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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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Version x.y.z

where:

- x the first digit:
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  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document specifies Key Performance Indicators (KPIs) for the IP Multimedia Subsystem (IMS).

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 32.409: "Telecommunication management; Performance Management (PM); Performance measurements - IP Multimedia Subsystem (IMS)".

[3] 3GPP TS 32.410: "Telecommunication management; Key Performance Indicators (KPI) for UMTS and GSM".

3 Abbreviations

For the purposes of the present document, the abbreviations given in TS 21.905 [1] and the following apply.

IMS	IP Multimedia Subsystem
KPI	Key Performance Indicator

4 KPI definitions template

KPI definitions template refers to 3GPP TS 32.410 [3].

5 IMS KPI definitions

5.1 Accessibility KPI

5.1.1 Initial Registration Success Rate of S-CSCF

a) Initial registration success rate of S-CSCF

b) This KPI describes the ratio of the number of successfully performed initial registration procedures of S-CSCF to the number of attempted initial registration procedures of S-CSCF for IMS network and is used to evaluate accessibility performance provided by IMS and network performance.

c) This KPI is obtained by successful initial registration procedures of S-CSCF divided by attempted initial registration procedures of S-CSCF.

d) $$\text{IRSR} = \frac{\sum_{s-cscf} \text{UR.SuccInitReg}}{\sum_{s-cscf} \text{UR.AttInitReg}} * 100\%$$

e) UR.AttInitReg
UR.SuccInitReg
(See in 3GPP TS 32.409 [2])

f) IMS

g) Accessibility

h) Percentage

i) RATIO

5.1.2 Session Setup Time (Mean)

a) Session setup time (Mean)

b) This KPI provides the mean setup time of the sessions.

c) This KPI is obtained by performance measurement: successful session establishment time (Mean).

d) SSTOI= SC.SessionEstabTimeMean.MediaName

e) SC.SessionEstabTimeMean.MediaName (See in 3GPP TS 32.409 [2]).

f) IMS

g) Accessibility

h) milliseconds

i) MEAN

5.1.3 Session Establishment Success Rate

a) Session Establishment Success Rate

b) This KPI describes the ratio of the number of successful originating session establishment to the number of attempted originating session establishment and the ratio of the number of successful terminating session establishment to the number of attempted terminating session establishment for IMS network and is used to evaluate accessibility performance provided by IMS and network performance.

If it is calculated by I-CSCF, it includes the successful rate of terminating session establishment of the own subscribers and the outbound roamers.
If it is calculated by P-CSCF, it includes the successful rate of terminating session establishment of the own subscribers and the inbound roamers.

c) This KPI is obtained by the number of successful session establishments divided by the number of attempted session establishments for originating side and terminating side respectively for IMS.

d) $$SESR\_Orig = \frac{\sum_{Type} SC.SuccSessionOrig.type}{SC.AttSessionOrig}$$

$$SESR\_Term = \frac{\sum_{Type} SC.SuccSessionTerm.type}{SC.AttSessionTerm}$$

e) SC.AttSessionOrig
SC.SuccSessionOrig.*type* type: SIP_180, SIP_200_OK.
SC.AttSessionTerm
SC.SuccSessionTerm.*type* type: SIP_180, SIP_200_OK.
(See in 3GPP TS 32.409 [2])

f) IMS

g) Accessibility

h) Percentage

i) RATIO

5.1.4 Third Party Registration Success Rate

a) Third party registration success rate

b) This KPI describes the ratio of the number of successfully performed third party registration procedures to the number of attempted third party registration procedures for IMS network and is used to evaluate accessibility performance provided by IMS and network performance.

c) This KPI is obtained by successful third party registration procedures divided by attempted third party registration procedures.

