multi-access Edge Computing (MEC); Framework and Reference Architecture	IMT-2020 and beyond
ETSI GS MEC 009	ETSI ISG	Published	Multi-access Edge Computing (MEC); General principles for MEC Service APIs	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
ETSI GS MEC 010-1	ETSI ISG	Published	Mobile Edge Computing (MEC); Mobile Edge Management; Part 1: System, host and platform management	IMT-2020 and beyond
ETSI GS MEC 010-2	ETSI ISG	Published	Mobile Edge Computing (MEC); Mobile Edge Management; Part 2: Application lifecycle, rules and requirements management	IMT-2020 and beyond
ETSI GS MEC 011	ETSI ISG	Published	Mobile Edge Computing (MEC); Mobile Edge Platform Application Enablement	IMT-2020 and beyond
ETSI GS MEC 012	ETSI ISG	Published	Mobile Edge Computing (MEC); Radio Network Information API	IMT-2020 and beyond
ETSI GS MEC 013	ETSI ISG	Published	Multi-access Edge Computing (MEC); Location API	IMT-2020 and beyond
ETSI GS MEC 014	ETSI ISG	Published	Mobile Edge Computing (MEC); UE Identity API	IMT-2020 and beyond
ETSI GS MEC 015	ETSI ISG	Published	Mobile Edge Computing (MEC); Bandwidth Management API	IMT-2020 and beyond
ETSI GS MEC 016	ETSI ISG	Published	Mobile Edge Computing (MEC); UE application interface	IMT-2020 and beyond
ETSI GS MEC 021	ETSI ISG	Published	Multi-access Edge Computing (MEC); MEC Application Mobility Service API	IMT-2020 and beyond
ETSI GS MEC 026	ETSI ISG	Published	Multi-access Edge Computing (MEC); Support for regulatory requirements	IMT-2020 and beyond
ETSI GS MEC 028	ETSI ISG	Draft	Multi-access Edge Computing (MEC); WLAN Information API	IMT-2020 and beyond
ETSI GS MEC 029	ETSI ISG	Published	Multi-access Edge Computing (MEC); Fixed Access Information API	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
ETSI GS MEC 030	ETSI ISG	Draft	Multi-access Edge Computing (MEC); MEC V2X API	IMT-2020 and beyond
ETSI GS MEC 033	ETSI ISG	Draft	Multi-access Edge Computing (MEC) IoT API	IMT-2020 and beyond
ETSI GS MEC-DEC 032-1	ETSI ISG	Draft	Multi-access Edge Computing (MEC); API Conformance Test Specification Part 1: Test Requirements and Implementation Conformance Statement (ICS)	IMT-2020 and beyond
ETSI GS MEC-DEC 032-2	ETSI ISG	Draft	Multi-access Edge Computing (MEC); API Conformance Test Specification Part 2: Test Purposes (TP)	IMT-2020 and beyond
ETSI GS MEC-DEC 032-3	ETSI ISG	Draft	Multi-access Edge Computing (MEC); API Conformance Test Specification; Part 3: Abstract Test Suite (ATS)	IMT-2020 and beyond
ETSI GS MEC-IEG 004	ETSI ISG	Published	Mobile-Edge Computing (MEC); Service Scenarios	IMT-2020 and beyond
ETSI GS MEC-IEG 005	ETSI ISG	Published	Mobile-Edge Computing (MEC); Proof of Concept Framework	IMT-2020 and beyond
ETSI GS MEC-IEG 006	ETSI ISG	Published	Mobile Edge Computing; Market Acceleration; MEC Metrics Best Practice and Guidelines	IMT-2020 and beyond
ETSI GS NFV 002	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Architectural Framework	IMT-2020 and beyond
ETSI GS NFV 003	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Terminology for Main Concepts in NFV	IMT-2020 and beyond
ETSI GS NFV 004	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV);	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			Virtualisation Requirements	
ETSI GS NFV 006	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Architectural Framework Specification	IMT-2020 and beyond
ETSI GS NFV-EVE 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Virtualisation Technologies; Hypervisor Domain Requirements specification; Release 3	IMT-2020 and beyond
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 and beyond
ETSI GS NFV-EVE 004	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Virtualisation Technologies; Report on the application of Different Virtualisation Technologies in the NFV Framework	IMT-2020 and beyond
ETSI GS NFV-EVE 005	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Ecosystem; Report on SDN Usage in NFV Architectural Framework	IMT-2020 and beyond
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 and beyond
ETSI GS NFV-EVE 011	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Virtualised Network Function;	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			Specification of the Classification of Cloud Native VNF implementations	
ETSI GS NFV-IFA 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Acceleration Technologies; Report on Acceleration Technologies & Use Cases	IMT-2020 and beyond
ETSI GS NFV-IFA 002	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Acceleration Technologies; VNF Interfaces Specification	IMT-2020 and beyond
ETSI GS NFV-IFA 003	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Acceleration Technologies; vSwitch Benchmarking and Acceleration Specification	IMT-2020 and beyond
ETSI GS NFV-IFA 004	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Acceleration Technologies; Management Aspects Specification	IMT-2020 and beyond
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 and beyond
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 and beyond
ETSI GS NFV-IFA 007	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Or-	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			Vnfm reference point - Interface and Information Model Specification	
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 and beyond
ETSI GS NFV-IFA 009	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Management and Orchestration; Report on Architectural Options	IMT-2020 and beyond
ETSI GS NFV-IFA 010	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Functional requirements specification	IMT-2020 and beyond
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 and beyond
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 and beyond
ETSI GS NFV-IFA 014	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Network Service Templates Specification	IMT-2020 and beyond
ETSI GS NFV-IFA 018	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Acceleration Technologies; Network Acceleration Interface Specification; Release 3	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
ETSI GS NFV-IFA 019	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Acceleration Technologies; Acceleration Resource Management Interface Specification; Release 3	IMT-2020 and beyond
ETSI GS NFV-IFA 026	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Architecture enhancement for Security Management Specification	IMT-2020 and beyond
ETSI GS NFV-IFA 027	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Performance Measurements Specification	IMT-2020 and beyond
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 and beyond
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 and beyond
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 and beyond
ETSI GS NFV-IFA 033	ETSI ISG NFV	Draft	Network Functions Virtualization (NFV)	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			Release 3; Management and Orchestration; Sc-Or, Sc-Vnfm, Sc-Vi reference points – Interface and Information Model Specification	
ETSI GS NFV-IFA012	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration Os-Ma-Nfvo reference point – Application and Service Management Interface and Information Model Specification	IMT-2020 and beyond
ETSI GS NFV-INF 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Infrastructure Overview	IMT-2020 and beyond
ETSI GS NFV-INF 003	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Infrastructure; Compute Domain	IMT-2020 and beyond
ETSI GS NFV-INF 004	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Infrastructure; Hypervisor Domain	IMT-2020 and beyond
ETSI GS NFV-INF 005	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Infrastructure; Network Domain	IMT-2020 and beyond
ETSI GS NFV-INF 007	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Infrastructure; Methodology to describe Interfaces and Abstractions	IMT-2020 and beyond
ETSI GS NFV-INF 010	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Service Quality Metrics	IMT-2020 and beyond
ETSI GS NFV-MAN 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Management and Orchestration	IMT-2020 and beyond
ETSI GS NFV-PER 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV);	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			NFV Performance & Portability Best Practises	
ETSI GS NFV-PER 002	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Proofs of Concept; Framework	IMT-2020 and beyond
ETSI GS NFV-REL 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Resiliency Requirements	IMT-2020 and beyond
ETSI GS NFV-REL 002	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Reliability; Report on Scalable Architectures for Reliability Management	IMT-2020 and beyond
ETSI GS NFV-REL 003	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Reliability; Report on Models and Features for End-to-End Reliability	IMT-2020 and beyond
ETSI GS NFV-REL 004	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Assurance; Report on Active Monitoring and Failure Detection	IMT-2020 and beyond
ETSI GS NFV-REL 005	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Accountability; Report on Quality Accountability Framework	IMT-2020 and beyond
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 and beyond
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 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
ETSI GS NFV-SEC 002	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); NFV Security; Cataloguing security features in management software	IMT-2020 and beyond
ETSI GS NFV-SEC 003	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); NFV Security; Security and Trust Guidance	IMT-2020 and beyond
ETSI GS NFV-SEC 004 V1.1.1 (2015-09)	ETSI NFV	Published	Network Functions Virtualisation (NFV); NFV Security; Privacy and Regulation; Report on Lawful Interception Implications	Lawful interception; Network security; Privacy; IMT-2020 and beyond
ETSI GS NFV-SEC 006 V1.1.1	ETSI NFV	Published	Network Functions Virtualisation (NFV); Security Guide; Report on Security Aspects and Regulatory Concerns	Security management standards and guidance documents; IMT-2020 and beyond
ETSI GS NFV-SEC 009 V1.1.1	ETSI	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 and beyond
ETSI GS NFV-SEC 010 V1.1.1	ETSI NFV	Published	Network Functions Virtualisation (NFV); NFV Security; Report on Retained Data problem statement and requirements	Sector-specific security standards; IMT-2020 and beyond
ETSI GS NFV-SEC 012 V3.1.1	ETSI	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 and beyond
ETSI GS NFV-SEC 013 V3.1.1	ETSI	Published	Network Functions Virtualisation (NFV) Release 3; Security; Security Management	Security Architectures, Models and Frameworks; Security management

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			and Monitoring specification	standards and guidance documents; IMT-2020 and beyond
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 and beyond
ETSI GS NFV-SEC 015	ETSI ISG NFV	Draft	Network Function Virtualization (NFV) Release 3; NFV Security; Security Specification for other MANO reference points	IMT-2020 and beyond
ETSI GS NFV-SEC 020	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3; Security; Identity Management and Security Specification	IMT-2020 and beyond
ETSI GS NFV-SEC021	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 2; Security; VNF Package Security Specification	IMT-2020 and beyond
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 and beyond
ETSI GS NFV-SOL 002	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Ve-Vnfm Reference Point	IMT-2020 and beyond
ETSI GS NFV-SOL 003	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Or-Vnfm Reference Point	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
ETSI GS NFV-SOL 004	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; VNF Package specification	IMT-2020 and beyond
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 and beyond
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 and beyond
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 and beyond
ETSI GS NFV-SOL 009	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models: RESTful protocols specification for the management of NFV-MANO	IMT-2020 and beyond
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 and beyond
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 and beyond
ETSI GS NFV-SOL 013	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3; Protocols and	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
			Data Models; Specification of common aspects for RESTful NFV MANO APIs	
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 and beyond
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 and beyond
ETSI GS NFV-SWA 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Virtual Network Functions Architecture	IMT-2020 and beyond
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 and beyond
ETSI GS NFV-TST 002	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); Testing Methodology; Report on NFV Interoperability Testing Methodology	IMT-2020 and beyond
ETSI GS NFV-TST 008	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Release 3; Testing; NFVI Compute and Network Metrics Specification	IMT-2020 and beyond

Table 7-3 – ETSI deliverables

Name	Responsible group	Status	Subject	Topics
ETSI GS NFV-TST 009	ETSI ISG NFV	Draft	Network Functions Virtualisation (NFV) Testing Specification of Networking Benchmarks and Measurement Methods for NFVI	IMT-2020 and beyond
ETSI GS NFV-TST 010	ETSI ISG NFV	Published	Network Function Virtualisation (NFV) Release 2; Testing; API Conformance Testing Specification	IMT-2020 and beyond
ETSI MI/MEC-DEC23OpenAPI	ETSI ISG	Draft	Multi-access Edge Computing (MEC); Describing ETSI MEC RESTful APIs using the OpenAPI specification	IMT-2020 and beyond
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 orchestration specification	IMT-2020 and beyond
ETSI White Paper No. 25	ETSI ISG	Published	Microwave and Millimetre wave for 5G Transport	IMT-2020 and beyond
GS NFV-SEC 001	ETSI ISG NFV	Published	Network Functions Virtualisation (NFV); NFV Security; Problem Statement	IMT-2020 and beyond

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 and beyond networks.

