

Recommendation

ITU-T Y.3144 (09/2024)

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

Future networks

Future networks including IMT-2020 – Requirements and functional architecture of distributed core network

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

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Recommendation ITU-T Y.3144

Future networks including IMT-2020 – Requirements and functional architecture of distributed core network

Summary

The distributed core network is a core network which builds on network functional units collaborating in a distributed manner to provide the network functions of control plane, user plane and data plane. Recommendation ITU-T Y.3144 specifies the enabling features, requirements, functional architecture, network function enhancements and procedures of the distributed core network, in the context of future networks including IMT-2020.

History*

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Recommendation ITU-T Y.3144

Future networks including IMT-2020 – Requirements and functional architecture of distributed core network

1 Scope

This Recommendation specifies the distributed core network in the context of future networks including IMT-2020. The distributed core network is a core network which builds on network functional units collaborating in a distributed manner to provide the network functions of control plane, user plane and data plane, in which the network functional unit is a core network software unit consisting of atomic network functionalities on the basis of IMT-2020 core network functions.

This Recommendation addresses the following aspects of distributed core network:

- General considerations;
- Requirements;
- Functional architecture;
- Network function enhancements;
- Procedures.

Some relevant use cases are provided in Appendix I.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T M.3010] Recommendation ITU-T M.3010 (2000), *Principles for a telecommunications management network*.
- [ITU-T Y.3101] Recommendation ITU-T Y.3101 (2018), *Requirements of the IMT-2020 network*.
- [ITU-T Y.3102] Recommendation ITU-T Y.3102 (2018), *Framework of the IMT-2020 network*.
- [ITU-T Y.3104] Recommendation ITU-T Y.3104 (2018), *Architecture of the IMT-2020 network*.
- [ITU-T Y.3114] Recommendation ITU-T Y.3114 (2022), *Future networks including IMT-2020: requirements and functional architecture of lightweight core for dedicated networks*.
- [ITU-T Y.3127] Recommendation ITU-T Y.3127 (2023), *Future networks including IMT-2020 – Requirements and framework for self-organizing core network*.
- [ITU-T Y.3172] Recommendation ITU-T Y.3172 (2019), *Architectural framework for machine learning in future networks including IMT-2020*.
- [ITU-T Y.3174] Recommendation ITU-T Y.3174 (2020), *Framework for data handling to enable machine learning in future networks including IMT-2020*.



- [ITU-T Y.3187] Recommendation ITU-T Y.3187 (2024), *Architectural Framework for Machine Learning Function Orchestrator in future networks including IMT-2020*.
- [ITU-T Y.3201] Recommendation ITU-T Y.3201 (2023), *Fixed, mobile and satellite convergence – Framework for IMT-2020 networks and beyond*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

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

3.1.2 IMT-2020 [b-ITU-T Y.3100]: Systems, system components, and related technologies that support to 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.

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

3.1.4 machine learning overlay [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 minimise interdependencies between machine learning functionalities and network functions using standard interfaces, allowing for parallel evolution of functionalities of the two.

3.1.5 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.

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

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AF	Application Function
AI	Artificial Intelligence
ASF	Authentication Server Function
CEF	Capability Exposure Function
DLT	Distributed Ledger Technology
FCAPS	Fault, Configuration, Accounting, Performance, Security
FQDN	Fully Qualified Domain Name
HTTP	Hypertext Transfer Protocol
IP	Internet Protocol

IPFS	InterPlanetary File System
ML	Machine Learning
NACF	Network Access Control Function
NFR	Network Function Registry function
NSSF	Network Slice Selection Function
PCF	Policy Control Function
PDU	Protocol Data Unit
QoS	Quality of Service
SMF	Session Management Function
TCP	Transmission Control Protocol
UE	User Equipment
UPF	User Plane Function
URL	Uniform Resource Locator
USM	Unified Subscription Management function
XR	extended Reality

5 Conventions

In this Recommendation:

The keywords "is required to" indicate a requirement which must be strictly followed and from which no deviation is permitted, if conformance to this Recommendation is to be claimed.

The keywords "is recommended" indicate a requirement which is recommended but which is not absolutely required. Thus, this requirement need not be present to claim conformance.

6 General considerations on distributed core network

6.1 Overview of distributed core network

This Recommendation specifies the distributed core network in the context of future networks including IMT-2020. The distributed core network is a core network which builds on network functional units collaborating in a distributed manner to provide the network functions of control plane, user plane, and data plane, in which the network functional unit is a core network software unit consisting of atomic network functionalities on the basis of IMT-2020 core network functions.

In the distributed core network, the control plane is a pool of control related network functionalities which enable control functions such as enhanced IMT-2020 control, sensing control, computing control, security control and energy efficiency. The user plane is a pool of user related network functionalities which enable user functions such as traffic processing, service processing and policy enforcement. The data plane is a pool of data related network functionalities which enable data functions such as data storage management, data agent and data orchestration.

NOTE 1 – The distributed core network aims to provide a method for the configuration of network entities, where a network entity integrates the network functional units of a specific network node for network deployment purposes.

With the support of atomic network functionalities and a separate control plane, user plane, and data plane, the distributed core network is expected to facilitate the introduction of new features and optimize energy consumption by maximizing the reuse of network functionalities. In addition, the