ETSI TS 186 008-3 V2.1.1 (2015-06)

Core Network and Interoperability Testing (INT); IMS/NGN Performance and Robustness Benchmarking; Part 3: Traffic Sets and Traffic Profiles

Reference
RTS/INT-00021-3

Keywords
IMS, performance, service

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Contents

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://ipr.etsi.org).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Core Network and Interoperability Testing (INT).

The present document is part 3 of a multi-part deliverable covering the IMS/NGN Performance Benchmark, as identified below:

Part 1: "Core Concepts";

Part 2: "Subsystem Configurations and Benchmarks";

Part 3: "Traffic Sets and Traffic Profiles";

Part 4: "Reference Load network quality parameters".

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

1 Scope

The present document defines initial benchmark tests through definitions of traffics sets and traffic profiles.

The benchmark is defined for the IMS network as a whole, as well as for several subsystems of an IMS network. The benchmark is designed so that nodes composing a subsystem can also be benchmarked alone.

The initial benchmark test data defined in the present document include:

- Traffic set.
- Traffic-time profile.
- Benchmark test procedure.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[1] ETSI TS 186 008-1: "IMS Network Testing (INT); IMS/NGN Performance Benchmark; Part 1: Core Concepts".

[2] ETSI TS 186 008-2: "IMS Network Testing (INT); IMS/NGN Performance Benchmark; Part 2: Subsystem Configurations and Benchmarks".

[3] Recommendation ITU-T Q.3930: "Performance testing of distributed systems - Concepts and terminology".

[4] ETSI TS 186 025-2: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IMS/PES Performance Benchmark; Part 2: Subsystem Configurations and Benchmarks".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] IETF RFC 3261: "SIP: Session Initiation Protocol".

[i.2] Recommendation ITU-T V.152: "Procedures for supporting voice-band data over IP networks".

[i.3] Recommendation ITU-T T.38: "Procedures for real-time Group 3 facsimile communication over IP networks".

[i.4] Recommendation ITU-T V.90: "A digital modem and analogue modem pair for use on the Public Switched Telephone Network (PSTN) at data signalling rates of up to 56 000 bit/s downstream and up to 33 600 bit/s upstream".

[i.5] Recommendation ITU-T V.34: "A modem operating at data signalling rates of up to 33 600 bit/s for use on the general switched telephone network and on leased point-to-point 2-wire telephone-type circuits".

[i.6] Recommendation ITU-T V.32: "A family of 2-wire, duplex modems operating at data signalling rates of up to 9600 bit/s for use on the general switched telephone network and on leased telephone-type circuits".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in Recommendation ITU-T Q.3930 [3] apply.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AKA	Authentication and Key Agreement
BC	Bearer Capability
CC	Completion of Communications on No Reply
CCBS	Completion of Calls to Busy Subscriber
CCNR	Completion of Calls to No Reply
CFB	Call forwarding busy
CFNR	Call forwarding not reply
CFU	Call forwarding unconditional
CPU	Central processor unit
GW	Gateway
IHS	Inadequately Handled Scenarios
IMS	IP Multimedia Subsystem
ISDN	Integrated Services Digital Network
MEM	MEMory usage
PI	Progress Indicator
PSTN	Public switched telephone network
PX_IHS	% Inadequately Handled Scenarios
SIP	Session Initiation Protocol
SIPP	SIPP Simple Internet Protocol Plus
SUM	Subscription Management
TLS	Transport Layer Security
UDI	Unrestricted Digital Information
UDUB	User determined user busy
UE	User Equipment
XML	Extensible Markup Language

4 Benchmark tests

ETSI TS 186 008-1 [1] and ETSI TS 186 008-2 [2] have defined the framework for defining and executing an IMS performance benchmark. The present document specifies a benchmark test, which may be implemented and performed as-is, or which may serve as an example for future benchmark tests developed by a service provider or SUT implementor.

4.1 Benchmark test goals

A benchmark test may be used either for comparison (e.g. comparing the performance of two products), or for prediction (e.g. the configuration specified for a benchmark test is similar enough to a service providers requirements that the result of the test can be used as an estimate of the performance of their deployed system).

4.2 Initial benchmark traffic set and traffic-time profile

As described in details in ETSI TS 186 008-1 [1], a benchmark test measures the behaviour of a SUT for a specified traffic set and traffic-time profile. A traffic set is composed of a mixture of test scenarios, whose relative frequency of occurrence is specified by traffic set parameters; the traffic-time profile is a specification of how the average arrival rate of test scenarios evolves over the execution of the benchmark test.

Tables 1 and 2 represent a generic IMS/PES traffic set and profile covering the major use-cases defined in ETSI TS 186 025-2 [4] and ETSI TS 186 008-2 [2].

The percentage of System Load for each scenario has not been defined, because the load depends on the number of selected use cases.