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
IEEE 1076.1-2017	IEEE	Published	IEEE Standard VHDL Analog and Mixed-Signal Extensions	IMT-2020 and beyond
IEEE 1076-2008	IEEE	Published	IEEE Standard VHDL Language Reference Manual	IMT-2020 and beyond
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 and beyond
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 and beyond
IEEE 1528-2013	IEEE	Published	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques	IMT-2020 and beyond
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 and beyond
IEEE 1647-2016	IEEE	Published	IEEE Standard for the Functional Verification Language e	IMT-2020 and beyond
IEEE 1666.1-2016	IEEE	Published	IEEE SystemC Analog/Mixed-Signal (AMS) extensions Language Reference Manual	IMT-2020 and beyond
IEEE 1666-2011	IEEE	Published	IEEE Standard System C(R) Language Reference Manual	IMT-2020 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
IEEE 1685-2014	IEEE	Published	IEEE Standard for IP-XACT, Standard Structure for Packaging, Integrating, and Reusing IP within Tool Flows	IMT-2020 and beyond
IEEE 1720-2012	IEEE	Published	IEEE Recommended Practice for Near-Field Antenna Measurements	IMT-2020 and beyond
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 and beyond
IEEE 1735-2014	IEEE	Published	IEEE Recommended Practice for Encryption and Management of Electronic Design Intellectual Property (IP)	IMT-2020 and beyond
IEEE 1735-2014/Cor 1-2015	IEEE	Published	IEEE Recommended Practice for Encryption and Management of Electronic Design Intellectual Property (IP) – Corrigendum 1: Correction to Rights Digest Description	IMT-2020 and beyond
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 and beyond
IEEE 1800.2-2017	IEEE	Published	IEEE Standard for Universal Verification Methodology Language Reference Manual	IMT-2020 and beyond
IEEE 1800-2017	IEEE	Published	IIEEE Standard for System Verilog--Unified Hardware Design, Specification, and Verification Language	IMT-2020 and beyond
IEEE 1801-2015	IEEE	Published	IEEE Standard for Design and Verification of Low Power, Energy Aware Electronic Systems	IMT-2020 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
IEEE 1903-2011	IEEE	Published	IEEE Standard for the Functional Architecture of Next Generation Service Overlay Networks	IMT-2020 and beyond
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 and beyond
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 Access Control (MAC) and Physical Layer (PHY) Specification	IMT-2020 and beyond
IEEE 802.11ad-2012	IEEE	Published	(adopted as ISO/IEC/IEEE 8802-11:2012/Amd 3:2014)	IoT; IMT-2020 and beyond
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) Specification	IMT-2020 and beyond
IEEE 802.15.11	IEEE 802.15	Draft	New activity to develop a standard supporting Multi-Gigabit/sec Optical Wireless Communications	IMT-2020 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
IEEE 802.15.3-2016	IEEE 802.15	Published	Standard for High Data Rate Wireless Multi-Media Networks	IMT-2020 and beyond
IEEE 802.15.3e-2017	IEEE 802.15	Published	IEEE 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	IMT-2020 and beyond
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 and beyond
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 and beyond
IEEE 802.16.1-2012	IEEE 802.16	Published	IEEE Standard for Wireless MAN-Advanced Air Interface for Broadband Wireless Access Systems	IMT-2020 and beyond; 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 and beyond; IEEE 802.16 Wireless MAN / WiMAX
IEEE 802.16.1b-2012	IEEE 802.16	Published	IEEE Standard for Wireless MAN-Advanced Air Interface for Broadband Wireless Access Systems – Amendment: Enhancements to Support	IoT; IMT-2020 and beyond; IEEE 802.16 Wireless MAN / WiMAX

