

# Recommendation

## **ITU-T Q.4073 (06/2024)**

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

Testing specifications – Testing specifications for IMT-2020 and IoT

---

## **Framework for interconnection testing of voice, video over 5G**

# ITU-T Q-SERIES RECOMMENDATIONS

## Switching and signalling, and associated measurements and tests

|                                                                                |                      |
|--------------------------------------------------------------------------------|----------------------|
| SIGNALLING IN THE INTERNATIONAL MANUAL SERVICE                                 | Q.1-Q.3              |
| INTERNATIONAL AUTOMATIC AND SEMI-AUTOMATIC WORKING                             | Q.4-Q.59             |
| FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN                       | Q.60-Q.99            |
| CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS                                   | Q.100-Q.119          |
| SPECIFICATIONS OF SIGNALLING SYSTEMS NO. 4, 5, 6, R1 AND R2                    | Q.120-Q.499          |
| DIGITAL EXCHANGES                                                              | Q.500-Q.599          |
| INTERWORKING OF SIGNALLING SYSTEMS                                             | Q.600-Q.699          |
| SPECIFICATIONS OF SIGNALLING SYSTEM NO. 7                                      | Q.700-Q.799          |
| Q3 INTERFACE                                                                   | Q.800-Q.849          |
| DIGITAL SUBSCRIBER SIGNALLING SYSTEM NO. 1                                     | Q.850-Q.999          |
| PUBLIC LAND MOBILE NETWORK                                                     | Q.1000-Q.1099        |
| INTERWORKING WITH SATELLITE MOBILE SYSTEMS                                     | Q.1100-Q.1199        |
| INTELLIGENT NETWORK                                                            | Q.1200-Q.1699        |
| SIGNALLING REQUIREMENTS AND PROTOCOLS FOR IMT-2000                             | Q.1700-Q.1799        |
| SPECIFICATIONS OF SIGNALLING RELATED TO BEARER INDEPENDENT CALL CONTROL (BICC) | Q.1900-Q.1999        |
| BROADBAND ISDN                                                                 | Q.2000-Q.2999        |
| SIGNALLING REQUIREMENTS AND PROTOCOLS FOR THE NGN                              | Q.3000-Q.3709        |
| SIGNALLING REQUIREMENTS AND PROTOCOLS FOR SDN                                  | Q.3710-Q.3899        |
| TESTING SPECIFICATIONS                                                         | Q.3900-Q.4099        |
| Testing specifications for next generation networks                            | Q.3900-Q.3999        |
| Testing specifications for SIP-IMS                                             | Q.4000-Q.4039        |
| Testing specifications for Cloud computing                                     | Q.4040-Q.4059        |
| <b>Testing specifications for IMT-2020 and IoT</b>                             | <b>Q.4060-Q.4099</b> |
| PROTOCOLS AND SIGNALLING FOR PEER-TO-PEER COMMUNICATIONS                       | Q.4100-Q.4139        |
| PROTOCOLS AND SIGNALLING FOR COMPUTING POWER NETWORKS                          | Q.4140-Q.4159        |
| PROTOCOLS AND SIGNALLING FOR QUANTUM KEY DISTRIBUTION NETWORKS                 | Q.4160-Q.4179        |
| SIGNALLING REQUIREMENTS AND PROTOCOLS FOR IMT-2020                             | Q.5000-Q.5049        |
| COMBATING COUNTERFEITING AND STOLEN ICT DEVICES                                | Q.5050-Q.5069        |

For further details, please refer to the list of ITU-T Recommendations.

# Recommendation ITU-T Q.4073

## Framework for interconnection testing of voice, video over 5G

### Summary

Recommendation ITU-T Q.4073 specifies the high-level framework for the interconnection of voice over new radio (VoNR) based networks to achieve worldwide interoperability with legacy and IP multimedia subsystem/multimedia telephony (IMS/MMTel) networks.

### History\*

| Edition | Recommendation | Approval   | Study Group | Unique ID          |
|---------|----------------|------------|-------------|--------------------|
| 1.0     | ITU-T Q.4073   | 2024-06-29 | 11          | 11.1002/1000/15960 |

### Keywords

5G, framework, IMS/MMTel, interconnection testing, legacy networks, roaming options, ViNR, VoNR.

---

\* To access the Recommendation, type the URL <https://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID.

## FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, and 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.

## NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

## INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents/software copyrights, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the appropriate ITU-T databases available via the ITU-T website at <http://www.itu.int/ITU-T/ipr/>.

