

Recommendation

ITU-T Q.5005 (02/2023)

SERIES Q: Switching and signalling, and associated measurements and tests

Signalling requirements and protocols for IMT-2020 –
Signalling requirements and architecture of IMT-2020

Requirements, framework and protocols for signalling network analysis and optimization in IMT-2020

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Recommendation ITU-T Q.5005

Requirements, framework and protocols for signalling network analysis and optimization in IMT-2020

Summary

Recommendation ITU-T Q.5005 specifies the framework, interfaces (IFs) and protocols, as well as service procedures for signalling network analysis and optimization in IMT-2020. The signalling network is the totality of network functions and the signalling exchanges that are related to telecommunication services. Recommendation ITU-T Q.5005 covers aspects including an overview of signalling networks, requirements for signalling collection, requirements for signalling network analysis, requirements for signalling network optimization, framework, IFs and protocols, service procedures, artificial intelligence-assisted functions and general security considerations of signalling network analysis and optimization in IMT-2020.

History

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FOREWORD

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Recommendation ITU-T Q.5005

Requirements, framework and protocols for signalling network analysis and optimization in IMT-2020

1 Scope

This Recommendation specifies requirements, framework, interfaces (IFs) and protocols for signalling network analysis and optimization in an IMT-2020 network. The signalling network in IMT-2020 is the totality of network functions and corresponding signalling exchanges that are related to IMT-2020 service procedures. The IMT-2020 signalling network analysis and optimization system is a network management system that consists of components for signalling collection, signalling network analysis, signalling network optimization and artificial intelligence or machine learning (AI/ML) assistance. The IMT-2020 signalling network analysis and optimization system is designed with the characteristics of high efficiency, real time reaction, reliability and intelligence, aimed at application in an IMT-2020 network.

The following aspects of IMT-2020 signalling network analysis and optimization system are addressed in this Recommendation.

- Overview, which presents the main network entities and IFs that are used in IMT-2020 signalling network analysis and optimization systems.
- Requirements for IMT-2020 signalling network analysis and optimization, including general signalling requirements for collection, network analysis and network optimization.
- A framework for IMT-2020 signalling network analysis and optimization systems, including global view, system architecture, external boundary and component design of signalling network analysis and optimization systems.
- IFs and protocols of IMT-2020 signalling network analysis and optimization systems, including internal IFs, external IFs and corresponding protocols.
- Service procedures of signalling interworking between collection, network analysis and network optimization.
- Functions of IMT-2020 signalling network analysis and optimization systems that are provided by an internal AI assistance component or external AI platforms. The architectural framework for an external AI platform is specified in [ITU-T Y.3172].
- Security considerations of IMT-2020 signalling network analysis and optimization systems, including signalling collection security, signalling network analysis security, signalling network optimization security, AI/ML-related security, inter-working security, data transport security and user privacy.

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 Q.3644] Recommendation ITU-T Q.3644 (2019), *Requirements for signalling network analyses and optimization in VoLTE*.

- [ITU-T Y.2701] Recommendation ITU-T Y.2701 (2007), *Security requirements for NGN release 1*.
- [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.3172] Recommendation ITU-T Y.3172 (2019), *Architectural framework for machine learning in future networks including IMT-2020*.
- [ITU-R M.1645] Recommendation ITU-R M.1645 (2003), *Framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 signalling network [ITU-T Q.3644]: Refers to the network entities and the signalling exchange which are related to telecommunications services.

3.1.2 signalling collection [ITU-T Q.3644]: Refers to signalling collection on the interfaces which are related to the signalling processes of telecommunications services.

3.1.3 signalling network analysis [ITU-T Q.3644]: Refers to analysis on quotas using the information obtained in signalling collecting, and analyses on status information of signalling network.

3.1.4 signalling network optimization [ITU-T Q.3644]: Refers to signalling network optimization on network entities and optimization of signalling exchange between network entities in signalling network, on the basis of signalling network analysis.

3.1.5 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 [ITU-R M.1645].

3.1.6 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.

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

5G	fifth Generation
AI	Artificial Intelligence
AF	Application Function
AS	Application Server
ASF	Authentication Server Function
BGCF	Breakout Gateway Control Function
CEF	Capability Exposure Function

CHF	Charging Function
CU	Centralized Unit
DU	Distributed Unit
DRA	Diameter Routing Agent
EPC	Evolved Packet Core
EPS	Evolved Packet System
EPSFB	Evolved Packet System Fallback
eMSC	enhanced Mobile Switching Centre
eNB	evolved Node B
GMLC	Gateway Mobile Location Centre
gNB	next generation Node B
GTP	General packet radio service Tunnel Protocol
GTP-C	General packet radio service Tunnel Protocol-Control plane
GTP-U	General packet radio service Tunnel Protocol-User plane
HSS	Home Subscriber Server
HTTP	Hypertext Transfer Protocol
IBCF	Interconnection Border Control Function
I-CSCF	Interrogating Call Session Control Function
IF	Interface
IMS	Internet Protocol Multimedia Subsystem
IMT-2020	International Mobile Telecommunication-2020
IP	Internet Protocol
MEP	Mobile Edge Platform
MGCF	Media Gateway Control Function
MME	Mobility Management Entity
ML	Machine Learning
MO	Mobile Originated
MT	Mobile Terminated
NACF	Network Access Control Function
NAF	Network Application Function
NAS	Non-Access Stratum
NFR	Network Function Repository
NGAP	Next Generation Application Protocol
NG-RAN	Next Generation Radio Access Network
NRF	Network Repository Function
NSSF	Network Slice Selection Function
PCF	Policy Control Function