Table 1: Initial benchmark traffic set

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
[2], clause 6.1: Registration/ De-registration Use-Case	Successful initial registration with unprotected REGISTER requests on the SIP default port values as specified in IETF RFC 3261 [i.1]	UC1_SC1			
	Successful initial registration with IMS AKA as a security mechanism	UC1_SC2			
	Successful initial registration with SIP digest without TLS as a security mechanism	UC1_SC3			
	Successful initial registration with SIP digest with TLS as a security mechanism	UC1_SC4			
	Successful initial registration with NASS-IMS bundled authentication as a security mechanism	UC1_SC5			
	Successful initial registration with GPRS-IMS-Bundled authentication as a security mechanism	UC1_SC6			
	Re-registration - user currently registered	UC1_SC7			

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Re-registration - user currently registered	UC1_SC8			
	Re-registration - user roaming	UC1_SC9			
	Initiated de-registration	UC1_SC10			
[2], clause 7.1: MMTel fixed access to MMTel fixed access	Successful call - This scenario represents the case when the call establishment is performed. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC2_SC1		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Successful call - This scenario represents the case when the call establishment is performed. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the called user.	UC2_SC2		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Basic call with Fax with 33,6 kBit/s (Super G3 Fax) This scenario represents the case when in the active call state the Fax transfer on the media is performed and the echo cancellers in the GW are not activated. The call is released from the calling user. Ensure that in the active call state the data transfer is performed.	UC2_SC3		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Basic call with Fax with 14,4 kBit/s; This scenario represents the case when in the active call state the Fax transfer on the media is performed and the echo cancellers in the GW are activated. The call is released from the calling user. Ensure that in the active call state the data transfer is performed.	UC2_SC4		Poisson, mean selected by traffic-time profile	
	Basic call - Fax with 14,4 kBit/s with V.152 [i.2] This scenario represents the case when in the active call state the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are not activated. The call is released from the calling user. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters).	UC2_SC5		Poisson, mean selected by traffic-time profile	
	Basic call - Fax with 14,4 kbit/s with using the T.38 [i.3] in an audio m-line codec This scenario represents the case when in the active call state the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are not activated. The call is released from the called user. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters).	UC2_SC6		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Called user is user busy This scenario represents the case, when the called user is user determined user busy the network initiate call clearing to the calling user.	UC2_SC7		Poisson, mean selected by traffic-time profile	
	CFU Ensure that when user A calls user B, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC2_SC8		Poisson, mean selected by traffic-time profile	
	CFB Ensure that when user A calls user B which is user determined user busy (UDUB), the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC2_SC9		Poisson, mean selected by traffic-time profile	
	CFNR Ensure that when user A calls user B which does not answer, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC2_SC10		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CCBS User A is located in network A and user B is located in network B. User A has successfully invoked a CCBS request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC2_SC11		Poisson, mean selected by traffic-time profile	
	CCNR User A is located in network A and user B is located in network B. User A has successfully invoked a CCNR request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC2_SC12		Poisson, mean selected by traffic-time profile	
IMS/PES – IMS/PES [2], clause 7.3	ISDN - ISDN Scenario 1.1 Basic call with BC= speech - enblock sending This use case represents the case when the call establishment using enbloc sending is performed. The call is released from the calling user.	UC3_SC1		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	ISDN - ISDN Scenario 1.2 Basic call with BC= speech - enblock sending This scenario represents the case when the call establishment using en-bloc sending is performed. The call is released from the called user.	UC3_SC2		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	ISDN - ISDN Scenario 1.3 Basic call - overlap sending with BC= speech This scenario represents the case when the call establishment using overlap sending is performed. The call is released from the calling user.	UC3_SC3		Poisson, mean selected by traffic-time profile	
	ISDN - ISDN Scenario 1.4 Basic call with BC= 3,1 KHz audio - Fax with 33,6 kbit/s This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are not activated. The call is released from the calling user.	UC3_SC4		Poisson, mean selected by traffic-time profile	
	ISDN - ISDN Scenario 1.5 Basic call with BC= 3,1 KHz audio - Fax with 14,4 kbit/s This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are not activated. The call is released from the calling user.	UC3_SC5		Poisson, mean selected by traffic-time profile	
	ISDN - ISDN Scenario 1.6 Basic call with BC= 3,1 kHz with PI#3 This scenario represents the case when in the active call state (N10) the 3,1 kHz transfer is performed. The call is released from the calling user.	UC3_SC6		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	ISDN - ISDN Scenario 1.7 Basic call with BC= 3,1 kHz with PI#3 This scenario represents the case when in the active call state (N10) the 3,1 kHz transfer is performed. The call is released from the called user.	UC3_SC7		Poisson, mean selected by traffic-time profile	
	ISDN - ISDN Scenario 1.8 Basic call with BC= 3,1 kHz - Modem V.32 [i.6] bis (4,8 kBit/s, 9,6 kBit/s 14,4 kBit/s) This scenario represents the case when in the active call state (N10) the 3,1 kHz transfer is performed. The call is released from the calling user.	UC3_SC8		Poisson, mean selected by traffic-time profile	
	ISDN - ISDN Scenario 1.9 Basic call with BC= 3,1 kHz - Modem V.34 [i.5] (up to 33,6 kBit/s) This scenario represents the case when in the active call state (N10) the 3,1 kHz transfer is performed. The call is released from the calling user.	UC3_SC9		Poisson, mean selected by traffic-time profile	
	ISDN - ISDN Scenario 1.10 Basic call with BC= UDI - enblock sending This scenario represents the case when the call establishment using en-bloc sending is performed. The call is released from the calling user.	UC3_SC10		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	ISDN - ISDN Scenario 1.11 Basic call with BC= UDI - enblock sending This scenario represents the case when the call establishment using en-bloc sending is performed. The call is released from the called user.	UC3_SC11		Poisson, mean selected by traffic-time profile	
	ISDN - ISDN Scenario 1.12 Called user is user determined user busy This scenario represents the case, when the called user is user determined user busy the network initiate call clearing to the calling user with cause value # 17.	UC3_SC12		Poisson, mean selected by traffic-time profile	
	ISDN - ISDN Scenario 1.13 No answer from the called user This scenario represents the case when there is no answer from the called user ("no user responding"), the network initiate call clearing to the calling user with the cause value # 18.	UC3_SC13		Poisson, mean selected by traffic-time profile	
	ISDN - PSTN Scenario 2.1 Basic call with BC= speech - enblock sending This scenario represents the case when the call establishment using en-bloc sending is performed. The call is released from the calling user.	UC3_SC14		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	ISDN - PSTN Scenario 2.2 Basic call with BC= speech - enblock sending This scenario represents the case when the call establishment using en-bloc sending is performed. The call is released from the called user.	UC3_SC15		Poisson, mean selected by traffic-time profile	
	ISDN - PSTN Scenario 2.3 Basic call - overlap sending with BC= speech This scenario represents the case when the call establishment using overlap sending. The call is released from the calling user. The call is released from the calling user.	UC3_SC15		Poisson, mean selected by traffic-time profile	
	ISDN - PSTN Scenario 2.4 Basic call with BC= 3,1 KHz audio - Fax with 33,6 kBit/s This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels are performed and the echo cancellers in the GW are not activated. The call is released from the called user.	UC3_SC16		Poisson, mean selected by traffic-time profile	