© ITU 2024

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

## Table of Contents

|                                                                                            | <b>Page</b> |
|--------------------------------------------------------------------------------------------|-------------|
| 1 Scope .....                                                                              | 1           |
| 2 References.....                                                                          | 1           |
| 3 Definitions .....                                                                        | 2           |
| 4 Abbreviations and acronyms .....                                                         | 3           |
| 5 Conventions .....                                                                        | 4           |
| 6 Rationale .....                                                                          | 4           |
| 7 Key issues of interconnection.....                                                       | 4           |
| 8 General principles of interconnection of VoNR-based networks.....                        | 5           |
| 9 E2E scenarios in terms of interconnection and roaming .....                              | 6           |
| 9.1 Key end-to-end (E2E) scenarios for VoNR interconnection.....                           | 6           |
| 9.2 Overview and comparison of 5G connectivity options and IMS impacts.....                | 16          |
| 10 IMS roaming, interconnection and interworking guidelines (from [b-GSMA PRD IR.65])..... | 20          |
| 11 Testing of mobile and legacy end-to-end (e2e) sessions.....                             | 20          |
| 11.1 User equipment (UE) conformance test specifications for 5G; LTE; 5GS ....             | 20          |
| 12 IMS profile for voice, video and messaging over 5GS (from [b-GSMA NG.114]).....         | 21          |
| Bibliography.....                                                                          | 22          |



# Recommendation ITU-T Q.4073

## Framework for interconnection testing of voice, video over 5G

### 1 Scope

This Recommendation outlines the testing framework and procedures that operators should implement to establish interconnection between voice over new radio (VoNR) networks and to achieve worldwide interoperability with legacy and IMS/MMTel networks.

Both Voice over LTE (VoLTE) and VoNR use the same IP Multimedia Subsystem (IMS) framework as defined in ETSI. While the IMS framework remains the same, technological advancements in radio, core, and devices are expected to enhance user experience in VoNR compared to VoLTE. Therefore, the VoLTE end-to-end (E2E) scenarios for interconnection and roaming, as described in ITU-T Q.3640, are still applicable.

In addition, this Recommendation identifies specific scenarios and requirements for VoNR interconnection and roaming, including possible E2E scenarios, a list of mandatory and optional services that operators should support for interconnection and roaming scenarios, a comparison between VoLTE/VoNR and EPSFB, and a protocol implementation statement (PICS) needed for the service level agreement (SLA).

### 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 E.164]       | Recommendation ITU-T E.164 (2010), <i>The international public telecommunication numbering plan</i> .                                                                                                                                                                                                                                   |
| [ITU-T Q.3640]      | Recommendation ITU-T Q.3640 (2018), <i>Framework of interconnection of VoLTE/ViLTE-based networks</i> .                                                                                                                                                                                                                                 |
| [ITU-T Q.3953]      | Recommendation ITU-T Q.3953 (2018), <i>VoLTE/ViLTE interconnection testing for interworking and roaming scenarios</i> .                                                                                                                                                                                                                 |
| [ETSI TS 103 653-1] | ETSI TS 103 653-1 V2.1.1 (2022-01), <i>Core Network and Interoperability Testing (INT); VoLTE/ViLTE interoperability test description over 4G/early 5G in physical/virtual environments; (3GPP™ Release 15); Part 1: Test Purposes (TP) and Protocol Implementation Conformance Statement (PICS) for VoLTE/ViLTE interoperability</i> . |
| [ETSI TS 103 653-2] | ETSI TS 103 653-2 V2.1.1 (2022-01), <i>Core Network and Interoperability Testing (INT); VoLTE/ViLTE interoperability test description over 4G/early 5G in physical/virtual environments; (3GPP™ Release 15); Part 2: Test Descriptions for VoLTE/ViLTE interoperability</i> .                                                           |
| [ETSI TS 123 216]   | ETSI TS 123 216 V17.1.0 (2022-07), <i>Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Single Radio Voice Call Continuity (SRVCC); Stage 2 (3GPP TS 23.216 version 17.1.0 Release 17)</i> .                                                                         |