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			Machine-to-Machine Applications	
IEEE 802.16.2-2004	IEEE 802.16	Published	IEEE Recommended Practice for Local and Metropolitan Area Networks – Recommended Practice for Coexistence of Fixed Broadband Wireless Access Systems	IMT-2020 and beyond; IEEE 802.16 Wireless MAN / WiMAX
IEEE 802.16-2012	IEEE	Published	IEEE Standard for Air Interface for Broadband Wireless Access Systems	IoT; IMT-2020 and beyond
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 and beyond
IEEE 802.16n-2013	IEEE	Published	IEEE Standard for Air Interface for Broadband Wireless Access Systems – Amendment 2: Higher Reliability Networks	IoT; IMT-2020 and beyond
IEEE 802.16p-2012	IEEE	Published	IEEE Standard for Air Interface for Broadband Wireless Access Systems Amendment: Enhancements to Support Machine-to-Machine Applications	IoT; IMT-2020 and beyond
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 and beyond
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 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
IEEE 802.1AB-2016	IEEE 802.1	Published	IEEE Standard for Local and metropolitan area networks – Station and Media Access Control Connectivity Discovery	IMT-2020 and beyond
IEEE 802.1ABdh-2021	IEEE 802.1	Published	IEEE Standard for Local and metropolitan area networks – Station and Media Access Control Connectivity Discovery Amendment 2: Support for Multiframe Protocol Data Units	IMT-2020 and beyond
IEEE 802.1AC-2016	IEEE 802.1	Published	IEEE Standard for Local and metropolitan area networks – Media Access Control (MAC) Service Definition	IMT-2020 and beyond
IEEE 802.1AC-2016/Cor 1-2018	IEEE 802.1	Published	IEEE Standard for Local and Metropolitan Area Networks – Media Access Control (MAC) Service Definition - Corrigendum 1: Logical Link Control (LLC) Encapsulation EtherType	IMT-2020 and beyond
IEEE 802.1ACct-2021	IEEE 802.1	Published	IEEE Standard for Local and Metropolitan Area networks – Media Access Control (MAC) Service Definition-Amendment 1: Support for IEEE Std 802.15.3	IMT-2020 and beyond
IEEE 802.1AE-2018	IEEE 802.1	Published	IEEE Standard for Local and metropolitan area networks – Media Access Control (MAC) Security	IMT-2020 and beyond
IEEE 802.1AE-2018/Cor 1-2020	IEEE 802.1	Published	IEEE Standard for Local and metropolitan area networks – Media Access Control (MAC) Security Corrigendum 1: Tag Control Information Figure	
IEEE 802.1AR-2018	IEEE	Published	IEEE Approved Draft Standard for Local and Metropolitan Area	Authorization; IMT-2020 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			Networks – Secure Device Identity	
IEEE 802.1AS-2020	IEEE 802.1	Published	IEEE Standard for Local and Metropolitan Area Networks – Timing and Synchronization for Time-Sensitive Applications	IMT-2020 and beyond
IEEE 802.1AX-2020	IEEE 802.1	Published	IEEE Standard for Local and Metropolitan Area Networks – Link Aggregation	IMT-2020 and beyond
IEEE 802.1BA-2021	IEEE 802.1	Published	IEEE Standard for Local and Metropolitan Area Networks – Audio Video Bridging (AVB) Systems	IMT-2020 and beyond
IEEE 802.1CB Frame Replication and Elimination	IEEE 802.1	Published	IEEE Std 802.1CB-2017 – IEEE Standard for Local and metropolitan area networks –Frame Replication and Elimination for Reliability	IMT-2020 and beyond
IEEE 802.1CB-2017	IEEE 802.1	Published	IEEE Standard for Local and metropolitan area networks – Frame Replication and Elimination for Reliability	IMT-2020 and beyond
IEEE 802.1CBcv-2021	IEEE 802.1	Published	IEEE Standard for Local and metropolitan area networks – Frame Replication and Elimination for Reliability – Amendment 1: Information Model, YANG Data Model, and Management Information Base Module	IMT-2020 and beyond
IEEE 802.1CBdb-2021	IEEE 802.1	Published	IEEE Standard for Local and metropolitan area networks – Frame Replication and Elimination for Reliability Amendment 2: Extended Stream Identification Functions	IMT-2020 and beyond
IEEE 802.1CF-2019	IEEE 802.1	Published	IEEE Recommended Practice for Network	IMT-2020 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			Reference Model and Functional Description of IEEE 802(R) Access Network	
IEEE 802.1CM-2018	IEEE 802.1	Published	IEEE Standard for Local and metropolitan area networks – Time-Sensitive Networking for Fronthaul	IMT-2020 and beyond
IEEE 802.1CMde-2020	IEEE 802.1	Published	IEEE Standard for Local and metropolitan area networks – Time-Sensitive Networking for Fronthaul – Amendment 1: Enhancements to Fronthaul Profiles to Support New Fronthaul Interface, Synchronization, and Syntonization Standards	IMT-2020 and beyond
IEEE 802.1CS-2020	IEEE 802.1	Published	IEEE Standard for Local and Metropolitan Area Networks – Link-local Registration Protocol	IMT-2020 and beyond
IEEE 802.1Q-2018	IEEE 802.1	Published	IEEE Standard for Local and Metropolitan Area Networks – Bridges and Bridged Networks	IMT-2020 and beyond
IEEE 802.1Qbv Enhancements for Scheduled Traffic	IEEE 802.1	Published	IEEE Std 802.1Qbv-2015 (Amendment to IEEE Std 802.1Q-2014 as amended by IEEE Std 802.1Qca-2015, IEEE Std 802.1Qcd-2015, and IEEE Std 802.1Q-2014/Cor 1-2015) – IEEE Standard for Local and metropolitan area networks – Bridges and Bridged Networks – Amendment	IMT-2020 and beyond
IEEE 802.1Qch Cyclic Queueing and Forwarding	IEEE 802.1	Published	IEEE Standard for Local and metropolitan area networks – Bridges and Bridged Networks – Amendment 29: Cyclic Queuing and Forwarding	IMT-2020 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
IEEE 802.1Qci Per-Stream Filtering and Policing	IEEE 802.1	Published	IEEE Std 802.1Qci-2017 (Amendment to IEEE Std 802.1Q-2014 as amended by IEEE Std 802.1Qca-2015, IEEE Std 802.1Qcd-2015, IEEE Std 802.1Q-2014/Cor 1-2015, IEEE Std 802.1Qbv-2015, IEEE Std 802.1Qbu-2016, and IEEE Std 802.1Qbz-2016) – IEEE Standard for Local	IMT-2020 and beyond
IEEE 802.1X-2020	IEEE 802.1	Published	IEEE Standard for Local and Metropolitan Area Networks – Port-Based Network Access Control	IMT-2020 and beyond
IEEE 802.21.1-2017	IEEE 802	Published	IEEE Standard for Local and metropolitan area networks – Part 21.1: Media Independent Services	IMT-2020 and beyond
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 and beyond
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-	IoT; IMT-2020 and beyond
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 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
IEEE 802.22-2011	IEEE	Published	(adopted as ISO/IEC/IEEE 8802-22:2015)	IoT; IMT-2020 and beyond
IEEE 802.22a-2014	IEEE 802	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) Spec	IMT-2020 and beyond
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) Sp	Security mechanisms; Network Management; Security protocol standards; Wireless; IMT-2020 and beyond; IoT & Smart Sustainable Cities Standards
IEEE 802.3 - 2018 - 1000BASE-LX10 and 1000BASE-BX10	IEEE	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 and beyond
IEEE 802.3 - 2018 - 100BASE-LX10 and 100BASE-BX10	IEEE	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 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
IEEE 802.3 - 2018 - 10GBASE-PR and 10/1GBASE-PRX	IEEE	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 and beyond
IEEE 802.3.1-2013	IEEE 802.3 Ethernet WG	Published	IEEE Standard for Management Information Base (MIB) Definitions for Ethernet	IoT; Management of Home Network devices; IMT-2020 and beyond
IEEE 802.3.2-2019 YANG Data Model	IEEE 802.3 Ethernet WG	Published	IEEE Standard for Ethernet – YANG Data Model Definitions	YANG data models; YANG models for PtP systems; YANG models for PON systems; IMT-2020; Data models for Home Network
IEEE 802.3cd - 2018	IEEE 802.3 Ethernet WG	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 and beyond
IEEE 802-2014	IEEE 802.1	Published	IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture	IMT-2020 and beyond
IEEE 802c-2017	IEEE 802.1	Published	IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture--Amendment 2: Local Medium Access Control (MAC) Address Usage	IMT-2020 and beyond
IEEE 802d-2017	IEEE 802.1	Published	IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture Amendment 1: Allocation of Uniform	IMT-2020 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			Resource Name (URN) Values in IEEE 802(R) Standards	
IEEE 802E-2020	IEEE 802.1	Published	IEEE Recommended Practice for Privacy Considerations for IEEE 802(R) Technologies	IMT-2020 and beyond
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 and beyond
IEEE P1451.8	IEEE	Draft	Standard for Wind Turbine Health Monitoring System Wireless Communication Protocols and Transducer Electronic Data Sheet (TEDS) Format	IMT-2020 and beyond
IEEE P1451-99	IEEE	Draft	Standard for Harmonization of Internet of Things (IoT) Devices and Systems	IMT-2020 and beyond
IEEE P149	IEEE	Draft	IEEE Draft Recommended Practice for Antenna Measurements	IMT-2020 and beyond
IEEE P1609.2.1	IEEE	Draft	Wireless Access in Vehicular Environments (WAVE) – Certificate Management Interfaces for End-entities	IMT-2020 and beyond
IEEE P1609.2b	IEEE	Draft	Standard for Wireless Access in Vehicular Environments – Security Services for Applications and Management Messages Amendment	IMT-2020 and beyond
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 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
IEEE P1770	IEEE	Draft	Recommended Practice for The Usage of Terms Commonly Employed In the Field of Large-Signal Vector Network Analysis	IMT-2020 and beyond
IEEE P1857.6	IEEE	Draft	IEEE Draft Standard for Digital Media Content Description	IMT-2020 and beyond
IEEE P1857.9	IEEE	Draft	IEEE Draft Standard for Immersive Visual Content Coding	IMT-2020 and beyond
IEEE P1903.1-2017	IEEE	Published	IEEE Approved Draft Standard for Content Delivery Protocols of Next Generation Service Overlay Network	IMT-2020 and beyond
IEEE P1903.2-2017	IEEE	Published	IEEE Approved Draft Standard for Service Composition Protocols of Next Generation Service Overlay Network (NGSON)	IMT-2020 and beyond
IEEE P1903.3-2017	IEEE	Published	IEEE Approved Draft Standard for Self-Organizing Management Protocols of Next Generation Service Overlay Network	IMT-2020 and beyond
IEEE P1912	IEEE	Draft	Standard for Privacy and Security Architecture for Consumer Wireless Devices	IMT-2020 and beyond
IEEE P1913	IEEE	Draft	Draft Standard for Software-Defined Quantum Communication	IMT-2020 and beyond
IEEE P1914.1	IEEE	Draft	Standard for Packet-based Fronthaul Transport Networks	IMT-2020 and beyond
IEEE P1914.3	IEEE 1914	Draft	IEEE Draft Standard for Radio Over Ethernet Encapsulations and Mappings	IMT-2020 and beyond
IEEE P1915.1	IEEE	Draft	IEEE Draft Standard for Software Defined Networking and Network	IMT-2020 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			Function Virtualization Security	
IEEE P1916.1	IEEE	Draft	IEEE Draft Standard for Software Defined Networking and Network Function Virtualization Performance	IMT-2020 and beyond
IEEE P1917.1	IEEE	Draft	IEEE Draft Standard for Software Defined Networking and Network Function Virtualization Reliability	IMT-2020 and beyond
IEEE P1918.1	IEEE	Draft	IEEE Draft Standard for Tactile Internet: Application Scenarios, Definitions and Terminology, Architecture, Functions, and Technical Assumptions	IMT-2020 and beyond
IEEE P1918.1.1	IEEE	Draft	IEEE Draft Standard for Haptic Codecs for the Tactile Internet	IMT-2020 and beyond
IEEE P1920.1	IEEE	Draft	IEEE Draft Standard for Aerial Communications and Networking Standards	IMT-2020 and beyond
IEEE P1921.1	IEEE	Draft	IEEE Draft Standard for Software-Defined Networking (SDN) Bootstrapping Procedures	IMT-2020 and beyond
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 and beyond
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 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
IEEE P211	IEEE	Draft	Standard Definitions of Terms for Radio Wave Propagation	IMT-2020 and beyond
IEEE P2413	IEEE	Draft	IEEE Draft Standard for an Architectural Framework for the Internet of Things (IoT)	IoT; IMT-2020 and beyond
IEEE P287.1	IEEE	Draft	Standard for Precision Coaxial Connectors at RF, Microwave and Millimeter-wave Frequencies	IMT-2020 and beyond
IEEE P3333.2.4	IEEE	Draft	IEEE Draft Standard for Three-Dimensional (3D) Medical Simulation	IMT-2020 and beyond
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: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specification	IMT-2020 and beyond
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) Specification	IMT-2020 and beyond
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 and beyond
IEEE P802.15.3d	IEEE 802.15	Draft	IEEE Draft Standard for Information technology--Local and metropolitan	IMT-2020 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			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) – A	
IEEE P802.15.8	IEEE	Draft	IEEE Draft Standard for Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Peer Aware Communications (PAC)	IoT; IMT-2020 and beyond
IEEE P802.16s	IEEE 802.16	Published	IEEE Draft Standard for Air Interface for Broadband Wireless Access Systems – Amendment: Fixed and Mobile Wireless Access in Channel Bandwidth up to 1.25 MHz	IMT-2020 and beyond
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	IMT-2020 and beyond
IEEE P802.19.1b	IEEE 802	Draft	New activity to develop a recommended practice with the purpose of is to identify performance enhancement settings that provide improvements for IEEE 802 wireless devices in automotive environments.	IMT-2020 and beyond
IEEE P802.1CF	IEEE 802.1	Draft	IEEE Draft Recommended Practice for Network Reference Model and	IMT-2020 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			Functional Description of IEEE 802 Access Network	
IEEE P802.1CM	IEEE 802.1	Draft	IEEE Draft Standard for Time-Sensitive Networking for Fronthaul	IMT-2020 and beyond
IEEE P802.1DC	IEEE 802.1	Draft	IEEE Standard for Local and Metropolitan Area Networks--Quality of Service Provision by Network Systems	IMT-2020 and beyond
IEEE P802.1DF	IEEE 802.1	Draft	IEEE Standard for Local and Metropolitan Area Networks--TSN Profile for Service Provider Networks	IMT-2020 and beyond
IEEE P802.1Qcj	IEEE 802.1	Draft	IEEE Draft Standard for Local and Metropolitan Area Networks – Bridges and Bridged Networks Amendment: Automatic Attachment to Provider Backbone Bridging (PBB) Services	IMT-2020 and beyond
IEEE P802.1Qcw	IEEE 802.1	Draft	Standard for Local and Metropolitan Area Networks--Bridges and Bridged Networks Amendment: YANG Data Models for Scheduled Traffic, Frame Preemption, and Per-Stream Filtering and Policing	IMT-2020 and beyond
IEEE P802.1Qcz	IEEE 802.1	Draft	Standard for Local and Metropolitan Area Networks--Bridges and Bridged Networks Amendment: Congestion Isolation	IMT-2020 and beyond
IEEE P802.1Qdd	IEEE 802.1	Draft	Standard for Local and Metropolitan Area Networks--Bridges and Bridged Networks Amendment: Resource Allocation Protocol	IMT-2020 and beyond
IEEE P802.1Qdj	IEEE 802.1	Draft	Standard for Local and Metropolitan Area	IMT-2020 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			Networks--Bridges and Bridged Networks Amendment: Configuration Enhancements for Time-Sensitive Networking	
IEEE P802.1Qdq	IEEE 802.1	Draft	Standard for Local and Metropolitan Area Networks--Bridges and Bridged Networks Amendment: Shaper Parameter Settings for Bursty Traffic Requiring Bounded Latency	IMT-2020 and beyond
IEEE P802.1Qdt	IEEE 802.1	Draft	Standard for Local and Metropolitan Area Networks--Bridges and Bridged Networks Amendment: PFC Enhancements	IMT-2020 and beyond
IEEE P802.1Q-REV	IEEE 802.1	Draft	IEEE Standard for Local and Metropolitan Area Networks--Bridges and Bridged Networks	IMT-2020 and beyond
IEEE P802.21-2017/Cor 1	IEEE 802	Draft	IEEE Standard for Local and Metropolitan Area Networks - Part 21: Media Independent Services Framework - Corrigendum 1: Clarification of Parameter Definition in Group Session Key Derivation	IMT-2020 and beyond
IEEE P802.22.3	IEEE 802	Draft	IEEE Draft Standard for Spectrum Characterization and Occupancy Sensing	IMT-2020 and beyond
IEEE P802.3bs	IEEE 802.1	Published	IEEE Draft Standard for Ethernet – Amendment: Media Access Control Parameters, Physical Layers and Management Parameters for 200 Gb/s and 400 Gb/s Operation	IMT-2020 and beyond
IEEE P802.3ca	IEEE 802.3 Ethernet WG	Draft	IEEE Draft Standard for Ethernet – Amendment: Physical Layer Specifications and	IMT-2020 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
			Management Parameters for 25 Gb/s, 50 Gb/s, and 100 Gb/s Passive Optical Networks	
IEEE P802.3cc	IEEE 802.3 Ethernet WG	Draft	IEEE Draft Standard for Ethernet – Amendment: Physical Layer and Management Parameters for Serial 25 Gb/s Ethernet Operation Over Single-Mode Fiber	IMT-2020 and beyond
IEEE P802.3cd	IEEE 802.3 Ethernet WG	Draft	IEEE Draft Standard for Ethernet – Amendment: 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 and beyond
IEEE P802f	IEEE 802.1	Draft	Standard for Local and Metropolitan Area Networks: Overview and Architecture Amendment: YANG Data Model for EtherTypes	IMT-2020 and beyond
P802.1CF Network Reference Model and Functional Description	IEEE 802.1	Draft	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 model, including entities and reference	IMT-2020 and beyond
P802.1CM TSN for Fronthaul	IEEE 802.1	Draft	The purpose of this standard is to enable the transport of time sensitive fronthaul streams in Ethernet bridged networks.	IMT-2020 and beyond
Standard for Packet-based Fronthaul Transport Networks	IEEE 1914	Draft	Use cases, Architecture, Requirements	IMT-2020 and beyond
Standard for Radio over Ethernet	IEEE 1914	Draft	Protocol	IMT-2020 and beyond

Table 7-4 – IEEE deliverables

Name	Responsible group	Status	Subject	Topics
Encapsulations and Mappings				

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 and beyond 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 and beyond
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 Data Sheet (TEDS) Formats	Sensor and Actuator; IMT-2020 and beyond
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 and beyond
ISO/IEC/IEEE 21451-7:2011	IEEE	Published	Information technology – Standard for a Smart Transducer Interface for Sensors and Actuators –	Sensor and Actuator; IMT-2020 and beyond

Table 7-5 – ISO/IEC deliverables

Name	Responsible group	Status	Subject	Topics
			Transducers to Radio Frequency Identification (RFID) Systems Communication Protocols and Transducer Electronic Data Sheet Formats	
ISO/IEC/IEEE P21451-1-4	IEEE	Draft	Information technology – Standard for a Smart Transducer Interface for Sensors	IMT-2020 and beyond; IoT

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 and beyond networks.

Table 7-6 – ITU-R deliverables

Name	Responsible group	Status	Subject	Topics
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 and beyond
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 and beyond
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 and beyond
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 and beyond
ITU-R M.2090-0	ITU-R WP 5D	Published	Specific out-of-band emission limit of IMT mobile stations operating in the frequency band 694-790 MHz for protection of existing services in Region 1 in	IMT-2020 and beyond

Table 7-6 – ITU-R deliverables

Name	Responsible group	Status	Subject	Topics
			the frequency band below 694 M	
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 and beyond
ITU-R M.2410-0	ITU-R WP 5D	Published	Minimum requirements related to technical performance for IMT-2020 radio interface(s)	IMT-2020 and beyond
ITU-R M.2411-0	ITU-R WP 5D	Published	Requirements, evaluation criteria and submission templates for the development of IMT-2020	IMT-2020 and beyond
ITU-R M.2412-0	ITU-R WP 5D	Published	Guidelines for evaluation of radio interface technologies for IMT-2020	IMT-2020 and beyond
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 and beyond
ITU-R M.2441-0	ITU-R WP 5D	Published	Emerging usage of the terrestrial component of International Mobile Telecommunication (IMT)	IMT-2020 and beyond

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 and beyond networks.

