International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Q.4004.3

(08/2016)

SERIES Q: SWITCHING AND SIGNALLING

Testing specifications – Testing specifications for SIP-IMS

Communication diversion using IP multimedia core network subsystem; Conformance testing – Part 3: User side; Test suite structure and test purposes

Recommendation ITU-T Q.4004.3

ITU-T Q-SERIES RECOMMENDATIONS

SWITCHING AND SIGNALLING

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

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

Recommendation ITU-T Q.4004.3

Communication diversion using IP multimedia core network subsystem; Conformance testing – Part 3: User side; Test suite structure and test purposes

Summary

Recommendation ITU-T Q.4004.3 v.1 (2016) is Part 3 of the testing specifications for communication diversion (CDIV) service implemented on IMS basis on the user side. The standard specifies the test suite structure and test purposes (TSS&TP) which can be used for testing against Recommendation ITU-T Q.3620 v.1.

The version number, v.1, indicates that this is version one of Recommendation ITU-T Q.4004.3, and that it relates to Release 10 of the relevant 3GPP/ETSI standard.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T Q.4004.3 v.1	2016-08-29	11	11.1002/1000/12992

Keywords

Communication diversion, CDIV, IP multimedia subsystem, IMS, session description protocol, SDP, session initiation protocol, SIP, testing, test purposes, TP, test suite structure, TSS, user side.

---

* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

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.

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, 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 TSB patent database at http://www.itu.int/ITU-T/ipr/.

Table of Contents

Recommendation ITU-T Q.4004.3

Communication diversion using IP multimedia core network subsystem; Conformance testing – Part 3: User side; Test suite structure and test purposes

1 Scope

This Recommendation specifies the test suite structure and test purposes (TSS&TP) for communication diversion (CDIV) services [ITU-T Q.3620 v.1] for the user side.

The communication diversion (CDIV) services enables diverting user, to divert the communications addressed to diverting user to another destination.

This Recommendation is part 3 of a multi-part deliverable covering communication diversion (CDIV), as identified below:

Part 1: "Protocol implementation conformance statement (PICS)";

Part 2: "Network side; Test suite structure and test purposes (TSS&TP)";

Part 3: "User side; Test suite structure and test purposes (TSS&TP)".

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.3620 v.1] Recommendation ITU-T Q.3620 v.1 (2016), *Communication diversion using IP multimedia core network subsystem – Protocol specification*.

[ITU-T Q.4004.1 v.1] Recommendation ITU-T Q.4004.1 v.1 (2016), *Communication diversion using IP multimedia core network subsystem; Conformance testing – Part 1: User side and network side; Protocol implementation conformance statement*.

[ITU-T X.290] Recommendation ITU-T X.290 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – General concepts*.

[IETF RFC 4244] IETF RFC 4244 (2005), *An Extension to the Session Initiation Protocol (SIP) for Request History Information*.

3 Definitions

For the purposes of this Recommendation, the terms and definitions given in [ITU-T Q.3620 v.1] and the following apply:

3.1 abstract test suite (ATS): Refer to [ISO/IEC 9646-1].

3.2 implementation under test (IUT): Refer to [ISO/IEC 9646-1].

3.3 PICS proforma: Refer to [ISO/IEC 9646-1].

3.4 point of control and observation: Refer to [ISO/IEC 9646-1].

3.5 protocol implementation conformance statement (PICS): Refer to [ISO/IEC 9646-1].

3.6 system under test (SUT): Refer to [ISO/IEC 9646-1].

3.7 test purpose (TP): Refer to [ISO/IEC 9646-1].

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

Gm Reference Point between a UE and a P-CSCF

TSS Test Suite Structure

5 Test suite structure

Table 1 – Test suite structure

User		
	OrigUE	CDIV_U01_xxx
	Diverted-toUE	CDIV_U02_xxx
	DivertingUE	CDIV_U03_xxx

5.1 Configuration

The scope of this Recommendation is to test the signalling and procedural aspects of the stage 3 requirements as described in [ITU-T Q.3620 v.1].

Testing of user equipment: There are several requirements regarding end devices. Therefore, a special configuration appears.