	ISDN - PSTN Scenario 2.5 Basic call with BC= 3,1 KHz audio - Fax with 14,4 kBit/s This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are not activated. The call is released from the called user.	UC3_SC17		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	ISDN - PSTN Scenario 2.6 Basic call with BC= 3,1 kHz - Modem V.32 [I.6] bis (4,8 kBit/s, 9,6 kBit/s 14,4 kBit/s) This scenario represents the case when in the active call state (N10) the 3,1 kHz transfer is performed. The call is released from the calling user.	UC3_SC18		Poisson, mean selected by traffic-time profile	
	ISDN - PSTN Scenario 2.7 Basic call with BC= 3,1 kHz - Modem V.34 [i.5] (up to 33,6 kBit/s) This scenario represents the case when in the active call state (N10) the 3,1 kHz transfer is performed. The call is released from the calling user.	UC3_SC19		Poisson, mean selected by traffic-time profile	
	ISDN - PSTN Scenario 2.8 Called user is user determined user busy This scenario represents the case, when the called user is user determined user busy. The network initiates call clearing to the calling user with cause value # 17.	UC3_SC20		Poisson, mean selected by traffic-time profile	
	ISDN - PSTN Scenario 2.9 No answer from the called user This scenario represents the case when there is no answer from the called user ("no user responding"), the network initiates call clearing to the calling user with the cause value # 18.	UC3_SC21		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	PSTN - ISDN Scenario 3.1 Basic call. The call is released from the calling user This scenario represents the case when the call establishment is performed. The call is released from the calling user.	UC3_SC22		Poisson, mean selected by traffic-time profile	
	PSTN - ISDN Scenario 3.2 Basic call The call is released from the called user This scenario represents the case when the call establishment is performed. The call is released from the called user.	UC3_SC23		Poisson, mean selected by traffic-time profile	
	PSTN - ISDN Scenario 3.3 Basic call with BC= 3,1 KHz audio - Fax with 33,6 kbit/s This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are not activated.	UC3_SC24		Poisson, mean selected by traffic-time profile	
	PSTN - ISDN Scenario 3.4 Basic call with BC= 3,1 KHz audio - Fax with 14,4 kbit/s This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are deactivated.	UC3_SC25		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	PSTN - ISDN Scenario 3.5 Basic call with BC= 3,1 KHz audio - Modem V.90 [i.4] This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are not activated.	UC3_SC26		Poisson, mean selected by traffic-time profile	
	PSTN - ISDN Scenario 3.6 Called user is user determined user busy This scenario represents the case, when the called user is user determined user busy the network initiate call clearing to the calling user.	UC3_SC27		Poisson, mean selected by traffic-time profile	
	PSTN - ISDN Scenario 3.7 No answer from the called user This scenario represents the case when there is no answer from the called user ("no user responding"), the network initiate call clearing to the calling user.	UC3_SC28		Poisson, mean selected by traffic-time profile	
	PSTN - PSTN Scenario 4.1 Basic call. The call is released from the calling user. This scenario represents the case when the call establishment is performed. The call is released from the calling user.	UC3_SC29		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	PSTN - PSTN Scenario 4.2 Basic call The call is released from the called user. This scenario represents the case when the call establishment is performed. The call is released from the called user.	UC3_SC30		Poisson, mean selected by traffic-time profile	
	PSTN - PSTN Scenario 4.3 Basic call with Fax with 33,6 kBit/s (Super G3 Fax) This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are deactivated.	UC3_SC31		Poisson, mean selected by traffic-time profile	
	PSTN - PSTN Scenario 4.4 Basic call with Fax with 14,4 kBit/s This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed. The echo cancellers in the GW are activated.	UC3_SC32		Poisson, mean selected by traffic-time profile	
	PSTN - PSTN Scenario 4.5 Basic call with BC= 3,1 KHz audio - Modem V.34 [I.5] (up to 33,6 kBit/s) This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are deactivated.	UC3_SC33		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	PSTN - PSTN Scenario 4.6 Basic call with BC= 3,1 KHz audio - Modem V.32 bis (4,8 kBit/s, 9,6 kBit/s 14,4 kBit/s) This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are activated.	UC3_SC34		Poisson, mean selected by traffic-time profile	
	PSTN - PSTN Scenario 4.7 Called user is user busy This scenario represents the case, when the called user is user determined user busy the network initiate call clearing to the calling user.	UC3_SC35		Poisson, mean selected by traffic-time profile	
	PSTN - PSTN Scenario 4.8 No answer from the called user This scenario represents the case when there is no answer from the called user ("no user responding"), the network initiate call clearing to the calling user.	UC3_SC37		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
ISDN to MMTel fixed access [2], clause 7.3.1	Basic call with BC= ITC_value - enblock sending. This scenario represents the case when the call establishment using en-bloc sending is performed. The call is released from the calling user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC4_SC1		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Basic call with BC= ITC_value - enblock sending This scenario represents the case when the call establishment using en-bloc sending is performed. The call is released from the called user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC4_SC2		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Basic call - overlap sending with BC= speech This scenario represents the case when the call establishment using overlap sending. The call is released from the calling user. The call is released from the calling user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC4_SC3		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Basic call with BC= 3,1 KHz audio - Fax with 33,6 kBit/s This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are not activated. The call is released from the calling user. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters).	UC4_SC4		Poisson, mean selected by traffic-time profile	
	Basic call with BC= 3,1 KHz audio - Fax with 14,4 kBit/s This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are activated. The call is released from the calling user. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters).	UC4_SC5		Poisson, mean selected by traffic-time profile	
	Basic call with BC= 3,1 KHz audio - Fax with 14,4 kbit/s with V.152 [i.2] This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are not activated. The call is released from the calling user. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters).	UC4_SC6		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Basic call with BC= 3,1 KHz audio - Fax with 14,4 kbit/s with using the T.38 [i.3] in an audio m-line codec This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are not activated. The call is released from the calling user. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters).	UC4_SC7		Poisson, mean selected by traffic-time profile	
	Basic call with BC= 3,1 kHz - Modem V.32 bis (4,8 kBit/s, 9,6 kBit/s 14,4 kBit/s) This scenario represents the case when in the active call state (N10) the 3,1 kHz transfer is performed. The call is released from the calling user.	UC4_SC8		Poisson, mean selected by traffic-time profile	
	Basic call with BC= 3,1 kHz - Modem V.34 (up to 33,6 kBit/s) This scenario represents the case when in the active call state (N10) the 3,1 kHz transfer is performed. The call is released from the calling user.	UC4_SC9		Poisson, mean selected by traffic-time profile	
	Called user is user determined user busy This scenario represents the case, when the called user is user determined user busy. The network initiates call clearing to the calling user.	UC4_SC10		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CFU Ensure that when user A calls user B, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC4_SC11		Poisson, mean selected by traffic-time profile	
	CFB Ensure that when user A calls user B which is user determined user busy (UDUB), the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC4_SC12		Poisson, mean selected by traffic-time profile	
	CFNR Ensure that when user A calls user B which does not answer, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC4_SC13		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CCBS User A is located in network A and user B is located in network B. User A has successfully invoked a CCBS request. Ensure that the recall from user A to user B is successful. The call is released from the calling user	UC4_SC14		Poisson, mean selected by traffic-time profile	