Table 7-7 – ITU-T SG2 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T M.3041 (02/2020)	ITU-T SG2	In force	Framework of smart operation, management and maintenance	IMT-2020 and beyond
ITU-T M.3080 (02/2021)	ITU-T SG2	In force	Framework of artificial intelligence enhanced telecom operation and management (AITOM)	IMT-2020 and beyond
ITU-T M.3381 (01/2022)	ITU-T SG2	In force	Requirements for energy saving management of 5G radio access network (RAN) systems with artificial intelligence (AI)	IMT-2020 and beyond
ITU-T M.rsmca	ITU-T SG2	Draft	Requirements for smart maintenance of cell antenna	IMT-2020 and beyond

7.8 ITU-T SG3

ITU-T Study Group 3 provides a unique global forum to improve the understanding of the financial and economic aspects associated with the growth of ICT, particularly with respect to the shift to IP-based and NGN/Future Networks and the exponential rise in mobile wireless communications. More specifically, ITU-T SG3 is responsible, inter alia, for studying international telecommunication/ICT policy and economic issues and tariff and accounting matters (including costing principles and methodologies), with a view to informing the development of enabling regulatory models and frameworks. SG3 is also tasked with the study of the economic and regulatory impact of the Internet, convergence (services or infrastructure) and new services, such as OTT, on international telecommunication services and networks.

Table 7-8 provides a list of ITU-T SG3 deliverables associated with IMT-2020 and beyond networks.

Table 7-8 – ITU-T SG3 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T STUDY_IMT2020 MVNOs	ITU-T SG3	Draft	5G related policy considering MVNOs	IMT-2020 and beyond

7.9 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 7-9 provides a list of ITU-T SG5 deliverables associated with IMT-2020 and beyond networks.

Table 7-9 – ITU-T SG5 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T K Suppl. 10 (11/2017)	ITU-T SG5	In force	Analysis of electromagnetic compatibility aspects and definition of requirements for 5G mobile systems	IMT-2020 and beyond
ITU-T K Suppl. 14 (09/2019)	ITU-T SG5	In force	The impact of RF-EMF exposure limits stricter than the ICNIRP or IEEE guidelines on 4G and 5G mobile network deployment	IMT-2020 and beyond
ITU-T K Suppl. 26 (05/2021)	ITU-T SG5	In force	ITU-T K.114 – Analysis of electromagnetic compatibility requirements and test methods of 5G active antenna system base stations	IMT-2020 and beyond
ITU-T K Suppl. 8 (11/2017)	ITU-T SG5	In force	Resistibility analysis of 5G systems	IMT-2020 and beyond
ITU-T K Suppl. 9 (05/2019)	ITU-T SG5	In force	5G technology and human exposure to radiofrequency electromagnetic fields	IMT-2020 and beyond
ITU-T K.116 (07/2019)	ITU-T SG5	In force	Electromagnetic compatibility requirements and test methods for radio telecommunication terminal equipment	IMT-2020 and beyond
ITU-T K.136 (11/2022)	ITU-T SG5	In force	Electromagnetic compatibility requirements for radio telecommunication equipment	IMT-2020 and beyond

Table 7-9 – ITU-T SG5 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T K.5G-Lightning	ITU-T SG5	Draft	Practical guide for lightning protection, earthing and bonding, and safety consideration of 5G radio base station	IMT-2020 and beyond
ITU-T L Suppl. 36 (11/2017)	ITU-T SG5	In force	ITU-T L.1310 – Study on methods and metrics to evaluate energy efficiency for future 5G systems	IMT-2020 and beyond
ITU-T L.1022 (10/2019)	ITU-T SG5	In force	Circular economy: Definitions and concepts for material efficiency for information and communication technology	IMT-2020 and beyond
ITU-T L.1036 (02/2022)	ITU-T SG5	In force	Scheduled waste management for a base station (inclusive of e-waste)	IMT-2020 and beyond
ITU-T L.1050 (01/2022)	ITU-T SG5	In force	Methodology to identify key equipment for environmental impact and e- waste generation assessment of network architectures	IMT-2020 and beyond; IoT & Smart Sustainable Cities Standards
ITU-T L.1210 (12/2019)	ITU-T SG5	In force	Sustainable power-feeding solutions for 5G networks	IMT-2020 and beyond
ITU-T L.1220 (08/2017)	ITU-T SG5	In force	Innovative energy storage technology for stationary use - Part 1: Overview of energy storage	Cloud Computing; IMT-2020 and beyond; Energy storage technology
ITU-T L.1221 (11/2018)	ITU-T SG5	In force	Innovative energy storage technology for stationary use – Part 2: Battery	IMT-2020 and beyond; Energy storage technology; IoT & Smart Sustainable Cities Standards
ITU-T L.1222 (05/2018)	ITU-T SG5	In force	Innovative energy storage technology for stationary use - Part 3: Supercapacitor technology	IMT-2020 and beyond; Energy storage technology; IoT & Smart Sustainable Cities Standards

Table 7-9 – ITU-T SG5 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T L.1310 (09/2020)	ITU-T SG5	In force	Energy efficiency metrics and measurement methods for telecommunication equipment	IMT-2020 and beyond; Environment and power supply of Home Network equipment; Energy efficiency and key performance indicators
ITU-T L.1316 (11/2019)	ITU-T SG5	In force	Energy efficiency framework	IMT-2020 and beyond; Energy efficiency and key performance indicators
ITU-T L.1320 (03/2014)	ITU-T SG5	In force	Energy efficiency metrics and measurement for power and cooling equipment for telecommunications and data centres	Cloud Computing; IMT-2020 and beyond
ITU-T L.1325 (12/2016)	ITU-T SG5	In force	Green ICT solutions for telecom network facilities	IMT-2020 and beyond; Green and smart energy solutions
ITU-T L.1331 (01/2022)	ITU-T SG5	In force	Assessment of mobile network energy efficiency	IMT-2020 and beyond
ITU-T L.1333 (09/2022)	ITU-T SG5	In force	Carbon data intensity for network energy performance monitoring	IMT-2020 and beyond; Environment and power supply of Home Network equipment
ITU-T L.1350 (10/2016)	ITU-T SG5	In force	Energy efficiency metrics of a base station site	IMT-2020 and beyond
ITU-T L.1351 (08/2018)	ITU-T SG5	In force	Energy efficiency measurement methodology for base station sites	Security assessment and evaluation criteria; Security policy and policy mechanisms; IMT-2020 and beyond
ITU-T L.1380 (11/2019)	ITU-T SG5	In force	Smart energy solution for telecom sites	IMT-2020 and beyond; Green and smart energy solutions

Table 7-9 – ITU-T SG5 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T L.1390 (08/2022)	ITU-T SG5	In force	Energy saving technologies and best practices for 5G radio access network (RAN) equipment	IMT-2020 and beyond
ITU-T L.1410 (12/2014)	ITU-T SG5	In force	Methodology for environmental life cycle assessments of information and communication technology goods, networks and services	Cloud Computing; IMT-2020 and beyond; Environment and power supply of Home Network equipment
ITU-T L.1470 (01/2020)	ITU-T SG5	In force	Greenhouse gas emissions trajectories for the information and communication technology sector compatible with the UNFCCC Paris Agreement	IMT-2020 and beyond; Environment and power supply of Home Network equipment
ITU-T L.GHGintensities	ITU-T SG5	Draft	GHG emissions intensity indicators for telecom network operators	IMT-2020 and beyond

7.10 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 7-10 provides a list of ITU-T SG9 deliverables associated with IMT-2020 and beyond networks.

Table 7-9 – ITU-T SG10 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T J.1 (10/2022)	ITU-T SG9	In force	Terms, definitions and acronyms for television and sound transmission and integrated broadband cable networks	IMT-2020 and beyond; General on Cable Networks
ITU-T J.1036 (07/2023)	ITU-T SG9	In force	Factual subscriber-base reporting and protected content delivery in conditional access system – Requirements	IMT-2020 and beyond
ITU-T J.1112 (07/2023)	ITU-T SG9	In force	Functional requirements for IP-based digital video convergence service	IMT-2020 and beyond
ITU-T J.125 (12/2007)	ITU-T SG9	In force	Link privacy for cable modem implementations	Cable Modem; DOCSIS 1.0 and 1.1; IMT-2020 and beyond
ITU-T J.1305 (07/2023)	ITU-T SG9	In force	Requirements for microservices architecture for audio-visual media in the converged media cloud	IMT-2020 and beyond
ITU-T J.1306 (07/2023)	ITU-T SG9	In force	Specification of microservices architecture for audio-visual media in the converged media cloud	IMT-2020 and beyond
ITU-T J.152 (07/2023)	ITU-T SG9	In force	Requirements for cable television services to use 5G radio systems	IMT-2020 and beyond; Fixed Broadband Wireless Access delivered from mobile networks; General on Cable Networks
ITU-T J.1612 (07/2023)	ITU-T SG9	In force	Architecture for a smart home gateway	IMT-2020 and beyond; Cable-based video services and IPTV; General on Smart Home Network; Home gateways

Name	Responsible group	Status	Subject	Topics
ITU-T J.cable-rf-to-ip	ITU-T SG 9	Draft	Requirements of cable television system for migration from RF to IP	IMT-2020 and beyond
ITU-T J.HiNoC3-MAC	ITU-T SG 9	Draft	MAC layer specification for third-generation HiNoC	IMT-2020 and beyond; HiNoC – High performance network over Coax; High Performance Networks over Coax (HiNoC)
ITU-T J.HiNoC3-PHY	ITU-T SG 9	Draft	Physical layer specification for third-generation HiNoC	IMT-2020 and beyond; HiNoC – High performance network over Coax; High Performance Networks over Coax (HiNoC)
ITU-T J.TR.WiFiTV	ITU-T SG 9	Draft	Secondary distribution of digital television and audiovisual content to portable devices using the wireless local area network	IMT-2020 and beyond
ITU-T JSTR.LCAP	ITU-T SG 9	Draft	Technical advances, challenges, and best practices in live captioning	IMT-2020 and beyond
ITU-T JSTR.STBN	ITU-T SG 9	Draft	The analysis of standards trends for scalable transmission in broadband network	IMT-2020 and beyond
ITU-T Sup11-rev	ITU-T SG 9	Draft	Guidelines for installing a digital television service for cable networks based on ITU-T Recommendations	IMT-2020 and beyond

7.11 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 7-11 provides a list of ITU-T SG11 deliverables associated with IMT-2020 and beyond networks.

Table 7-11 – ITU-T SG11 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Q.3054 (04/2019)	ITU-T SG11	In force	Signalling architecture for virtualization of control network entities	Security Architectures, Models and Frameworks; Security protocol standards; IMT-2020 and beyond
ITU-T Q.3062 (09/2022)	ITU-T SG11	In force	Signalling procedures and protocols for enabling interconnection between trustable network entities in support of existing and emerging networks	IMT-2020 and beyond
ITU-T Q.3063 (09/2022)	ITU-T SG11	In force	Signalling procedures of calling line identification authentication	IMT-2020 and beyond
ITU-T Q.3406 (09/2022)	ITU-T SG11	In force	Signalling requirements for telemetry of virtual broadband network services	IMT-2020 and beyond

Table 7-11 – ITU-T SG11 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Q.3630 v1 (03/2017)	ITU-T SG11	In force	Inter-IMS network to network interface – Protocol specification	IMT-2020 and beyond
ITU-T Q.3641 (10/2018)	ITU-T SG11	In force	IMS references to Release 11 for communication between IMS and NGN networks to support end-to-end service interoperability	IMT-2020 and beyond
ITU-T Q.3642 (04/2019)	ITU-T SG11	In force	IMS references to Release 12 for communication between IMS and NGN networks to support end-to-end service interoperability	IMT-2020 and beyond
ITU-T Q.3646 (02/2022)	ITU-T SG11	In force	Framework and protocols for signalling network analysis and optimization in VoLTE	IMT-2020 and beyond
ITU-T Q.3714 (01/2018)	ITU-T SG11	In force	Signalling requirements of SDN-based access networks with media-independent management capabilities	IMT-2020 and beyond
ITU-T Q.3715 (01/2018)	ITU-T SG11	In force	Signalling requirements for dynamic bandwidth adjustment on demand on broadband network gateway implemented by software-defined networking technologies	IMT-2020 and beyond
ITU-T Q.3716 (01/2018)	ITU-T SG11	In force	Signalling requirements for mapping between physical and virtual networks	IMT-2020 and beyond
ITU-T Q.3721 (09/2022)	ITU-T SG11	In force	Procedures for a programming protocol independent packet processor switch-based virtual border network gateway	IMT-2020 and beyond