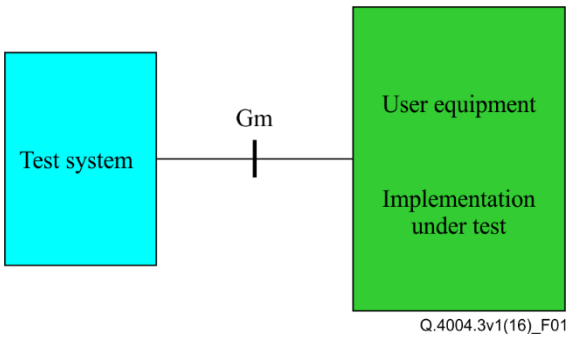

Figure 1 – Applicable configuration to test the user equipment

6 Test purposes

6.1 Introduction

6.1.1 TP naming convention

Test purposes (TPs) are numbered, starting at 001, within each group. Groups are organized according to the TSS. Additional references are added to identify the actual test suite and whether it applies to the network or the user (see Figure 2).

Identifier: **<ss>_<iut><group>_<nnn>**			
<ss>	= supplementary service:	e.g., "CDIV"	
<iut>	= type of IUT:	U N yyy	User Network service
<group>	= group	2 digit field representing group reference according to TSS	
<nnn>	= sequential number	(001-999)	

Figure 2 – TP identifier naming convention scheme

6.1.2 Test strategy

As the base standard [ITU-T Q.3620 v.1] contains no explicit requirements for testing, the TPs were generated as a result of an analysis of the base standard and the PICS specification [ITU-T Q.4004.1 v.1].

6.2 Signalling requirements

6.2.1 Actions at the user equipment

6.2.1.1 Actions at the originating user equipment

TSS **OrigUE**	**TP** **CDIV_U01_001**	**Reference** **Clause 4.5.2.1 of** **[ITU-T Q.3620 v.1]**	**Selection expression** **PICS 5/1** **[ITU-T Q.4004.1 v.1]**

Test purpose

Communication diversion information received in a 181 Call is Being Forwarded.

Ensure that the user equipment (UE) is able to receive a 181 Call is Being Forwarded and the 181 Response contains a History-Info header.
Ensure that the information contained in the History-Info header (identities, reason of CDIV) is displayed at the device. The Cause Value in the latest History Index; cause-param =CAUSE_VAL defined in Table 2.

SIP header values: SIP header values:

INVITE

Supported: histinfo

181 Call is Being Forwarded

History-Info: <sip:SIP#2>;index=1

Comments:

UE				**Test equipment**
INVITE	→		→	INVITE
181 Call is Being Forwarded	←		←	181 Call is Being Forwarded
180 Ringing	←		←	180 Ringing
200 OK (INVITE)	←		←	200 OK (INVITE)
ACK	→		→	ACK
BYE	→		→	BYE
200 OK (BYE)	←		←	200 OK (BYE)

TSS OrigUE	TP CDIV_U01_002	Reference Clause 4.5.2.1 of [ITU-T Q.3620 v.1]	Selection expression PICS 5/2 [ITU-T Q.4004.1 v.1]

Test purpose

Communication diversion information received in a 180 Ringing.

Ensure that the user equipment is able to receive a 180 Ringing and the 180 Response contains a History-Info header.
Ensure that the information contained in the History-Info header (identities, reason of CDIV) is displayed at the device.
The Cause Value in the latest History Index; cause-param =CAUSE_VAL defined in Table 2.

SIP header values: SIP header values:

INVITE

Supported: histinfo

180 Ringing

History-Info: <sip:SIP#2>;index=1,
<sip:SIP#3; cause=CAUSE_VAL>;index=1.1

Comments:

UE			**Test equipment**
INVITE	→	→	INVITE
181 Call is Being Forwarded	←	←	181 Call is Being Forwarded
180 Ringing	←	←	180 Ringing
200 OK (INVITE)	←	←	200 OK (INVITE)
ACK	→	→	ACK
BYE	→	→	BYE
200 OK (BYE)	←	←	200 OK (BYE)

TSS OrigUE	TP CDIV_U01_003	Reference Clause 4.5.2.1 of [ITU-T Q.3620 v.1]	Selection expression PICS 5/3 [ITU-T Q.4004.1 v.1]

Test purpose

Communication diversion information received in a 200 OK INVITE.

Ensure that the user equipment is able to receive a 200 OK INVITE and the 200 OK final Response contains a History-Info header.
Ensure that the information contained in the History-Info header (identities, reason of CDIV) is displayed at the device.
The Cause Value in the latest History Index; cause-param =CAUSE_VAL defined in Table 2.

