

ITU-T Technical Report

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YSTR.IMT2030-terms

IMT-2030 networks – Considerations on terms and definitions

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Summary

This Technical Report studies the common terms and definitions for IMT-2030 networks. It is expected to enable further development of standards and other publications for IMT-2030 networks.

This Technical Report considers terms which have already been defined in published ITU-T Recommendations and other relevant specifications of ITU-T or other organizations, as well as some new terms.

Keywords

Definitions, IMT-2030, terms.

Note

This is an informative ITU-T publication. Mandatory provisions, such as those found in ITU-T Recommendations, are outside the scope of this publication. This publication should only be referenced bibliographically in ITU-T Recommendations.

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IMT-2030 networks – Considerations on terms and definitions

1 Scope

This Technical Report studies the common terms and definitions for IMT-2030 networks. It is expected to enable further development of standards and other publications for IMT-2030 networks.

This Technical Report provides terms and definitions, which are considered suitable and applicable to the development of standards and other publications for IMT-2030 networks and which have already been defined in published ITU-T Recommendations and other relevant specifications of ITU-T or other organizations. Additionally, some terms not defined in published ITU-T Recommendations and other relevant specifications are also provided according to the criteria identified in clause 2.

The terms and definitions considered in this Technical Report may be used in standards and other publications of IMT-2030 networks, depending on the further standardization of IMT-2030 networks.

The terms and definitions considered in this Technical Report may be revisited in further standardization work, according to the progress of IMT-2030 networks standardization.

2 Criteria for terms considered in this Technical Report

The criteria for terms considered in this Technical Report are as follows:

- The term being considered is expected to be related to the mobile networks deployed in the era of 2030.
- The term is expected to be a "common" term (i.e., of common (not specific) usage) for standards and other publications related to IMT-2030 networks (in the context of ITU-T, with their usage in at least two ITU-T Study Groups' documents).

NOTE 1 – The radio aspects of IMT-2030 are out of the scope.

NOTE 2 – The term being considered has some relationship with the trends, technologies, enablers, usage scenarios, capabilities, requirements, framework, services and applications, etc. that have been identified in the ITU-R Recommendation [ITU-R M.2160-0] and other publications on IMT-2030.

NOTE 3 – The term being considered is relevant from an international standardization viewpoint.

3 References

[ITU-R M.2160-0] Recommendation ITU-R M.2160-0 (2023), *Framework and overall objectives of the future development of IMT for 2030 and beyond*.

4 Definitions

4.1 Terms defined elsewhere

This Technical Report uses the following "common" terms defined elsewhere, which are considered to have some relationship with IMT-2030 networks:

4.1.1 application domain [b-ITU-T Y.4100]: An area of knowledge or activity applied for one specific economic, commercial, social or administrative scope.

4.1.2 artificial intelligence (AI) [b-ETSI GR ENI 004]: Computerized system that uses cognition to understand information and solve problems.

NOTE 1 – ISO/IEC 2382-28 defines AI as "an interdisciplinary field, usually regarded as a branch of computer science, dealing with models and systems for the performance of functions generally associated with human intelligence, such as reasoning and learning".

NOTE 2 – In computer science AI research is defined as the study of "intelligent agents": any device that perceives its environment and takes actions to achieve its goals.

NOTE 3 – This includes pattern recognition, the application of machine learning and related techniques.

NOTE 4 – Artificial-intelligence is the whole idea and concept of machines being able to carry out tasks in a way that mimics human intelligence and would be considered "smart".

4.1.3 AI agent [b-ISO/IEC 22989]: Automated entity that senses and responds to its environment and takes actions to achieve its goals.

4.1.4 assurance [b-ITU-T X.1500]: The degree of confidence that the process or deliverable meets defined characteristics or objectives.

4.1.5 autonomous network [b-ETSI TS 128 100]: Telecommunication system (including management system and network) with autonomy capabilities which is able to be governed by itself with minimal to no human intervention.

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

4.1.7 blockchain [b-ITU-T X.1400]: A type of distributed ledger which is composed of digitally recorded data arranged as a successively growing chain of blocks with each block cryptographically linked and hardened against tampering and revision.

4.1.8 capability level [b-ITU-T Y.3119]: The level of availability of capabilities in a network.