Table 7-11 – ITU-T SG11 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Q.3740 (01/2018)	ITU-T SG11	In force	Signalling requirements for software-defined networking and network function virtualization-based central office services	IMT-2020 and beyond
ITU-T Q.3741 (07/2019)	ITU-T SG11	In force	Signalling requirements for SD-WAN service	IMT-2020 and beyond
ITU-T Q.3745 (04/2020)	ITU-T SG11	In force	Protocol for time constraint Internet of things-based applications over software-defined networking	IMT-2020 and beyond
ITU-T Q.3963 (04/2020)	ITU-T SG11	In force	The compatibility testing of SDN-based equipment using OpenFlow protocol	IMT-2020 and beyond
ITU-T Q.4043 (07/2019)	ITU-T SG11	In force	Interoperability testing requirements of a virtual switch	IMT-2020 and beyond
ITU-T Q.4044 (08/2021)	ITU-T SG11	In force	Test suite for interoperability testing of a virtual switch	IMT-2020 and beyond
ITU-T Q.4045	ITU-T SG 11	Draft	Framework of network function virtualization automated testing	IMT-2020 and beyond
ITU-T Q.4061 (04/2019)	ITU-T SG11	In force	Framework of software-defined network controller testing	IMT-2020 and beyond
ITU-T Q.4064 (09/2020)	ITU-T SG11	In force	Interoperability testing requirements for a virtualized broadband network gateway	IMT-2020 and beyond
ITU-T Q.4066 (09/2020)	ITU-T SG11	In force	Testing procedures of augmented reality applications	IMT-2020 and beyond
ITU-T Q.4067 (05/2021)	ITU-T SG11	In force	Signalling requirements for the virtualized network function lifecycle management in a testing environment	IMT-2020 and beyond

Table 7-11 – ITU-T SG11 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Q.4069 (09/2022)	ITU-T SG11	In force	Testing requirements and procedures for Internet of things based green data centres	IMT-2020 and beyond
ITU-T Q.4070 (02/2023)	ITU-T SG11	In force	Test suite for interoperability testing of virtualized broadband network gateways	IMT-2020 and beyond
ITU-T Q.4140 (07/2023)	ITU-T SG11	In force	Signalling requirements for service deployment in computing power networks	IMT-2020 and beyond
ITU-T Q.4141	ITU-T SG 11	Draft	Requirements and signalling of intelligence control for the border network gateway in computing power network	Software-Defined Networking (SDN)
ITU-T Q.5001 (10/2018)	ITU-T SG11	In force	Signalling requirements and architecture of intelligent edge computing	Software-Defined Networking (SDN)
ITU-T Q.5002 (12/2019)	ITU-T SG11	In force	Signalling requirements and architecture for media service entity attachment	IMT-2020 and beyond
ITU-T Q.5003 (02/2022)	ITU-T SG11	In force	Signalling requirements and architecture for federated multiaccess edge computing	IMT-2020 and beyond
ITU-T Q.5004 (02/2023)	ITU-T SG11	In force	Signalling architecture of Lite IMS for IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Q.5005 (02/2023)	ITU-T SG11	In force	Requirements, framework and protocols for signalling network analysis and optimization in IMT-2020	IMT-2020 and beyond

Table 7-11 – ITU-T SG11 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Q.5006 (07/2023)	ITU-T SG11	In force	Signalling requirements for hierarchical network slicing service	Software-Defined Networking (SDN)
ITU-T Q.5020 (04/2019)	ITU-T SG11	In force	Protocol requirements and procedures for network slice lifecycle management	IMT-2020 and beyond
ITU-T Q.5021 (07/2019)	ITU-T SG11	In force	Protocol for managing capability exposure APIs in IMT-2020 networks	IMT-2020 and beyond
ITU-T Q.5022 (04/2020)	ITU-T SG11	In force	Signalling procedure of energy efficient device-to-device communication for IMT-2020 network	IMT-2020 and beyond
ITU-T Q.5023 (08/2021)	ITU-T SG11	In force	Protocol for managing intelligent network slicing with AI-assisted analysis in IMT-2020 networks	IMT-2020 and beyond
ITU-T Q.5024 (02/2022)	ITU-T SG11	In force	Protocol for providing intelligent analysis services in IMT-2020 networks	IMT-2020 and beyond
ITU-T Q.5025 (09/2022)	ITU-T SG11	In force	Protocol for managing the user plane function in IMT-2020 networks	IMT-2020 and beyond
ITU-T Q.5026 (07/2023)	ITU-T SG11	In force	Signalling requirements and protocol for providing network-oriented data integrity verification service based on blockchain in IMT-2020 networks	IMT-2020 and beyond
ITU-T Q.5027 (07/2023)	ITU-T SG11	In force	Protocol for IMT-2020 network integration with time sensitive network	IMT-2020 and beyond
ITU-T Q.BNG-CA	ITU-T SG 11	Draft	Signalling requirements of virtual Broadband Network Gateway for cloud access	IMT-2020 and beyond

Table 7-11 – ITU-T SG11 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Q.BNG-PUP	ITU-T SG 11	Draft	Signalling requirements for cloud-based control plane and pooled user plane of vBNG (Broadband Network Gateway)	IMT-2020 and beyond
ITU-T Q.CNCG-IC	ITU-T SG 11	Draft	Signalling requirements for intelligent control of cloud-network-converged networks gateway	IMT-2020 and beyond
ITU-T Q.DC-SA	ITU-T SG 11	Draft	Signalling architecture of data channel enhanced IMS network	IMT-2020 and beyond
ITU-T Q.IEC-PRO	ITU-T SG 11	Draft	Signalling architecture for microservices based intelligent edge computing	IMT-2020 and beyond
ITU-T Q.IMT2020-PFW	ITU-T SG 11	Draft	Protocol Framework for IMT-2020	IMT-2020 and beyond
ITU-T Q.PCNC-FMSC	ITU-T SG 11	Draft	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.PDN	ITU-T SG 11	Draft	Signalling and Protocol for distributed core network in future network	IMT-2020 and beyond
ITU-T Q.PEC	ITU-T SG 11	Draft	Signalling Requirements and Protocols for enhanced quality assured connections in IMT-2020 network and beyond	IMT-2020 and beyond
ITU-T Q.PMMC	ITU-T SG 11	Draft	Protocol for traffic flow coordination of multi-modality communication	IMT-2020 and beyond
ITU-T Q.SCC	ITU-T SG 11	Draft	Signalling requirements and information model of Cooperative Controller	IMT-2020 and beyond

Table 7-11 – ITU-T SG11 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Q.Scvh-iopt	ITU-T SG 11	Draft	Interoperability testing between SDN and hypervisor based computing virtualization	IMT-2020 and beyond
ITU-T Q.SD-DCI	ITU-T SG 11	Draft	Signalling requirements and data models for SD-DCI service	IMT-2020 and beyond
ITU-T Q.SPMA	ITU-T SG 11	Draft	Signalling and protocol management for multiple access types in IMT-2020 network and beyond	IMT-2020 and beyond
ITU-T Q.WLAN5G-REQ	ITU-T SG 11	Draft	Signalling requirements of WLAN access network for interworking with 5G network	IMT-2020 and beyond

7.12 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 7-12 provides a list of ITU-T SG12 deliverables associated with IMT-2020 and beyond networks.

Table 7-12 – ITU-T SG12 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T G Suppl. 73 (10/2021)	ITU-T SG12	In force	Influencing factors on quality of experience for multiview video (MVV) services	IMT-2020 and beyond
ITU-T G Suppl. 77 (06/2022)	ITU-T SG12	In force	Supplement 77 to ITU-T G-series of Recommendations – Influencing factors on quality of experience (QoE) for video customized alerting tone (CAT) and video customized ringing signal (CRS) services	IMT-2020 and beyond

Name	Responsible group	Status	Subject	Topics
ITU-T G.1035 (11/2021)	ITU-T SG12	In force	Influencing factors on quality of experience for virtual reality services	IMT-2020 and beyond
ITU-T G.1036 (07/2022)	ITU-T SG12	In force	Quality of experience influencing factors for augmented reality services	IMT-2020 and beyond
ITU-T GSTR-5GQoE (06/2022)	ITU-T SG12	In force	Quality of experience (QoE) requirements for real-time multimedia services over 5G networks	IMT-2020 and beyond
ITU-T P.1320 (07/2022)	ITU-T SG12	In force	Quality of experience assessment of extended reality meetings	IMT-2020 and beyond
ITU-T Y.1550 (01/2019)	ITU-T SG12	In force	Considerations for realizing virtual measurement systems	IMT-2020 and beyond

7.13 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 7-13 provides a list of ITU-T SG13 deliverables associated with IMT-2020 and beyond networks.

Table 7-13 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y Suppl. 44 (07/2017)	ITU-T SG13	In force	Standardization and open source activities related to network	IMT-2020 and beyond

Table 7-13 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
			softwarization of IMT-2020	
ITU-T Y Suppl. 48 (07/2018)	ITU-T SG13	In force	Proof-of-concept for data service using information centric networking in IMT-2020	Security services; IMT-2020 and beyond; Generic security mechanisms; IMT-2020 and beyond
ITU-T Y Suppl. 55 (10/2019)	ITU-T SG13	In force	ITU-T Y.3170-series – Machine learning in future networks including IMT-2020: use cases	IMT-2020 and beyond
ITU-T Y Suppl. 59 (11/2022)	ITU-T SG13	In force	ITU-T Y.3100-series – IMT-2020 standardization roadmap	IMT-2020 and beyond
ITU-T Y Suppl. 64 (07/2020)	ITU-T SG13	In force	ITU-T Y.3100-series – Awareness on use cases and migration aspects of IMT-2020	IMT-2020 and beyond
ITU-T Y. FMSC-MEC	ITU-T SG 13	Draft	Multi-access Edge Computing for fixed, mobile and satellite convergence in IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y. FMSC-NS	ITU-T SG 13	Draft	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 SG 13	Draft	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 SG 13	Draft	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.3071 (03/2017)	ITU-T SG13	In force	Data aware networking (information centric networking) –	IMT-2020; Cloud Computing

Table 7-13 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
			Requirements and capabilities	
ITU-T Y.3072 (04/2019)	ITU-T SG13	In force	Requirements and capabilities of name mapping and resolution for information-centric networking in IMT-2020	IMT-2020 and beyond
ITU-T Y.3074 (08/2019)	ITU-T SG13	In force	Framework for directory service for management of large numbers of heterogeneously-named objects in IMT-2020	IMT-2020 and beyond
ITU-T Y.3075 (09/2020)	ITU-T SG13	In force	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 (09/2020)	ITU-T SG13	In force	Architecture of ICN-enabled edge network in IMT-2020	IMT-2020 and beyond
ITU-T Y.3077 (09/2021)	ITU-T SG13	In force	Framework for interworking of heterogeneous application domain connected objects through information-centric networking in IMT-2020	IMT-2020 and beyond
ITU-T Y.3078 (02/2022)	ITU-T SG13	In force	Information centric networking for IMT-2020 and beyond – Requirements and capabilities of data object segmentation	IMT-2020 and beyond
ITU-T Y.3079 (09/2022)	ITU-T SG13	In force	Information-centric networking in networks beyond IMT-2020 – Framework of locally enhanced name mapping and resolution	IMT-2020 and beyond
ITU-T Y.3080 (09/2022)	ITU-T SG13	In force	Information-centric networking in networks beyond IMT-2020 – Requirements and	IMT-2020 and beyond

Table 7-13 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
			mechanisms of the transport layer	
ITU-T Y.3081 (09/2022)	ITU-T SG13	In force	Self-controlled identity based on blockchain – Requirements and framework	IMT-2020 and beyond
ITU-T Y.3082 (03/2023)	ITU-T SG13	In force	Mobile network sharing based on distributed ledger technology for networks beyond IMT-2020: Requirements and framework	IMT-2020 and beyond
ITU-T Y.3083 (09/2023)	ITU-T SG13	In force	Information-centric networking in networks beyond IMT-2020: Reference model of on-site, elastic and autonomous networks	IMT-2020 and beyond
ITU-T Y.3090 (02/2022)	ITU-T SG13	In force	Digital twin network – Requirements and architecture	IMT-2020 and beyond
ITU-T Y.3100 (09/2017)	ITU-T SG13	In force	Terms and definitions for IMT-2020 network	IMT-2020
ITU-T Y.3101 (01/2018)	ITU-T SG13	In force	Requirements of the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3102 (05/2018)	ITU-T SG13	In force	Framework of the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3103 (09/2018)	ITU-T SG13	In force	Business role-based models in IMT-2020	IMT-2020 and beyond
ITU-T Y.3104 (12/2018)	ITU-T SG13	In force	Architecture of the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3105 (12/2018)	ITU-T SG13	In force	Requirements of capability exposure in the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3106 (04/2019)	ITU-T SG13	In force	Quality of service functional requirements for the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3107 (08/2019)	ITU-T SG13	In force	Functional architecture for QoS assurance management in the IMT-2020 network	IMT-2020 and beyond