SIP header values: SIP header values:

INVITE

Supported: histinfo

200 OK (INVITE)

History-Info: <sip:SIP#2>;index=1,
<sip:SIP#3; cause=CAUSE_VAL>;index=1.1

Comments:

UE			**Test equipment**
INVITE	→	→	INVITE
181 Call is Being Forwarded	←	←	181 Call is Being Forwarded
180 Ringing	←	←	180 Ringing
200 OK (INVITE)	←	←	200 OK (INVITE)
ACK	→	→	ACK
BYE	→	→	BYE
200 OK (BYE)	←	←	200 OK (BYE)

6.2.1.2 Action at the diverted to UE

TSS Diverted-toUE	TP CDIV_U02_001	Reference Clause 4.5.2.15 of [ITU-T Q.3620 v.1]	Selection expression PICS 5/4 [ITU-T Q.4004.1 v.1]

Test purpose
Communication diversion information received in an INVITE request.

Ensure that the user equipment is able to receive an INVITE request and the INVITE contains a History-Info header.
Ensure that the information contained in the History-Info header (identities, reason of CDIV) is displayed at the device.
The Cause Value in the latest History Index; cause-param =CAUSE_VAL defined in Table 2.

SIP header values: SIP header values:
INVITE: History-Info: <sip:SIP#2>;index=1,
<sip:SIP#3; cause=CAUSE_VAL>;index=1.1

Comments:

UE			**Test equipment**
INVITE	←	←	INVITE
180 Ringing	→	→	180 Ringing
200 OK (INVITE)	→	→	200 OK (INVITE)
ACK	←	←	ACK
BYE	←	←	BYE
200 OK (BYE)	→	→	200 OK (BYE)

TSS Diverted-toUE	TP CDIV_U02_002	Reference Clauses 4.5.2.6.2, 4.5.2.7 of [ITU-T Q.3620 v.1]	Selection expression PICS 5/5 [ITU-T Q.4004.1 v.1]

Test purpose
The user equipment is able to send a History-Info header in 180 response.

Ensure that the user equipment is able to send a History-Info header in a 180 provisional response containing a History-Info header received in the initial INVITE.
The Cause Value in the latest History Index; cause-param =CAUSE_VAL defined in Table 2.

SIP header values: SIP header values:
INVITE: History-Info: <sip:SIP#2>;index=1,
<sip:SIP#3; cause=CAUSE_VAL>;index=1.1
180 Ringing: History-Info: <sip:SIP#2>;index=1,
<sip:SIP#3; cause=CAUSE_VAL>;index=1.1

Comments:

UE			**Test equipment**
INVITE	←	←	INVITE
180 Ringing	→	→	180 Ringing
200 OK (INVITE)	→	→	200 OK (INVITE)
ACK	←	←	ACK
BYE	←	←	BYE
200 OK (BYE)	→	→	200 OK (BYE)

TSS Diverted-toUE	TP CDIV_U02_003	Reference Clauses 4.5.2.6.2, 4.5.2.7 of [ITU-T Q.3620 v.1]	Selection expression PICS 5/6 [ITU-T Q.4004.1 v.1]

Test purpose
The user equipment is able to send a History-Info header in 200 OK INVITE final response.

Ensure that the user equipment is able to send a History-Info header in a 200 OK final response containing a History-Info header received in the initial INVITE.
The Cause Value in the latest History Index; cause-param =CAUSE_VAL defined in Table 2.

SIP header values: SIP header values:
INVITE: History-Info: <sip:SIP#2>;index=1,
<sip:SIP#3; cause=CAUSE_VAL>;index=1.1
200 OK: History-Info: <sip:SIP#2>;index=1,
<sip:SIP#3; cause=CAUSE_VAL>;index=1.1

Comments:

UE			**Test equipment**
INVITE	←	←	INVITE
180 Ringing	→	→	180 Ringing
200 OK (INVITE)	→	→	200 OK (INVITE)
ACK	←	←	ACK
BYE	←	←	BYE
200 OK (BYE)	→	→	200 OK (BYE)

6.2.1.3 Actions at the diverting UE

TSS DivertingUE	TP CDIV_U03_001	Reference Clause 4.5.2.6.4 of [ITU-T Q.3620 v.1]	Selection expression PICS 5/7 [ITU-T Q.4004.1 v.1]

Test purpose
Communication diversion using the MESSAGE request method.