4.1.9 certification authority (CA) [b-ITU-T Y.4500.3]: Authority responsible for establishing and vouching for the authenticity of public keys.

NOTE – This includes binding public keys to distinguished names through signed certificates, managing certificate serial numbers, and certificate revocation.

4.1.10 cloud computing [b-ITU-T Y.3500]: Paradigm for enabling network access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on-demand.

NOTE – Examples of resources include servers, operating systems, networks, software, applications, and storage equipment.

4.1.11 dedicated network [b-ITU-T Y.3114]: A network designed for application domains with common requirements.

4.1.12 deterministic networking [b-ITU-T Y.3219]: Processes and functionalities on a network aims to deliver deterministic services.

4.1.13 digital twin network [b-ITU-T Y.3090]: A virtual representation of a physical network. It is useful for analysing, diagnosing, emulating and controlling the physical network based on data, model and interface, to achieve the real-time interactive mapping between the physical network and virtual twin network.

4.1.14 distributed ledger technology (DLT) [b-ITU-T F.751.1]: Technology enabling large groups of nodes in distributed ledger networks to reach agreement and record information without the need for a central authority.

4.1.15 energy efficiency (EE) [b-ITU-T L.1330]: The relation between the useful output and energy/power consumption.

4.1.16 federated machine learning (FML) [b-ITU-T M.3387]: A machine learning framework that facilitates collaborative construction of machine learning models among multiple distributed training nodes without exposing the private data owned by the data owners.

4.1.17 fixed mobile convergence (FMC) [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.

4.1.18 fixed, mobile and satellite convergence (FMSC) [b-ITU-T Y.3200]: The capabilities that provide services and applications to end users regardless of the fixed, mobile or satellite access technologies being used independently of the users' location.

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

4.1.20 information centric networking (ICN) [b-ITU-T Y Sup. 48]: A new approach to networking where named objects (not only devices) are the principal components for the network. Named data objects can be stored in network nodes (with caching capability) distributed throughout the network. Data objects are transmitted by using names to requesting consumers from any network node that can provide requested data. Locations of the nodes that store data objects in their caches are irrelevant to consumers because they send their requests for data objects by using names (not the data object locations).

4.1.21 IMT-2020 [b-ITU-T Y.3100]: 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-2020 and systems beyond IMT-2020 for the radio access network.

4.1.22 key performance indicator (KPI) [b-ISO/IEC 30134-1]: Indicator representing the resource usage effectiveness or efficiency of a given system.

4.1.23 knowledge [b-ETSI GS ENI 005]: Analysis of data and information, resulting in an understanding of what the data and information mean.

NOTE – Knowledge represents a set of patterns that are used to explain, as well as predict, what has happened, is happening, or is possible to happen in the future; it is based on acquisition of data, information, and skills through experience and education.

4.1.24 machine learning (ML) [b-ITU-T Y.3172]: Processes that enable computational systems to understand data and gain knowledge from it without necessarily being explicitly programmed.

NOTE 1 – This definition is adapted from [b-ETSI GR ENI 004].

NOTE 2 – Supervised machine learning and unsupervised machine learning are two examples of machine learning types.

4.1.25 machine learning overlay [b-ITU-T Y.3172]: A loosely coupled deployment model of machine learning functionalities whose integration and management with network functions are standardized.

NOTE – A machine learning overlay aims to minimize interdependencies between machine learning functionalities and network functions using standard interfaces, allowing for the parallel evolution of functionalities of the two.

4.1.26 management plane [b-ITU-T Y.2011]: The set of functions used to manage entities in the stratum or layer under consideration, plus the functions required to support this management.

4.1.27 multi-access user equipment (MUE) [b-ITU-T Y.3218]: User equipment which can support accessing two or more access networks simultaneously under the control of a network enhanced for multi-access capability.

4.1.28 network functions virtualization (NFV) [b-ETSI GS NFV 003]: Principle of separating network functions from the hardware they run on by using virtual hardware abstraction.

4.1.29 network intelligence level [b-ITU-T Y.3173]: Level of application of automation capabilities including those enabled by the integration of artificial intelligence techniques in the network.

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

4.1.31 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.

4.1.32 protocol data unit session [b-ITU-T Y.3100]: In the context of IMT-2020, an association between a user equipment (UE) and a data network that provides a protocol data unit (PDU) connectivity service.