	CCNR User A is located in network A and user B is located in network B. User A has successfully invoked a CCNR request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC4_SC15		Poisson, mean selected by traffic-time profile	
MMTel fix access to ISDN [2], clause 7.3.2	Basic call. The call is released from the calling user This scenario represents the case when the call establishment is performed. The call is released from the calling user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC5_SC1		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Basic call The call is released from the called user This scenario represents the case when the call establishment is performed. The call is released from the called user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC5_SC2		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Basic call with BC= 3,1 KHz audio - Fax with 33,6 kbit/s This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are not activated. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC5_SC3		Poisson, mean selected by traffic-time profile	
	Basic call with BC= 3,1 KHz audio - Fax with 14,4 kbit/s This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are activated. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters). The call is released from the calling user	UC5_SC4		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Basic call with BC= 3,1 KHz audio - Fax with 14,4 kbit/s with V.152 [i.2] This scenario represents the case when in the active call state (N10) the Fax transfer is performed and the echo cancellers in the GW are activated. The call is released from the calling user. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters).	UC5_SC5		Poisson, mean selected by traffic-time profile	
	Basic call with BC= 3,1 KHz audio - Fax with 14,4 kBit/s with using the T.38 [i.3] in an audio m-line codec This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are activated. The call is released from the calling user. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters).	UC5_SC6		Poisson, mean selected by traffic-time profile	
	Basic call with BC= 3,1 kHz - Modem V.32 bis (4,8 kBit/s, 9,6 kBit/s, 14,4 kBit/s) This scenario represents the case when in the active call state (N10) the 3,1 kHz transfer is performed. The call is released from the calling user.	UC5_SC7		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Basic call with BC= 3,1 kHz - Modem V.34 (up to 33,6 kBit/s) This scenario represents the case when in the active call state (N10) the 3,1 kHz transfer is performed. The call is released from the calling user.	UC5_SC8		Poisson, mean selected by traffic-time profile	
	Called user is user determined user busy This scenario represents the case, when the called user is user determined user busy the network initiate call clearing to the calling user.	UC5_SC9		Poisson, mean selected by traffic-time profile	
	CFU Ensure that when user A calls user B, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC5_SC10		Poisson, mean selected by traffic-time profile	
	CFB Ensure that when user A calls user B which is user determined user busy (UDUB), the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC5_SC11		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CFNR Ensure that when user A calls user B which does not answer, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC5_SC12		Poisson, mean selected by traffic-time profile	
	CCBS User A is located in network A and user B is located in network B. User A has successfully invoked a CCBS request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC5_SC13		Poisson, mean selected by traffic-time profile	
	CCNR User A is located in network A and user B is located in network B. User A has successfully invoked a CCNR request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC5_SC14		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
MMTel fix Access to PSTN [2], clause 7.3.3	Basic call. The call is released from the called user. This scenario represents the case when the call establishment is performed. The call is released from the called user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC6_SC1		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Basic call. The call is released from the calling user This scenario represents the case when the call establishment is performed. The call is released from the calling user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC6_SC2		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Basic call with Fax with 33,6 kBit/s (Super G3 Fax) This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are deactivated. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC6_SC3		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Basic call with Fax with 14,4 kBit/s This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed. The echo cancellers in the GW are activated. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC6_SC4		Poisson, mean selected by traffic-time profile	
	Basic call - Fax with 14,4 kbit/s with V.152 [i.2] This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are not activated. The call is released from the called user. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters).	UC6_SC5		Poisson, mean selected by traffic-time profile	
	Basic call with BC= 3,1 kHz - Modem V.32 bis (4,8 kBit/s, 9,6 kbit/s 14,4 kBit/s) This scenario represents the case when in the active call state (N10) the 3,1 kHz transfer is performed. The call is released from the calling user.	UC6_SC6		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Basic call with BC= 3,1 kHz - Modem V.34 (up to 33,6 kBit/s) This scenario represents the case when in the active call state (N10) the 3,1 kHz transfer is performed. The call is released from the calling user.	UC6_SC7		Poisson, mean selected by traffic-time profile	
	Basic call - Fax with 14,4 kbit/s with using the T.38 [i.3] in an audio m-line codec This scenario represents the case when in the active call state (N10) the Fax transfer is performed and the echo cancellers in the GW are not activated. The call is released from the calling user. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters).	UC6_SC8		Poisson, mean selected by traffic-time profile	
	Called user is user busy This scenario represents the case, when the called user is user determined user busy the network initiate call clearing to the calling user.	UC6_SC9		Poisson, mean selected by traffic-time profile	
	CFU Ensure that when user A calls user B, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC6_SC10		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CFB Ensure that when user A calls user B which is user determined user busy (UDUB), the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC6_SC11		Poisson, mean selected by traffic-time profile	
	CFNR Ensure that when user A calls user B which does not answer, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC6_SC12		Poisson, mean selected by traffic-time profile	
	CCBS User A is located in network A and user B is located in network B. User A has successfully invoked a CCBS request. Ensure when the user B becomes available for CC recall, the CC recall procedure is started. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC6_SC13		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CCNR User A is located in network A and user B is located in network B. User A has successfully invoked a CCNR request. Ensure when the user B becomes available for CC recall, the CC recall procedure is started. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC6_SC14		Poisson, mean selected by traffic-time profile	
PSTN to MMTel fix Access [2], clause 7.3.4	Basic call. The call is released from the calling user This scenario represents the case when the call establishment is performed. The call is released from the calling user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC7_SC1		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Basic call The call is released from the called user. This scenario represents the case when the call establishment is performed. The call is released from the called user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC7_SC2		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Basic call - overlap sending This scenario represents the case when the call establishment using overlap sending. The call is released from the calling user. The call is released from the calling user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC7_SC3		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Basic call with Fax with 33,6 kBit/s (Super G3 Fax) This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are deactivated. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC7_SC4		Poisson, mean selected by traffic-time profile	
	Basic call with Fax with 14,4 kBit/s This scenario represents the case when in the active call state (N10) the Fax transfer is performed. The echo cancellers in the GW are activated. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC7_SC5		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Basic call - Fax with 14,4 kbit/s with V.152 codec This scenario represents the case when in the active call state (N10) the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are not activated. The call is released from the calling user. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters).	UC7_SC6		Poisson, mean selected by traffic-time profile	