Ensure that the user equipment is able to receive a MESSAGE request containing the notification about a performed communication diversion by the network.
The Cause Value in the latest History Index; cause-param =CAUSE_VAL defined in Table 2.

SIP header values: SIP header values:
MESSAGE
Content-Type: text/plain
… text (PIXIT) …

Comments:

UE			**Test equipment**
MESSAGE	←	←	MESSAGE

TSS DivertingUE	TP CDIV_U03_002	Reference Clauses 4.5.2.6.5, 4.10 of [ITU-T Q.3620 v.1]	Selection expression PICS 5/8 [ITU-T Q.4004.1 v.1]

Test purpose

Communication diversion using the CDIVN service, subscription of the service.

Ensure that the user equipment is able to subscribe the communication diversion notification service (CDIVN).
A SUBSCRIBE request is sent. The Event header contains the package name "comm-div-info" and a MIME body containing a XML instance of "http://uri.etsi.org/ngn/params/xml/comm-div-info".
The Cause Value in the latest History Index; cause-param =CAUSE_VAL defined in Table 2.

SIP header values: SIP header values:

SUBSCRIBE: Event:comm-div-info
application/comm-div-info+xml
<comm-div-info>
<comm-div-subs-info >
<comm-div-selection-criteria>
< originating-user-selection-criteria >
<diverting-user-selection-criteria>
<diverted-to-user-selection-criteria>
< diversion-time-selection-criteria >
< diversion-reason-selection-criteria > CAUSE_VAL
<comm-div-ntfy-trigger-criteria>
<notification-time-selection-criteria>
</comm-div-info>

NOTIFY: Event:comm-div-info

Comments:

UE			**Test equipment**
SUBSCRIBE	→	→	SUBSCRIBE
200 OK (SUBSCRIBE)	←	←	200 OK (SUBSCRIBE)
NOTIFY	←	←	NOTIFY
200 OK (NOTIFY)	→	→	200 OK (NOTIFY)

TSS DivertingUE	TP CDIV_U03_003	Reference Clauses 4.5.2.6.5, 4.10 of [ITU-T Q.3620 v.1]	Selection expression PICS 5/8 [ITU-T Q.4004.1 v.1]

Test purpose

Communication diversion using the CDIVN service, notification applies.

Ensure that the user equipment is able to receive notification based on the communication diversion notification service (CDIVN).
A NOTIFY request is received. The Event header contains the package name "comm-div-info". The Event header contains the package name "comm-div-info" and a MIME body containing a XML instance of "http://uri.etsi.org/ngn/params/xml/comm-div-info".
Ensure that the notification is displayed at the user equipment.
The Cause Value in the latest History Index; cause-param =CAUSE_VAL defined in Table 2.

SIP header values: SIP header values:

NOTIFY: Event:comm-div-info
application/comm-div-info+xml
<comm-div-info>
<comm-div-ntfy-info>
<originating-user-info>
<diverting-user-info>
<diverted-to-user-info>
<diversion-time-info>
<diversion-reason-info> CAUSE_VAL
<diversion-rule-info-type>
<diversion-rule> (any text)
</comm-div-info>

Comments:

UE		**CDIVN is activated**		**Test equipment**
NOTIFY	←		←	NOTIFY
200 OK (NOTIFY)	→		→	200 OK (NOTIFY)

Table 2 – Cause values the "cause" parameter in the History-Info header and XML element used in CDIV_U03_001-003

Cause Value in History Index; cause-param = "cause" EQUAL CAUSE_VAL	**Cause value**	Call diversion information	**Redirecting reason**
	404		Subscriber not Logged-In
	302		Unconditional
	486		User busy
	408		No reply
	480		Deflection immediate
	503		Mobile subscriber not reachable
	487		Deflection during alerting

SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of ITU-T
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Cable networks and transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Environment and ICTs, climate change, e-waste, energy efficiency; construction, installation and protection of cables and other elements of outside plant
Series M	Telecommunication management, including TMN and network maintenance
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Terminals and subjective and objective assessment methods
Series Q	**Switching and signalling**
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks, open system communications and security
Series Y	Global information infrastructure, Internet protocol aspects and next-generation networks, Internet of Things and smart cities
Series Z	Languages and general software aspects for telecommunication systems

Printed in Switzerland
Geneva, 2017