Table 7-13 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.3108 (12/2019)	ITU-T SG13	In force	Capability exposure function in IMT-2020 networks	IMT-2020 and beyond
ITU-T Y.3109 (04/2021)	ITU-T SG13	In force	Quality of service 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 (09/2017)	ITU-T SG13	In force	IMT-2020 network management and orchestration requirements	IMT-2020 and beyond
ITU-T Y.3111 (09/2017)	ITU-T SG13	In force	IMT-2020 network management and orchestration framework	IMT-2020 and beyond
ITU-T Y.3112 (12/2018)	ITU-T SG13	In force	Framework for the support of network slicing in the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3113 (02/2021)	ITU-T SG13	In force	Requirements and framework for latency guarantee in large-scale networks including the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3114 (02/2022)	ITU-T SG13	In force	Future networks including IMT-2020: requirements and functional architecture of lightweight core for dedicated networks	IMT-2020 and beyond
ITU-T Y.3115 (02/2022)	ITU-T SG13	In force	AI enabled cross-domain network architectural requirements and framework for future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3116 (02/2022)	ITU-T SG13	In force	Traffic typization IMT-2020 management based on an artificial intelligence approach	IMT-2020 and beyond
ITU-T Y.3118 (09/2022)	ITU-T SG13	In force	Requirements and framework for jitter guarantee in large scale	IMT-2020 and beyond

Table 7-13 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
			networks including IMT-2020 and beyond	
ITU-T Y.3119 (01/2023)	ITU-T SG13	In force	Future networks including IMT-2020 – Capability classification framework for dedicated networks	IMT-2020 and beyond
ITU-T Y.3120 (01/2023)	ITU-T SG13	In force	Functional architecture for latency guarantee in large scale networks including IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.3121 (01/2023)	ITU-T SG13	In force	Quality of service requirements and framework for supporting deterministic communication services in local area networks for IMT-2020	IMT-2020 and beyond
ITU-T Y.3122 (05/2023)	ITU-T SG13	In force	Quality of service assurance requirements and framework for smart grid supported by IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.3123 (05/2023)	ITU-T SG13	In force	Framework of edge computing capability exposure for IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.3124 (09/2023)	ITU-T SG13	In force	Quality of service monitoring requirements and framework for IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.3125 (09/2023)	ITU-T SG13	In force	QoS assurance requirements and framework for cloud gaming supported by IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3130 (01/2018)	ITU-T SG13	In force	Requirements of IMT-2020 fixed mobile convergence	Wireline-Wireless Convergence; Fixed Broadband Wireless Access delivered from mobile networks; IMT-2020 and beyond

Table 7-13 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.3131 (08/2019)	ITU-T SG13	In force	Functional architecture for supporting fixed mobile convergence in IMT-2020 networks	Wireline-Wireless Convergence; Fixed Broadband Wireless Access delivered from mobile networks; IMT-2020 and beyond
ITU-T Y.3132 (12/2019)	ITU-T SG13	In force	Mobility management for fixed mobile convergence in IMT-2020 networks	IMT-2020 and beyond
ITU-T Y.3133 (12/2019)	ITU-T SG13	In force	Capability exposure enhancement for supporting fixed mobile convergence in IMT-2020 networks	IMT-2020 and beyond
ITU-T Y.3134 (09/2020)	ITU-T SG13	In force	IMT-2020 fixed mobile convergence functional requirements for management and orchestration	IMT-2020 and beyond
ITU-T Y.3135 (02/2021)	ITU-T SG13	In force	Service scheduling to support fixed-mobile convergence in the IMT 2020 network	IMT-2020 and beyond
ITU-T Y.3136 (09/2020)	ITU-T SG13	In force	Session management for fixed mobile convergence in IMT-2020 networks	IMT-2020 and beyond
ITU-T Y.3137 (09/2022)	ITU-T SG13	In force	Technical requirements for supporting application addressing in edge computing for future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3138 (09/2022)	ITU-T SG13	In force	Unified multiaccess edge computing for supporting fixed mobile convergence in IMT-2020 networks	IMT-2020 and beyond
ITU-T Y.3139 (09/2022)	ITU-T SG13	In force	Fixed mobile convergence enhancements to support IMT-2020 based software-defined wide area networking service	IMT-2020 and beyond

Table 7-13 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.3150 (09/2020)	ITU-T SG13	In force	High-level technical characteristics of network softwarization for IMT-2020	IMT-2020 and beyond
ITU-T Y.3151 (04/2019)	ITU-T SG13	In force	High-level technical characteristics of network softwarization for IMT-2020 – Part: SDN	IMT-2020 and beyond
ITU-T Y.3152 (04/2019)	ITU-T SG13	In force	Advanced data plane programmability for IMT-2020	IMT-2020 and beyond
ITU-T Y.3153 (12/2019)	ITU-T SG13	In force	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 (04/2020)	ITU-T SG13	In force	Resource pooling for scalable network slice service management and orchestration in the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3155 (09/2020)	ITU-T SG13	In force	Enhanced software-defined networking data plane for IMT-2020	IMT-2020 and beyond
ITU-T Y.3156 (09/2020)	ITU-T SG13	In force	Framework of network slicing with AI-assisted analysis in IMT-2020 networks	IMT-2020 and beyond
ITU-T Y.3157 (02/2021)	ITU-T SG13	In force	IMT-2020 network slice configuration	IMT-2020 and beyond
ITU-T Y.3158 (09/2022)	ITU-T SG13	In force	Local shunting for multi-access edge computing in IMT-2020 networks	IMT-2020 and beyond
ITU-T Y.3159	ITU-T SG 13	Draft	Framework for classifying network slice level in future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3160 (05/2023)	ITU-T SG13	In force	Architectural framework of end-to-end service level objective guarantee for	IMT-2020 and beyond

Table 7-13 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
			future networks including IMT-2020	
ITU-T Y.3170 (09/2018)	ITU-T SG13	In force	Requirements for machine learning-based quality of service assurance for the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3172 (06/2019)	ITU-T SG13	In force	Architectural framework for machine learning in future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3173 (02/2020)	ITU-T SG13	In force	Framework for evaluating intelligence levels of future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3174 (02/2020)	ITU-T SG13	In force	Framework for data handling to enable machine learning in future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3175 (04/2020)	ITU-T SG13	In force	Functional architecture of machine learning-based quality of service assurance for the IMT-2020 network	IMT-2020 and beyond
ITU-T Y.3176 (09/2020)	ITU-T SG13	In force	Machine learning marketplace integration in future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3177 (02/2021)	ITU-T SG13	In force	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 (07/2021)	ITU-T SG13	In force	Functional framework of artificial intelligence-based network service provisioning in future networks including IMT-2020	IMT-2020 and beyond

Table 7-13 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.3179 (04/2021)	ITU-T SG13	In force	Architectural framework for machine learning model serving in future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3181 (09/2022)	ITU-T SG13	In force	Architectural framework for machine learning sandbox in future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.3182 (09/2022)	ITU-T SG13	In force	Machine learning based end-to-end multi-domain network slice management and orchestration	IMT-2020 and beyond
ITU-T Y.3200 (02/2022)	ITU-T SG13	In force	Fixed, mobile and satellite convergence – Requirements for IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.3201 (01/2023)	ITU-T SG13	In force	Fixed, mobile and satellite convergence – Framework for IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.3202 (05/2023)	ITU-T SG13	In force	Fixed, mobile and satellite convergence – Mobility management for IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.3203 (05/2023)	ITU-T SG13	In force	Fixed, mobile and satellite convergence – Connection management for IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.3204 (09/2023)	ITU-T SG13	In force	Fixed, mobile and satellite convergence – Service continuity for IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.3324 (12/2018)	ITU-T SG13	In force	Requirements and architectural framework for autonomic management and control of IMT-2020 networks	IMT-2020 and beyond

Table 7-13 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.3325 (01/2023)	ITU-T SG13	In force	Framework for high-level AI-based management communicating with external management systems	IMT-2020 and beyond
ITU-T Y.3537 (09/2022)	ITU-T SG13	In force	Cloud computing – Functional requirements of a cloud service partner for multi-cloud	IMT-2020 and beyond
ITU-T Y.3538 (09/2022)	ITU-T SG13	In force	Cloud computing - Global management framework of distributed cloud	IMT-2020 and beyond
ITU-T Y.3655 (09/2022)	ITU-T SG13	In force	Big data driven networking - Management and control mechanisms	IMT-2020 and beyond
ITU-T Y.3807 (02/2022)	ITU-T SG13	In force	Quantum key distribution networks – Quality of service parameters	IMT-2020 and beyond
ITU-T Y.3810 (09/2022)	ITU-T SG13	In force	Quantum key distribution network interworking – Framework	IMT-2020 and beyond
ITU-T Y.3811 (09/2022)	ITU-T SG13	In force	Quantum key distribution networks – Functional architecture for quality of service assurance	IMT-2020 and beyond
ITU-T Y.DTN-CapLevel	ITU-T SG13	Draft	Digital twin network - Capability level and evaluation methods	IMT-2020 and beyond
ITU-T Y.FMC-AAEC	ITU-T SG13	Draft	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	Fixed, mobile and satellite convergence – Requirements of supporting airborne broadband communication in IMT-2020 networks and beyond	IMT-2020 and beyond

Table 7-13 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.FMSC-CE	ITU-T SG13	Draft	Capability exposure 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	Distributed Ledger Technology for 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	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	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	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	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	Fixed, mobile and satellite convergence - Policy control for IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.FMSC-SFC	ITU-T SG13	Draft	Fixed, mobile and satellite convergence – Service Function Chaining (SFC) in IMT-2020 network and beyond	IMT-2020 and beyond
ITU-T Y.ICN-DLT	ITU-T SG13	Draft	Requirements and Functional Framework of Information Centric Networking to support	IMT-2020 and beyond

Table 7-13 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
			Distributed Ledger Technology in IMT-2020 and beyond	
ITU-T Y.ICN-INP	ITU-T SG13	Draft	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-UP	ITU-T SG13	Draft	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	Requirements and framework for AI-based network design optimization in future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.IMT2020-CNC-req	ITU-T SG13	Draft	Requirements of computing and network convergence for IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.IMT2020-DCN	ITU-T SG13	Draft	Future networks including IMT-2020: requirements and functional architecture of distributed core network	IMT-2020 and beyond
ITU-T Y.IMT2020-DJLML	ITU-T SG13	Draft	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-EIL	ITU-T SG13	Draft	Evaluating intelligence capability for network slice management and orchestration in IMT-2020	IMT-2020 and beyond
ITU-T Y.IMT2020-IBNMO	ITU-T SG13	Draft	Intent-based network management and orchestration for	IMT-2020 and beyond

Table 7-13 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
			network slicing in IMT-2020 networks and beyond	
ITU-T Y.IMT2020-NFC-req	ITU-T SG13	Draft	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-asur-mec	ITU-T SG 13	Draft	Quality of service assurance mechanisms for IMT-2020 and beyond	IMT-2020 and beyond
ITU-T Y.IMT2020-QoS-II-req	ITU-T SG13	Draft	QoS assurance use cases and requirements for the industrial internet supported by IMT-2020	IMT-2020 and beyond
ITU-T Y.IMT2020-qos-lstn-req	ITU-T SG13	Draft	Requirements and framework of Deterministic QoS in large-scale telecommunications networking for IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.IMT2020-qos-req-sh	ITU-T SG13	Draft	QoS requirements for smart healthcare supported by IMT-2020	IMT-2020 and beyond
ITU-T Y.IMT2020-REEM	ITU-T SG13	Draft	Energy efficiency management of virtual resources in IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.IMT2020-SOCN-req-frame	ITU-T SG13	Draft	Future networks including IMT-2020: requirements and framework for self-organizing core network	IMT-2020 and beyond
ITU-T Y.JDEVOP-req	ITU-T SG13	Draft	Requirements for joint development and operation for IMT-2020 and beyond	IMT-2020 and beyond

Table 7-13 – ITU-T SG13 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y.M&O-CNC-fra	ITU-T SG13	Draft	Framework of management and orchestration for computing and network convergence in IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.MBIMT2020-Gen	ITU-T SG13	Draft	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	Architectural Framework for Machine learning function orchestrator in future networks including IMT-2020	IMT-2020 and beyond
ITU-T Y.MMC	ITU-T SG13	Draft	Requirements and framework for traffic flow coordination of multi-modality communication in IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.NAEC	ITU-T SG13	Draft	Network accelerating for edge computing in IMT-2020 networks and beyond	IMT-2020 and beyond
ITU-T Y.qos_req_ti	ITU-T SG13	Draft	Quality of service assurance requirements for the tactile internet	IMT-2020 and beyond
ITU-T Y.STI-NS	ITU-T SG13	Draft	Network slicing in satellite-terrestrial integration in IMT-2020 networks and beyond	IMT-2020 and beyond

7.14 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 7-14 provides a list of ITU-T SG15 deliverables associated with IMT-2020 and beyond networks.