	Basic call - Fax with 14,4 kbit/s with using the T.38 in an audio m-line codec This scenario represents the case when in the active call state the Fax transfer is performed. The call is released from the calling user. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters).	UC7_SC7		Poisson, mean selected by traffic-time profile	
	Basic call with BC= 3,1 kHz - Modem V.32 bis (4,8 kBit/s, 9,6 kBit/s 14,4 kBit/s) This scenario represents the case when in the active call state (N10) the 3,1 kHz transfer is performed. The call is released from the calling user.	UC7_SC8		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Basic call with BC= 3,1 kHz - Modem V.34 (up to 33,6 kBit/s) This scenario represents the case when in the active call state (N10) the 3,1 kHz transfer is performed. The call is released from the calling user.	UC7_SC9		Poisson, mean selected by traffic-time profile	
	Called user is user busy This scenario represents the case, when the called user is user determined user busy the network initiate call clearing to the calling user.	UC7_SC10		Poisson, mean selected by traffic-time profile	
	CFU Ensure that when user A calls user B, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC7_SC11		Poisson, mean selected by traffic-time profile	
	CFB Ensure that when user A calls user B which is user determined user busy (UDUB), the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC7_SC12		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CFNR Ensure that when user A calls user B which does not answer, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC7_SC13		Poisson, mean selected by traffic-time profile	
	CCBS User A is located in network A and user B is located in network B. User A has successfully invoked a CCBS request. Ensure when the user B becomes available for CC recall, the CC recall procedure is started. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC7_SC14		Poisson, mean selected by traffic-time profile	
	CCNR User A is located in network A and user B is located in network B. User A has successfully invoked a CCNR request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC7_SC15		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
ISDN to VoLTE [2], clause 7.4.1	Basic call with BC= ITC_value - enblock sending This scenario represents the case when the call establishment using en-bloc sending is performed. The call is released from the calling user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC8_SC1		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Basic call with BC= ITC_value - enblock sending This scenario represents the case when the call establishment using en-bloc sending is performed. The call is released from the called user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC8_SC2		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Basic call - overlap sending with BC= speech This scenario represents the case when the call establishment using overlap sending. The call is released from the calling user. The call is released from the calling user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC8_SC3		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Called user is user determined user busy. This scenario represents the case, when the called user is user determined user busy. the network initiates call clearing to the calling user.	UC8_SC4		Poisson, mean selected by traffic-time profile	
	CFU Ensure that when user A calls user B, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC8_SC5		Poisson, mean selected by traffic-time profile	
	CFB Ensure that when user A calls user B which is user determined user busy (UDUB), the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC8_SC6		Poisson, mean selected by traffic-time profile	
	CFNR Ensure that when user A calls user B which does not answer, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC8_SC7		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CCBS User A is located in network A and user B is located in network B. User A has successfully invoked a CCBS request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC8_SC8		Poisson, mean selected by traffic-time profile	
	CCNR User A is located in network A and user B is located in network B. User A has successfully invoked a CCNR request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC8_SC9		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
VoLTE to ISDN [2], clause 7.4.1 VoLTE - PSTN	Basic call. The call is released from the calling user This scenario represents the case when the call establishment is performed. The call is released from the calling user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC9_SC1		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Basic call The call is released from the called user This scenario represents the case when the call establishment is performed. The call is released from the called user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC9_SC2		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Called user is user determined user busy This scenario represents the case, when the called user is user determined user busy the network initiate call clearing to the calling user.	UC9_SC3		Poisson, mean selected by traffic-time profile	
	CFU Ensure that when user A calls user B, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC9_SC4		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CFB Ensure that when user A calls user B which is user determined user busy (UDUB), the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC9_SC5		Poisson, mean selected by traffic-time profile	
	CFNR Ensure that when user A calls user B which does not answer, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC9_SC6		Poisson, mean selected by traffic-time profile	
	CCBS User A is located in network A and user B is located in network B. User A has successfully invoked a CCBS request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC9_SC7		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CCNR User A is located in network A and user B is located in network B. User A has successfully invoked a CCNR request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC9_SC8		Poisson, mean selected by traffic-time profile	
	Basic call. The call is released from the called user. This scenario represents the case when the call establishment is performed. The call is released from the called user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC9_SC1		Poisson, mean selected by traffic-time profile	
	Basic call. The call is released from the calling user. This scenario represents the case when the call establishment is performed. The call is released from the called user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC9_SC2		Poisson, mean selected by traffic-time profile	
	Called user is user busy. This scenario represents the case, when the called user is user determined user busy the network initiate call clearing to the calling user.	UC9_SC3		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CFU Ensure that when user A calls user B, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC9_SC4		Poisson, mean selected by traffic-time profile	
	CFB Ensure that when user A calls user B which is user determined user busy (UDUB), the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC9_SC5		Poisson, mean selected by traffic-time profile	
	CFNR Ensure that when user A calls user B which does not answer, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC9_SC6		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CCBS User A is located in network A and user B is located in network B. User A has successfully invoked a CCBS request. Ensure when the user B becomes available for CC recall, the CC recall procedure is started. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC9_SC7		Poisson, mean selected by traffic-time profile	
	CCNR User A is located in network A and user B is located in network B. User A has successfully invoked a CCNR request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC9_SC8		Poisson, mean selected by traffic-time profile	
VoLTE to PSTN [2], clause 7.4.3	Basic call. The call is released from the called user. This scenario represents the case when the call establishment is performed. The call is released from the called user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC10_SC1		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Basic call. The call is released from the calling user This scenario represents the case when the call establishment is performed. The call is released from the calling user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC10_SC2		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Called user is user busy This scenario represents the case, when the called user is user determined user busy the network initiate call clearing to the calling user	UC10_SC3		Poisson, mean selected by traffic-time profile	