- [ETSI TS 123 501] ETSI TS 123 501 V17.11.0 (2024-01), 5G; *System architecture for the 5G System (5GS)* (ETSI TS 23.501 version 17.11.0 Release 17).
- [ETSI TS 123 502] ETSI TS 123 502 V17.11.0 (2024-01), 5G; *Procedures for the 5G System.* (3GPP TS 23.502 version 17.11.0 Release 17).
- [ETSI TS 123 503] ETSI TS 123 503 V17.6.0 (2022-09), 5G; *Policy and charging control framework for the 5G System (5GS); Stage 2.* (3GPP TS 23.503 version 17.6.0 Release 17).
- [ETSI TS 134 229-5] ETSI TS 134 229-5 V16.9.0 (2024-01), 5G; *Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); User Equipment (UE) conformance specification; Part 5: Protocol conformance specification using 5G System (5GS)* (3GPP TS 34.229-5 version 16.9.0 Release 16).
- [ETSI TS 138 521-1] ETSI TS 138 521-1 V17.11.0 (2024-01), NR; *User Equipment (UE) conformance specification; Radio transmission and reception. Part 1: Range 1 Standalone* (3GPP TS 38.521-1 version 17.11.0 Release 17).
- [ETSI TS 138 521-2] ETSI TS 138 521-2 V17.5.0 (2024-01), 5G; NR; *User Equipment (UE) conformance specification; Radio transmission and reception; Part 2: Range 2 standalone* (3GPP TS 38.521-2 version 17.5.0 Release 17).
- [ETSI TS 138 521-3] ETSI TS 138 521-3 V17.11.0 (2024-01), 5G; NR; *User Equipment (UE) conformance specification; Radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios* (3GPP TS 38.521-3 version 17.11.0 Release 17).
- [ETSI TS 138 521-4] ETSI TS 138 521-4 V17.5.0 (2024-01), 5G; NR; *User Equipment (UE) conformance specification; Radio transmission and reception; Part 4: Performance* (3GPP TS 38.521-4 version 17.5.0 Release 17).
- [ETSI TS 138 521-5] ETSI TS 138 521-5 V17.0.0 (2024-01), 5G; NR; *User Equipment (UE) conformance specification; Radio transmission and reception; Part 5: Satellite access Radio Frequency (RF) and performance* (3GPP TS 38.521-5 version 17.0.0 Release 17).
- [ETSI TS 138 523-1] ETSI TS 138 523-1 V17.5.1 (2024-02), 5G; 5GS; *User Equipment (UE) conformance specification; Part 1: Protocol.* (3GPP TS 38.523-1 version 17.5.1 Release 17).
- [ETSI TS 138 523-2] ETSI TS 138 523-2 V17.5.0 (2024-01), LTE; 5G; 5GS; *User Equipment (UE) conformance specification; Part 2: Applicability of protocol test cases* (3GPP TS 38.523-2 version 17.5.0 Release 17).
- [ETSI TS 138 523-3] ETSI TS 138 523-3 V17.9.0 (2024-01), 5G; LTE; 5GS; *User Equipment (UE) conformance specification; Part 3: Protocol Test Suites* (3GPP TS 38.523-3 version 17.9.0 Release 17).
- [ETSI TS 138 533] ETSI TS 138 533 V17.9.0 (2024-01), 5G; NR; *User Equipment (UE) conformance specification; Radio Resource Management (RRM).* (3GPP TS 38.533 version 17.9.0 Release 17).

### 3 Definitions

None.

## 4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

|       |                                                      |
|-------|------------------------------------------------------|
| 5G    | 5th Generation (of mobile networks)                  |
| AI    | Artificial Intelligence                              |
| AMF   | Access and Mobility Management Function              |
| CCN   | Converged Core Network                               |
| CNNs  | Convolutional Neural Networks                        |
| eLTE  | Enhanced Long Term Evolution                         |
| eMBB  | Enhanced Mobile Broadband                            |
| EN-DC | Evolved-Universal Terrestrial Radio Access-New Radio |
| ENUM  | telephone Number Mapping                             |
| EPC   | Evolved Packet Core                                  |
| EPS   | Evolved Packet System                                |
| HPMN  | Home Public Mobile Network                           |
| IMS   | IP Multimedia Subsystem                              |
| IP    | Internet Protocol                                    |
| LBO   | Local Breakout                                       |
| LI    | Lawful Interception                                  |
| LTE   | Long-Term Evolution                                  |
| MEC   | Multi-Access Edge Computing                          |
| mMTC  | Massive Machine-Type Communications                  |
| MMTel | Multimedia Telephony                                 |
| NSA   | Non-Standalone                                       |
| OTT   | Over-the-top                                         |
| PS    | Packet Switched                                      |
| PSTN  | Public Switched Telephone Network                    |
| PLMN  | Public Land Mobile Network                           |
| SA    | Standalone                                           |
| SBA   | Service-Based Architecture                           |
| SIP   | Session Initiation Protocol                          |
| SLA   | Service Level Agreement                              |
| SRVCC | Single Radio Voice Call Continuity                   |
| URLLC | Ultra-Reliable Low-Latency Communications            |
| USSD  | Unstructured Supplementary Service Data              |
| ViLTE | Video over LTE                                       |
| ViNR  | Video over New Radio                                 |
| VoLTE | Voice over LTE                                       |