4.1.33 quality of experience (QoE) [b-ITU-T P.915]: The degree of satisfaction of the user of an application or service. It results from the fulfilment of his or her expectations with respect to the utility or enjoyment of the application or service in the light of the user's personality and current state.

NOTE – Definition based on that appearing in Qualinet-2014.

4.1.34 quality of service (QoS) [b-ITU-T Q.1743]: The collective effect of service performances, which determine the degree of satisfaction of a user of a service. It is characterized by the combined aspects of performance factors applicable to all services, such as:

- service operability performance;
- service accessibility performance;
- service retainability performance;
- service integrity performance; and
- other factors specific to each service.

4.1.35 reliability [b-ITU-T Y.3514]: The ability of a system, product or component to perform and maintain under stated conditions as required for a specified period of time.

4.1.36 resilience [b-ITU-T X.1710]: Ability to adapt to and recover from adverse conditions and attacks.

4.1.37 service continuity [b-ITU-T Y.3204]: The ability for a moving object to maintain ongoing service, including maintaining current states such as the user network environment and session.

4.1.38 service level agreement (SLA) [b-ITU-T Y.3106]: A formal agreement between two or more entities reached after a negotiating activity with the scope to assess service characteristics, responsibilities and priorities of every part. A SLA may include statements about performance, billing, service delivery but also legal and economic issues.

NOTE – Definition based on [b-ITU-T E.860].

4.1.39 service level objective (SLO) [b-ETSI GS ZSM 007]: Element in a service level specification that is defined in terms of parameters, and related metrics, thresholds and tolerances associated with the parameters.

4.1.40 service plane [b-ITU-T Q.1290]: The plane in the unified functional model that describes services.

4.1.41 software-defined networking (SDN) [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.

4.1.42 sustainability [b-ITU-T Y.4051]: State of the global system, including environmental, social and economic aspects, in which the needs of the present are met without compromising the ability of future generations to meet their own needs.

4.1.43 transport network [b-ITU-T G.805]: The functional resources of the network which conveys user information between locations.

4.1.44 trust [b-ITU-T X.1252]: The confidence of one party or entity that another party or entity will behave in a well-defined way that does not violate agreed-upon rules, policies or legal clauses of the identity management system.

4.1.45 third party (3rd party) [b-ITU-T Y.3100]: In the context of IMT-2020, with respect to a given network operator and network end-users, an entity which consumes network capabilities and/or provides applications and/or services.

4.1.46 user equipment (UE) [b-ITU-T H.360]: Equipment under the control of an End User.

4.1.47 workflow [b-ITU-T Y.3061]: Sequence of activities to describe or realize a given task executed by a system.

4.2 Terms considered in this Technical Report

This Technical Report considers the following new "common" terms, which are considered to have some relationship with IMT-2030 networks:

4.2.1 artificial intelligence and communication: A usage scenario that supports distributed computing and artificial intelligence (AI)-applications.

NOTE – Based on the IMT-2030 usage scenario "artificial intelligence and communication" [ITU-R M.2160-0].

4.2.2 computing plane: A pool of computing related network functionalities which enable computing functions such as computing enforcement, computing resource management and computing task management.

4.2.3 control plane (CP): A pool of control related network functionalities which enable control functions such as communications control, sensing control, computing control, artificial intelligence (AI) control, multi-access control, service control and energy efficiency control.

4.2.4 data plane (DP): A pool of data related network functionalities which enable data functions such as data collection, data delivery, data processing, data storage, data exposure and data management.

4.2.5 high altitude platform (HAP): An object located at an operational altitude of 18 to 50 kilometres that provides network functions of the access network, core network, and application services, and delivers communication services to end users in cooperation with fixed, mobile and satellite convergence (FMSC).

NOTE – Based on RR No.1.66A and WRC Resolutions 213, 218 and 221.

4.2.6 hyper reliable and low-latency communication (HRLLC): A usage scenario that extends the ultra-reliable and low latency communications (URLLC) of IMT-2020 and covers specialized use cases that are expected to have more stringent requirements on reliability and latency.

NOTE – Based on the IMT-2030 usage scenario "hyper reliable and low-latency communication" [ITU-R M.2160-0].