	CFU Ensure that when user A calls user B, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC10_SC4		Poisson, mean selected by traffic-time profile	
	CFB Ensure that when user A calls user B which is user determined user busy (UDUB), the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC10_SC5		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CFNR Ensure that when user A calls user B which does not answer, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC10_SC6		Poisson, mean selected by traffic-time profile	
	CCBS User A is located in network A and user B is located in network B. User A has successfully invoked a CCBS request. Ensure when the user B becomes available for CC recall, the CC recall procedure is started. Ensure that the recall from user A to user B is successful. The call is released from the calling user	UC10_SC7		Poisson, mean selected by traffic-time profile	
	CCNR User A is located in network A and user B is located in network B. User A has successfully invoked a CCNR request. Ensure that the recall from user A to user B is successful. The call is released from the calling	UC10_SC8		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
PSTN to VoLTE [2], clause 7.4.4	Basic call. The call is released from the calling user. This scenario represents the case when the call establishment is performed. The call is released from the calling user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC11_SC1		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Basic call The call is released from the called user. This scenario represents the case when the call establishment is performed . The call is released from the called user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC11_SC2		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Basic call - overlap sending This scenario represents the case when the call establishment using overlap sending. The call is released from the calling user. The call is released from the calling user. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters).	UC11_SC3		Poisson, mean selected by traffic-time profile	
	Called user is user busy This scenario represents the case, when the called user is user determined user busy the network initiate call clearing to the calling user.	UC11_SC4		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CFU Ensure that when user A calls user B, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC11_SC5		Poisson, mean selected by traffic-time profile	
	CFB Ensure that when user A calls user B which is user determined user busy (UDUB), the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC11_SC5		Poisson, mean selected by traffic-time profile	
	CFNR Ensure that when user A calls user B which does not answer, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC11_SC7		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CCBS User A is located in network A and user B is located in network B. User A has successfully invoked a CCBS request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC11_SC8		Poisson, mean selected by traffic-time profile	
	CCNR User A is located in network A and user B is located in network B. User A has successfully invoked a CCNR request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC11_SC9		Poisson, mean selected by traffic-time profile	
VoLTE to VoLTE [2], clause 7.5	Successful call - This scenario represents the case when the call establishment is performed. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC12_SC1		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Successful call - This scenario represents the case when the call establishment is performed. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the called user.	UC12_SC2		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Basic call - Fax with 14,4 kBit/s with using the T.38 in an audio m-line codec This scenario represents the case when in the active call state the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are not activated. The call is released from the called user. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters).	UC12_SC3		Poisson, mean selected by traffic-time profile	
	Called user is user busy This scenario represents the case, when the called user is user determined user busy the network initiate call clearing to the calling user.	UC12_SC4		Poisson, mean selected by traffic-time profile	
	CFU Ensure that when user A calls user B, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC12_SC5		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CCNR User A is located in network A and user B is located in network B. User A has successfully invoked a CCNR request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC12_SC9		Poisson, mean selected by traffic-time profile	
VoLTE to MMTel fix access [2], clause 7.6.1	Successful call - This scenario represents the case when the call establishment is performed. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC13_SC1		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Successful call - This scenario represents the case when the call establishment is performed. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the called user.	UC13_SC2		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	Basic call - Fax with 14,4 kbit/s with using the T.38 in an audio m-line codec. This scenario represents the case when in the active call state the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are not activated. The call is released from the called user. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters).	UC13_SC3		Poisson, mean selected by traffic-time profile	
	Called user is user busy This scenario represents the case, when the called user is user determined user busy the network initiate call clearing to the calling user.	UC13_SC4		Poisson, mean selected by traffic-time profile	
	CFU Ensure that when user A calls user B, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC13_SC5		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CFB Ensure that when user A calls user B which is user determined user busy (UDUB), the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC13_SC6		Poisson, mean selected by traffic-time profile	
	CFNR Ensure that when user A calls user B which does not answer, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC13_SC7		Poisson, mean selected by traffic-time profile	
	CCBS User A is located in network A and user B is located in network B. User A has successfully invoked a CCBS request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC13_SC8		Poisson, mean selected by traffic-time profile	
	CCNR User A is located in network A and user B is located in network B. User A has successfully invoked a CCNR request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC13_SC9		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
MMTel fix access to VoLTE [2], clause 7.6.2	Successful call - This scenario represents the case when the call establishment is performed. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC14_SC1		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Successful call - This scenario represents the case when the call establishment is performed. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the called user.	UC14_SC2		Poisson, mean selected by traffic-time profile	Exponential, mean 120 s
	Basic call - Fax with 14,4 kbit/s with using the T.38 in an audio m-line codec This scenario represents the case when in the active call state the Fax transfer on the media and B-channels is performed and the echo cancellers in the GW are not activated. The call is released from the called user. Ensure that in the active call state the data transfer is performed (e.g. testing QoS parameters).	UC14_SC3		Poisson, mean selected by traffic-time profile	
	Called user is user busy This scenario represents the case, when the called user is user determined user busy the network initiate call clearing to the calling user.	UC14_SC4		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CFU Ensure that when user A calls user B, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC14_SC5		Poisson, mean selected by traffic-time profile	
	CFB Ensure that when user A calls user B which is user determined user busy (UDUB), the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC14_SC6		Poisson, mean selected by traffic-time profile	
	CFNR Ensure that when user A calls user B which does not answer, the call is forwarded to user C. Ensure that in the active call state the voice transfer is performed (e.g. testing QoS parameters). The call is released from the calling user.	UC14_SC7		Poisson, mean selected by traffic-time profile	
	CCBS User A is located in network A and user B is located in network B. User A has successfully invoked a CCBS request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC14_SC8		Poisson, mean selected by traffic-time profile	