Table 7-14 – ITU-T SG15 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T G Suppl. 66 (09/2020)	ITU-T SG15	In force	5G wireless fronthaul requirements in a passive optical network context	IMT-2020 and beyond; Wireless/Mobile xHaul; Mobile backhaul/midhaul/fronthaul over PON
ITU-T G Suppl. 67 (07/2019)	ITU-T SG15	In force	Application of optical transport network Recommendations to 5G transport	IMT-2020 and beyond
ITU-T G Suppl. 74 (12/2021)	ITU-T SG15	In force	Network slicing in a passive optical network context	Wireless/Mobile xHaul; ETSI 5th Generation Fixed Network (F5G); IMT-2020 and beyond; PON Abstraction Interface, Slicing, Latency control, OLT with IT functions
ITU-T G.709.4/Y.1331.4 (03/2020)	ITU-T SG15	In force	OTU 25 and OTU 50G short reach interfaces	IMT-2020 and beyond; OTN; Interface
ITU-T G.7711/Y.1702 (02/2022)	ITU-T SG15	In force	Generic protocol-neutral information model for transport resources	IMT-2020 and beyond; Information model – Common Management; Management & transport technolgies
ITU-T G.7712/Y.1703 (2019) Amd. 1 (02/2022)	ITU-T SG15	In force	Architecture and specification of data communication network - Amendment 1	IMT-2020 and beyond; Synchronization; Information model – purpose specific

Table 7-14 – ITU-T SG15 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T G.7721.1 (06/2022)	ITU-T SG15	In force	Data model of synchronization management	IMT-2020 and beyond; Synchronization; Information model – purpose specific
ITU-T G.781.1 (02/2022)	ITU-T SG15	In force	Synchronization layer functions for packet-based synchronization	IMT-2020 and beyond; Synchronization
ITU-T G.8121.1/Y.1381.1 (2018) Cor. 1 (11/2022)	ITU-T SG15	In force	Characteristics of MPLS-TP equipment functional blocks supporting ITU-T G.8113.1/Y.1372.1 OAM mechanisms – Corrigendum 1	IMT-2020 and beyond; MPLS-TP; Equipment
ITU-T G.8121.2/Y.1381.2 (2018) Cor. 1 (11/2022)	ITU-T SG15	In force	Characteristics of MPLS-TP equipment functional blocks supporting ITU-T G.8113.2/Y.1372.2 OAM mechanisms – Corrigendum 1	IMT-2020 and beyond; MPLS-TP; Equipment
ITU-T G.8261/Y.1361 (08/2019)	ITU-T SG15	In force	Timing and synchronization aspects in packet networks	IMT-2020 and beyond; Synchronization
ITU-T G.8272.1/Y.1367.1 (2016) Amd. 2 (08/2019)	ITU-T SG15	In force	Timing characteristics of primary reference time clocks – Amendment 2	IMT-2020 and beyond
ITU-T G.8272/Y.1367 (2018) Amd. 2 (11/2022)	ITU-T SG15	In force	Timing characteristics of primary reference time clocks – Amendment 2	IMT-2020 and beyond
ITU-T G.8300 (05/2020)	ITU-T SG15	In force	Characteristics of transport networks to support IMT-2020/5G	IMT-2020 and beyond
ITU-T G.8310 (12/2020)	ITU-T SG15	In force	Architecture of the metro transport network	IMT-2020 and beyond; MTN; Specific Architecture
ITU-T G.8312 (12/2020)	ITU-T SG15	In force	Interfaces for a metro transport network	IMT-2020 and beyond MTN; Interface
ITU-T G.8321 (11/2022)	ITU-T SG15	In force	Characteristics of MTN equipment functional blocks	IMT-2020 and beyond; MTN; Equipment

Table 7-14 – ITU-T SG15 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T G.8331 (02/2022)	ITU-T SG15	In force	MTN linear protection	IMT-2020 and beyond
ITU-T G.8350 (11/2022)	ITU-T SG15	In force	Management and Control for metro transport network	IMT-2020 and beyond
ITU-T G.9701 (2019) Cor. 3 (11/2022)	ITU-T SG15	In force	-	IMT-2020 and beyond
ITU-T G.9701 (2019) Cor. 4 (06/2023)	ITU-T SG15	In force	-	IMT-2020 and beyond
ITU-T G.9711 (2021) Cor. 1 (12/2022)	ITU-T SG15	In force	-	IMT-2020 and beyond
ITU-T G.9901 (2017) Cor. 1 (11/2022)	ITU-T SG15	In force	Narrowband orthogonal frequency division multiplexing power line communication transceivers – Power spectral density specification – Corrigendum 1	IMT-2020 and beyond
ITU-T G.9903 (2017) Amd. 2 (03/2023)	ITU-T SG15	In force	-	IMT-2020 and beyond
ITU-T G.9903 (2017) Cor. 1 (03/2023)	ITU-T SG15	In force	-	IMT-2020 and beyond
ITU-T G.997.2 (2019) Cor. 2 (11/2022)	ITU-T SG15	In force	Physical layer management for G.fast transceivers: Corrigendum 2	IMT-2020 and beyond
ITU-T G.997.3 (2021) Cor. 1 (11/2022)	ITU-T SG15	In force	Physical layer management for MGfast transceivers – Corigendum 1	IMT-2020 and beyond
ITU-T G.owdm 2	ITU-T SG 15	Draft	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 GSTR-GNSS (02/2020)	ITU-T SG15	In force	Considerations on the use of GNSS as a primary time reference in telecommunications	IMT-2020 and beyond

Table 7-14 – ITU-T SG15 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T GSTR-TN5G (10/2018)	ITU-T SG15	In force	Transport network support of IMT-2020/5G (October 2018)	IMT-2020 and beyond

7.15 ITU-T SG16

ITU-T Study Group 16 is responsible for studies relating to ubiquitous multimedia applications, multimedia capabilities for services and applications for existing and future networks, including the coordination of related studies across the various ITU-T SGs. It is the lead study group on multimedia coding, systems and applications; ubiquitous multimedia applications; telecommunication/ICT accessibility for persons with disabilities; human factors; intelligent transport system (ITS) communications; e-health; Internet Protocol television (IPTV) and digital signage; and e-services. SG16 is active in all aspects of multimedia standardization, including terminals, architecture, protocols, security, mobility, interworking and quality of service (QoS). It focuses its studies on telepresence and conferencing systems; IPTV; digital signage; speech, audio and visual coding; network signal processing; PSTN modems and interfaces; facsimile terminals; e-health, ICT accessibility, visual surveillance, distributed ledger technologies, ITS, immersive live experience, and digital culture.

Table 7-15 provides a list of ITU-T SG16 deliverables associated with IMT-2020 and beyond networks.

Table 7-15 – ITU-T SG16 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T F.748.22 (09/2023)	ITU-T SG16	In force	Functional architecture for feature-based distributed intelligent systems	IMT-2020 and beyond
ITU-T F.AI-IBRI	ITU-T SG 16	Draft	Metrics and evaluation methods for image-based re-identification algorithm	IMT-2020 and beyond
ITU-T F.AIM-RCM	ITU-T SG 16	Draft	Representation and compression methods of artificial intelligence models	IMT-2020 and beyond

Table 7-15 – ITU-T SG16 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T F.CSDH	ITU-T SG 16	Draft	Requirements of communication services for digital human	IMT-2020 and beyond
ITU-T F.DHSMD	ITU-T SG 16	Draft	Technical requirements and evaluation methods of 3D digital human system based on smart mobile devices	IMT-2020 and beyond
ITU-T F.FRTVM	ITU-T SG 16	Draft	Framework for the robustness training of visual model based on deep learning	IMT-2020 and beyond
ITU-T F.FW-IVPS	ITU-T SG 16	Draft	Framework for interactive virtual performing arts services	IMT-2020 and beyond
ITU-T F.IF-SLM	ITU-T SG 16	Draft	Interoperability framework for sleep management services	IMT-2020 and beyond
ITU-T F.IMCSI	ITU-T SG 16	Draft	Requirements and framework for interactive multimedia communication of Internet of thing (IoT) devices	IMT-2020 and beyond
ITU-T F.RFDSSN	ITU-T SG 16	Draft	Requirements and framework for data sharing service networks	IMT-2020 and beyond

7.16 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 7-16 provides a list of ITU-T SG17 deliverables associated with IMT-2020 and beyond networks.

Table 7-16 – ITU-T SG17 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T TR.5Gsec-bsf	ITU-T SG 17	Draft	Guidelines of built-in security framework for telecommunications network	IMT-2020 and beyond
ITU-T X Suppl. 37 (09/2022)	ITU-T SG17	In force	ITU-T X.1231 – Supplement on countering spam based on machine learning	IMT-2020 and beyond
ITU-T X Suppl. 38 (09/2022)	ITU-T SG17	In force	ITU-T X.1152 – Supplement on use cases for contact tracing technologies to prevent spread of infectious diseases	IMT-2020 and beyond
ITU-T X.1038 (10/2016)	ITU-T SG17	In force	Security requirements and reference architecture for software-defined networking	IMT-2020 and beyond
ITU-T X.1042 (01/2019)	ITU-T SG17	In force	Security services using software-defined networking	Network security; Security services; IMT-2020 and beyond
ITU-T X.1043 (03/2019)	ITU-T SG17	In force	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 and beyond
ITU-T X.1044 (10/2019)	ITU-T SG17	In force	Security requirements of network virtualization	IMT-2020 and beyond
ITU-T X.1045 (10/2019)	ITU-T SG17	In force	Security service chain architecture for networks and applications	IMT-2020 and beyond
ITU-T X.1046 (12/2020)	ITU-T SG17	In force	Framework of software-defined security in software-defined networks/network functions virtualization networks	IMT-2020 and beyond

Table 7-16 – ITU-T SG17 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T X.1047 (10/2021)	ITU-T SG17	In force	Security requirements and architecture for network slice management and orchestration	IMT-2020 and beyond
ITU-T X.1352 (09/2022)	ITU-T SG17	In force	Security requirements for Internet of things devices and gateways	IMT-2020 and beyond; Home Network Security
ITU-T X.1811 (04/2021)	ITU-T SG17	In force	Security guidelines for applying quantum-safe algorithms in IMT-2020 systems	IMT-2020 and beyond
ITU-T X.1812 (05/2022)	ITU-T SG17	In force	Security framework based on trust relationships for the IMT-2020 ecosystem	IMT-2020 and beyond
ITU-T X.1813 (09/2022)	ITU-T SG17	In force	Security and monitoring requirements for operation of vertical services supporting ultra-reliability and low latency communication (URLLC) in IMT-2020 private networks	IMT-2020 and beyond
ITU-T X.1814 (09/2022)	ITU-T SG17	In force	Security guidelines for IMT-2020 communication systems	IMT-2020 and beyond
ITU-T X.1815 (03/2023)	ITU-T SG17	In force	Security guidelines and requirements for IMT-2020 edge computing services	IMT-2020 and beyond
ITU-T X.1816 (03/2023)	ITU-T SG17	In force	Guidelines and requirements for classifying security capabilities in IMT-2020 network slice	IMT-2020 and beyond
ITU-T X.1817 (09/2023)	ITU-T SG17	In force	Security requirements for 5G message service	IMT-2020 and beyond
ITU-T X.5Gsec-netec	ITU-T SG 17	Draft	Security capabilities of network layer for 5G edge computing	IMT-2020 and beyond

Table 7-16 – ITU-T SG17 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T X.5Gsec-srocvs	ITU-T SG 17	Draft	Security Requirements for the Operation of 5G Core Network to Support Vertical Services	IMT-2020 and beyond
ITU-T X.dpki	ITU-T SG 17	Draft	Decentralized Public-key infrastructure	IMT-2020 and beyond
ITU-T X.evpnc-sec	ITU-T SG 17	Draft	Security guidelines for electric vehicle plug and charge (PnC) services using vehicle identity (VID)	IMT-2020 and beyond; Cybersecurity (ITS)
ITU-T X.sec_QKDNi	ITU-T SG 17	Draft	Security requirements for Quantum Key Distribution Network interworking (QKDNi)	IMT-2020 and beyond; QKDN
ITU-T X.sg-scmr	ITU-T SG 17	Draft	Security guidelines for selecting computing methods and resources from Cloud Service Providers	IMT-2020 and beyond
ITU-T X.sup-cv2x-sec	ITU-T SG 17	Draft	Supplement to X.1813 – Security deployment scenarios for cellular vehicle-to-everything (C-V2X) services supporting ultra-reliable and low latency communication (URLLC)	IMT-2020 and beyond; Cybersecurity (ITS); V2X

7.17 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 7-17 provides a list of ITU-T SG20 deliverables associated with IMT-2020 and beyond networks.