4.2.7 immersive communication: A usage scenario that extends the enhanced mobile broadband (eMBB) of IMT-2020 and covers use cases that provide a rich and interactive video (immersive) experience to users, including interaction with machine interfaces.

NOTE – Based on the IMT-2030 usage scenario "immersive communication" [ITU-R M.2160-0].

4.2.8 IMT-2030: Systems, networks, services and related technologies that provide enhanced capabilities as described in [ITU-R M.2160-0].

NOTE 1 – [ITU-R M.2160-0] defines the framework and overall objectives of the future development of IMT for 2030 and beyond.

NOTE 2 – Enhanced capabilities include, among others, the coordination of communications, sensing, computing, artificial intelligence (AI) and security.

4.2.9 integrated sensing and communication (ISAC): A usage scenario that facilitates new applications and services that require sensing capabilities, offering wide area multi-dimensional sensing that provides spatial information about unconnected objects as well as connected devices and their movements and surroundings.

NOTE – Based on the IMT-2030 usage scenario "integrated sensing and communication" [ITU-R M.2160-0].

4.2.10 massive communication: A usage scenario that extends the massive machine type communications (mMTC) of IMT-2020 and involves the connection of a massive number of devices or sensors for a wide range of use cases and applications.

NOTE – Based on the IMT-2030 usage scenario "massive communication" [ITU-R M.2160-0].

4.2.11 network complexity: A measurement of the degree of order of the elements of a specific network.

NOTE 1 – The elements for measurement may include, but are not limited to, the number of network nodes, number of network connections, the number of network functions, the number of services, the number of interfaces, the number of protocols, the number of procedures, signalling overhead, the type of heterogeneous networks, networking, computing and storage resource attributes, and energy efficiency.

NOTE 2 – Based on [b-ITU-T Y.3327].

4.2.12 network sharing: The sharing of part(s) of or all of a network among operators and/or users.

NOTE – The access network, core network, service plane, management plane and interworking components of a network can be used for network sharing.

4.2.13 space and terrestrial integration: The integration of technologies, networks and services of a space system and a terrestrial system.

NOTE – The terrestrial system includes the fixed-based system and the mobile-based system.

4.2.14 ubiquitous computing: The ability to support computing capabilities ubiquitously for specific user or service.

NOTE – Based on the IMT-2030 user and application trend "ubiquitous computing" [ITU-R M.2160-0].

4.2.15 ubiquitous connectivity: A usage scenario that is intended to enhance connectivity with the aim of bridging the digital divide, in which connectivity could be enhanced, *inter alia*, through interworking with other systems.

NOTE – Based on the IMT-2030 usage scenario "ubiquitous connectivity" [ITU-R M.2160-0].

4.2.16 ubiquitous intelligence: The ability to support artificial intelligence (AI) capabilities ubiquitously for a specific user or service.

NOTE – Based on the IMT-2030 user and application trend "ubiquitous intelligence" [ITU-R M.2160-0].

4.2.17 user plane (UP): A pool of user-related network functionalities which enable user functions such as traffic processing, service processing, information exposure and policy enforcement.

5 Abbreviations and acronyms

This Technical Report uses the following abbreviations and acronyms:

AI	Artificial Intelligence
CA	Certification Authority
CP	Control Plane
DLT	Distributed Ledger Technology
DP	Data Plane
EE	Energy Efficiency
eMBB	enhanced Mobile Broadband

FMC	Fixed Mobile Convergence
FML	Federated Machine Learning
FMSC	Fixed, Mobile and Satellite Convergence
HAP	High Altitude Platform
HRLLC	Hyper Reliable and Low-Latency Communication
ICN	Information Centric Networking
IMT	International Mobile Telecommunications
ISAC	Integrated Sensing and Communication
KPI	Key Performance Indicator
ML	Machine Learning
mMTC	massive Machine Type Communications
MUE	Multi-access User Equipment
NFV	Network Functions Virtualization
PDU	Protocol Data Unit
QoE	Quality of Experience
QoS	Quality of Service
SDN	Software-Defined Networking
SLA	Service Level Agreement
SLO	Service Level Objective
UE	User Equipment
UP	User Plane
URLLC	Ultra-Reliable and Low Latency Communications

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