Use Case Section	Test Scenario	Scenario ID	Scenario % of System Load	Scenario Arrival Distribution	Scenario Duration Distribution (calls), message size (text messaging)
	CCNR User A is located in network A and user B is located in network B. User A has successfully invoked a CCNR request. Ensure that the recall from user A to user B is successful. The call is released from the calling user.	UC14_SC9		Poisson, mean selected by traffic-time profile	

Table 2: Initial benchmark traffic-time profile

Traffic-time profile Parameter	Traffic-time profile Value	Notes
PX_SimultaneousScenarios (SIMS)	2	Maximum per UE
PX_TotalProvisionedSubscribers	100 000 Subs	Data in ETSI TS 186 008-2 [2]
PX_PercentRegisteredSubscribers	40 %	At test start. The percent of registered subscribers will fluctuate during the test
PX_PercentRoamingSubscribers	None	No roaming
PX_StepNumber	3 steps	DOC underload, DOC, and DOC overload
PX_StepTransientTime	120 seconds	Maximum
PX_StepTime	30 minutes	Minimum
PX_BackgroundLoad	None	
PX_SApSIncreaseAmount	10 SApS	Maximum Report three results, step before, DOC and step after
PX_SystemLoad	DOC	Reported result in Scenario Attempts Per Second
PX_IHS % InAdequately Handle Scenario Attempts Maximum (IHS)	0,1 %	Average over a test step