Table 7-17 – ITU-T SG20 deliverables

Name	Responsible group	Status	Subject	Topics
ITU-T Y Suppl. 45 (09/2017)	ITU-T SG20	In force	ITU-T Y.4000-series – An overview of smart cities and communities and the role of information and communication technologies	IMT-2020 and beyond; IoT & Smart Sustainable Cities Standards
ITU-T Y.4100/Y.2066 (06/2014)	ITU-T SG20	In force	Common requirements of the Internet of things	IMT-2020 and beyond; IoT & Smart Sustainable Cities Standards
ITU-T Y.4113 (09/2016)	ITU-T SG20	In force	Requirements of the network for the Internet of things	IMT-2020 and beyond; IoT & Smart Sustainable Cities Standards
ITU-T Y.4114 (07/2017)	ITU-T SG20	In force	Specific requirements and capabilities of the Internet of things for big data	IMT-2020 and beyond; IoT & Smart Sustainable Cities Standards
ITU-T Y.4122 (07/2021)	ITU-T SG20	In force	Requirements and capability framework of the edge-computing-enabled gateway in the Internet of things	IMT-2020 and beyond
ITU-T Y.4208 (01/2020)	ITU-T SG20	In force	Internet of things requirements for support of edge computing	IMT-2020 and beyond
ITU-T Y.4421 (10/2021)	ITU-T SG20	In force	Functional architecture for unmanned aerial vehicles and unmanned aerial vehicle controllers using IMT-2020 networks	IMT-2020 and beyond

7.18 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 7-18 provides a list of MEF deliverables associated with IMT-2020 and beyond networks.

Table 7-18 – MEF deliverables

Name	Responsible group	Status	Subject	Topics
MEF 10.4	MEF	Published	Subscriber Ethernet Services Attributes	IMT-2020 and beyond
MEF 22.3	MEF	Published	Implementation Agreement – Transport Services for Mobile Networks	IMT-2020 and beyond
MEF 23.2	MEF	Published	Class of Service Phase 3 Implementation Agreement	IMT-2020 and beyond
MEF 23.2.1	MEF	Published	Models for Bandwidth Profiles with Token Sharing	IMT-2020 and beyond
MEF 26.2	MEF	Published	External Network Network Interface (ENNI) and Operator Service Attributes	IMT-2020 and beyond
MEF 30.1	MEF	Published	Service OAM Fault Management Implementation Agreement Phase 2	IMT-2020 and beyond
MEF 30.1.1	MEF	Published	Amendment to SOAM FM IA	IMT-2020 and beyond
MEF 35.1	MEF	Published	Service OAM Performance Monitoring Implementation Agreement	IMT-2020 and beyond
MEF 43	MEF	Published	Virtual NID (vNID) Functionality for E-Access Services	IMT-2020 and beyond
MEF 51.1	MEF	Published	Operator Ethernet Service Definitions	IMT-2020 and beyond
MEF 6.2	MEF	Published	EVC Ethernet Services Definitions Phase 3	IMT-2020 and beyond
MEF 61	MEF	Published	IP Service Attributes for Subscriber IP Services	IMT-2020 and beyond
MEF 62	MEF	Published	Managed Access E-Line Service Implementation Agreement	IMT-2020 and beyond
MEF 63	MEF	Published	Subscriber Layer 1 Service Attributes	IMT-2020 and beyond

7.19 NGMN

The Next Generation Mobile Networks (NGMN) Alliance is a mobile telecommunications 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 7-19 provides a list of NGMN deliverables associated with IMT-2020 and beyond networks.

Table 7-19 – NGMN deliverables

Name	Responsible group	Status	Subject	Topics
Architectural Proposal for the Handling of Network Operations Data with Specific Focus on Virtualized Networks	NGMN Alliance	Draft	Network Management & Orchestration	IMT-2020 and beyond
Final Report on 5G NSA & SA IoT	NGMN Alliance	Draft	Trial & Testing	IMT-2020 and beyond
Final report on 5G pre-commercial trials	NGMN Alliance	Draft	Trial & Testing	IMT-2020 and beyond
First Version of Framework document to 3GPP and others	NGMN Alliance	Draft	E2E Architecture Framework	IMT-2020 and beyond
First version of pre-commercial trials framework document	NGMN Alliance	Draft	Trial & Testing	IMT-2020 and beyond
Initial report on 5G pre-commercial trials	NGMN Alliance	Draft	Trial & Testing	IMT-2020 and beyond
Intermediate Report on 5G NSA IoT	NGMN Alliance	Draft	Trial & Testing	IMT-2020 and beyond
Position Paper on "Additional spectrum bands for 5G and the WRC-19"	NGMN Alliance	Draft	Spectrum	IMT-2020 and beyond
Spectrum White Paper on "Spectrum licensing and other regulatory issues for 5G"	NGMN Alliance	Draft	Spectrum	IMT-2020 and beyond
Technology Building Blocks	NGMN Alliance	Draft	Trial & Testing	IMT-2020 and beyond
V2X White Paper	NGMN Alliance	Draft	V2X	IMT-2020 and beyond
White Paper on 5G and IPR Related Questions	NGMN Alliance	Draft	IPR	IMT-2020 and beyond

Table 7-19 – NGMN deliverables

Name	Responsible group	Status	Subject	Topics
White Paper on 5G RAN CU-DU network architecture, dimensioning and performance requirements	NGMN Alliance	Draft	RAN functional split & X-haul	IMT-2020 and beyond
White Paper on Active Antenna Requirements	NGMN Alliance	Draft	Base Station Antenna Requirements	IMT-2020 and beyond
White Paper on Extreme 5G Requirements	NGMN Alliance	Draft	Extreme 5G Requirements	IMT-2020 and beyond
White Paper on Passive Antenna Requirements	NGMN Alliance	Draft	Base Station Antenna Requirements	IMT-2020 and beyond
White Paper on recommendations for RAN functional decomposition	NGMN Alliance	Draft	RAN functional split & X-haul	IMT-2020 and beyond
White Paper on Service-Based Architecture in 5G	NGMN Alliance	Draft	Service-Based Architecture in 5G	IMT-2020 and beyond

7.20 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 7-20 provides a list of TM Forum deliverables associated with IMT-2020 and beyond networks.

Table 7-20 – TM Forum deliverables

Name	Responsible group	Status	Subject	Topics
GB922 Logical and Compound Resource R17.0.1	TM Forum	Published	Network function virtualization | NaaS	IMT-2020 and beyond
TM Forum GB922 Information Framework (SID) R17.0.1	TM Forum	Draft	Network function virtualization | NaaS	IMT-2020 and beyond
TM Forum GB922 Standards Addenda for Information Framework R17.0.1	TM Forum	Draft	Network function virtualization | NaaS	IMT-2020 and beyond
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 and beyond

Table 7-20 – TM Forum deliverables

Name	Responsible group	Status	Subject	Topics
TM Forum TMF070 Hybrid Environment Implementation Blueprints Suite R17.0.1	TM Forum	Draft	Network function virtualization | NaaS	IMT-2020 and beyond
TM Forum TMF070B Advanced Platform Deployment Blueprints R17.5.1	TM Forum	Published	Network function virtualization | NaaS	IMT-2020 and beyond
TM Forum TMF628 Performance Management API REST Specification R14.5.1	TM Forum	Published	NaaS, OpenAPIs	IMT-2020 and beyond
TM Forum TMF664 Resource Function Activation and Configuration API REST Specification R17.0.1	TM Forum	Published	NaaS, OpenAPIs	IMT-2020 and beyond
TM Forum TR255 Resource Function Activation and Configuration Suite R17.0.1	TM Forum	Draft	Network function virtualization | NaaS	IMT-2020 and beyond
TM Forum TR262 Hybrid Infrastructure Platform Blueprint R17.0.1	TM Forum	Published	NaaS	IMT-2020 and beyond

7.21 TSDSI

TSDSI is an autonomous, membership based, standards development organization (SDO) for Telecom/ICT products and services in India. TSDSI develop standards for access, back-haul, and infrastructure systems, solutions and services that best meet India specific Telecom/ICT needs, based on research and innovation in India. TSDSI work closely with global standards' bodies to reflect Indian requirements into International telecom/ICT standards.

Table 7-21 provides a list of TSDSI deliverables associated with IMT-2020 and beyond networks.

Table 7-21 – TSDSI deliverables

Name	Responsible group	Status	Subject	Topics
TSDSI NIP 281	TSDSI	Draft	Furturistic architecture of 5G Backbone and Slicing	IMT-2020 and beyond
TSDSI NIP 290	TSDSI	Draft	Architecture for 6G Communication	IMT-2020 and beyond

Table 7-21 – TSDSI deliverables

Name	Responsible group	Status	Subject	Topics
TSDSI NIP 295	TSDSI	Draft	Qualitative metrics for 6G KPI definitions	IMT-2020 and beyond

7.22 ONAP

ONAP is an open source software platform that provides a comprehensive platform for real-time, policy-driven orchestration and automation of physical and virtual network functions that will enable software, network, IT and cloud providers and developers to rapidly automate new services and support complete lifecycle management. By unifying member resources, ONAP is accelerating the development of a vibrant ecosystem around a globally shared architecture and implementation for network automation–with an open standards focus–faster than any one product could on its own. ONAP is a founding member of LF Networking (LFN), a consortium that increases collaboration and operational excellence across networking projects. Each technical project retains its technical independence and project roadmaps

Table 7-22 provides a list of ONAP deliverables associated with IMT-2020 and beyond networks.

Table 7-22 – ONAP deliverables

Name	Responsible group	Status	Subject	Topics
REQ-1214	ONAP	Draft	Maintenance and Enhancement of Intent-driven Closed-loop Autonomous Networks in R11	IMT-2020 and beyond
REQ-1268	ONAP	Draft	CCVPN Kohn Enhancements for Intent-based Cloud Leased Line and Transport Slicing	IMT-2020 and beyond
REQ-1349	ONAP	Draft	(London-R12) – Removal of AAF	IMT-2020 and beyond
REQ-1350	ONAP	Draft	All components must be able to run without MSB	IMT-2020 and beyond
REQ-1351	ONAP	Draft	External secure communication only via Ingress	IMT-2020 and beyond
REQ-1378	ONAP	Draft	E2E Network Slicing use case enhancements for London release	IMT-2020 and beyond

Table 7-22 – ONAP deliverables

Name	Responsible group	Status	Subject	Topics
REQ-1391	ONAP	Draft	A1 Policy Functions - London	IMT-2020 and beyond
REQ-1394	ONAP	Draft	Provide ASD-based CNF Onboarding, Distribution & Orchestration capabilities	IMT-2020 and beyond
REQ-1404	ONAP	Draft	5G self-organizing network aligned with O-RAN	IMT-2020 and beyond
REQ-1408	ONAP	Draft	R12: Enhance general intent implementation solutions	IMT-2020 and beyond
REQ-1411	ONAP	Draft	Intent-driven Operating for Cloud-network Convergence Services	IMT-2020 and beyond
REQ-1413	ONAP	Draft	CCVPN Support for Cloud-Network Convergence in London Release	IMT-2020 and beyond
REQ-716	ONAP	Draft	Control Loop in TOSCA LCM	IMT-2020 and beyond
REQ-994	ONAP	Draft	Control Loop in TOSCA LCM improvement	IMT-2020 and beyond

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