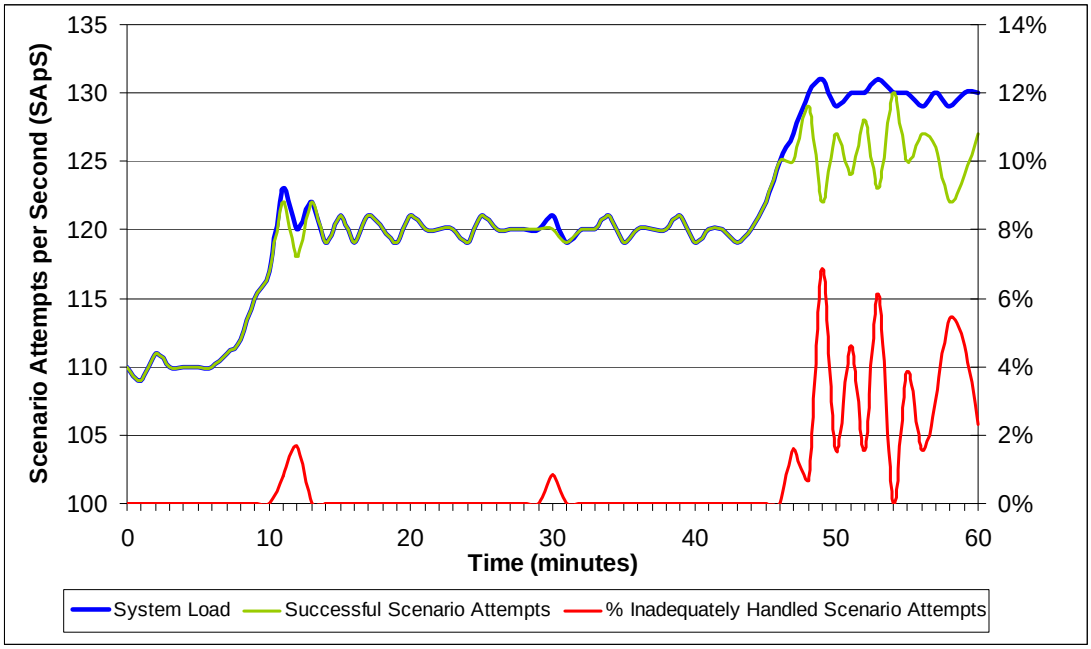

Figure 1: Example of an IMS benchmark traffic profile

4.3 Initial benchmark test implementation

The present document does not dictate the specific implementation of a test scenario. The test scenarios are defined in ETSI TS 186 008-2 [2] as protocol diagrams. These scenarios are implemented either by a commercial test system provider or as part of a benchmark test run. Example implementations include using the ETSI TTCN3 notation, using an XML notation (e.g. based on the open source SIPP), or specifically coding the test in a general programming language. For comparison (and ultimately certification) purposes, a specification of the test system used to implement the traffic-time profile, and documentation of the test scenario implementation in the test system with sufficient detail to be independently replicated, shall be included as part of the report.

4.3.1 SUT Configuration

The initial benchmark supports a Session Control Subsystem SUT configuration as defined in ETSI TS 186 008-2 [2], clause 4. Release 1 does not specify reliability or availability requirements. The availability architecture and design objective target of the SUT should be described in the test report.

4.3.2 Preamble

The preamble defines the steps necessary to configure the SUT for a benchmark run. The following steps shall be completed before the initial benchmark test run.

1) The SUT shall be started from a cold boot.

2) "Total Provisioned Subscribers" shall be provisioned in the database.

3) The initial "Percent Registered Subscribers" shall be setup.

4.3.3 Test Execution

The initial benchmark test shall contain *StepNumber* stair steps in the profile.

The test execution is valid if the profile has steps in the DOC underload range and at least one step in the DOC overload range.

4.3.4 Graphs

The following graphs shall be plotted in the benchmark report:

- Scenario success rate:
  - X-Axis: time (s).
  - Y-Axis 1: Scenario Attempts Per Second for the traffic set.
  - Y-Axis 2: Percentage of Inadequately Handled Scenario Attempts.
- Scenario average transaction response time{for each identified scenario in the traffic set}:
  - X-Axis: time (s).
  - Y-Axis 1: Scenario Attempts Per Second for the individual scenario.
  - Y-Axis 2: For each TRTdesign objective in the identified scenario, SUM of the TRT for a second divided by the SApS for the second.
- Scenario Retransmissions {for each identified scenario in the traffic set that has retransmissions}:
  - X-Axis: time (s).
  - Y-Axis 1: Scenario Attempts Per Second.
  - Y-Axis 2: Number of retransmissions in a second for that scenario.
- CPU {on each of SUT node}:
  - X-Axis: time (s).
  - Y-Axis 1: Scenario Attempts Per Second.
  - Y-Axis 2: CPU.
- MEM {on each of SUT node}:
  - X-Axis: time (s).
  - Y-Axis 1: Scenario Attempts Per Second.
  - Y-Axis 2: MEM.

Annex A (informative): Bibliography

ETSI ES 282 007 (V1.1.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Subsystem (IMS); Functional architecture".

IETF RFC 3310 (September 2002): "Hypertext Transfer Protocol (HTTP) Digest Authentication Using Authentication and Key Agreement (AKA)".

IETF RFC 3840 (August 2004): "Indicating User Agent Capabilities in the Session Initialization Protocol (SIP)".

ETSI TR 121 905: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Vocabulary for 3GPP Specifications (3GPP TR 21.905 version 7.0.0 Release 7)".

ETSI TS 183 041 (V1.1.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Messaging service using the IP Multimedia (IM) Core Network (CN) subsystem; Stage 3: Protocol specifications [Endorsement of 3GPP TS 24.247 Release 6]".

ETSI TS 123 228: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); IP Multimedia Subsystem (IMS); Stage 2 (3GPP TS 23.228 Release 6)".

ETSI TS 124 247: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Messaging service using the IP Multimedia (IM) Core Network (CN) subsystem; Stage 3 (3GPP TS 24.247)".

History

Document history		
V1.1.1	October 2007	Publication
V2.1.1	June 2015	Publication