d) $$TPRSR = \frac{\sum_{s-cscf} UR.Succ3rdPartyReg}{\sum_{s-cscf} UR.Att3rdPartyReg} * 100\%$$

e) UR.Att3rdPartyReg
UR.Succ3rdPartyReg (See in 3GPP TS 32.409 [2])

f) IMS

g) Accessibility

h) Percentage

i) RATIO

5.1.5 Re-registration Success Rate of S-CSCF

a) Re-registration success rate of S-CSCF

b) This KPI describes the ratio of the number of successfully performed re-registration procedures of S-CSCF to the number of attempted re-registration procedures of S-CSCF for IMS network and is used to evaluate accessibility performance provided by IMS and network performance.

c) This KPI is obtained by successful re-registration procedures of S-CSCF divided by attempted re-registration procedures of S-CSCF.

d) $$\text{RRSR} = \frac{\sum_{s-cscf} \text{UR.SuccReReg}}{\sum_{s-cscf} \text{UR.AttReReg}} * 100\%$$

e) UR.AttReReg
UR.SuccReReg (See in 3GPP TS 32.409 [2])

f) IMS

g) Accessibility

h) Percentage

i) RATIO

5.1.6 Session Setup Time Originated from IMS (Mean)

a) Session setup time originated from IMS (Mean)

b) This KPI provides the mean setup time of the successful IM CN subsystem originated calls.

c) This KPI is obtained by performance measurement: call set-up time (mean), IM CN originated

d) MSSTOI= CC.SetupTimeImOrigMean.

e) CC.SetupTimeImOrigMean (See in 3GPP TS 32.409 [2]).

f) IMS

g) Accessibility

h) Millisecond

i) MEAN

5.1.7 Session Setup Time Originated from CS (Mean)

a) Session setup time originated from CS (Mean)

b) This KPI provides the mean setup time of the successful CS network originated calls.

c) This KPI is obtained by performance measurement: call set-up time (Mean), CS network originated

d) MSSTOC= CC.SetupTimeCsOrigMean.

e) CC.SetupTimeCsOrigMean. (See in 3GPP TS 32.409 [2]).

f) IMS

g) Accessibility

h) Millisecond

i) MEAN

5.1.8 Immediate Messaging Success Rate

a) Immediate messaging success rate

b) This KPI describes the ratio of the number of successful immediate messaging procedures to the number of attempted immediate messaging procedures for IMS network and is used to evaluate accessibility performance provided by IMS and network performance.

c) This KPI is obtained by the number of successful immediate messaging procedures divided by the number of attempted immediate messaging procedures.

d) $$\text{IMSR} = \frac{\text{SC.SuccImMsg}}{\text{SC.AttImMsg}} \times 100\%$$

e) SC.AttImMsg
SC.SuccImMsg
(See in 3GPP TS 32.409 [2])

f) IMS

g) Accessibility

h) Percentage

i) RATIO

5.1.9 Session Establishment Network Success Rate

a) Session Establishment Network Success Rate

b) This KPI describes the ratio of the sum of number of successful session establishment and the number of failed session establishment due to user"s behaviour factors to the number of attempted session establishment distinguished by originating side and terminating side for IMS network and is used to evaluate accessibility performance provided by IMS network.
If it is calculated by I-CSCF, it includes the successful rate of terminating session establishment of the own subscribers and the outbound roamers.
If it is calculated by P-CSCF, it includes the successful rate of terminating session establishment of the own subscribers and the inbound roamers.

c) This KPI is obtained by the sum of the number of successful session establishments and the number of failed session establishment due to user behaviour factors divided by the number of attempted session establishments for originating side and terminating side respectively for IMS.

d)

SENSR_Orig =

$$\frac{\text{SC.SuccSessionOrig.sum} + \text{SC.RelBeforeRingOrig} + \text{SC.FailSessionOrig.486} + \text{SC.FailSessionOrig.600} + \text{SC.FailSessionOrig.404} + \text{SC.FailSessionOrig.484}}{\text{SC.AttSessionOrig}}$$

SENSR_Term =

$$\frac{\text{SC.SuccSessionTerm.sum} + \text{SC.RelBeforeRingTerm} + \text{SC.FailSessionTerm.486} + \text{SC.FailSessionTerm.600} + \text{SC.FailSessionTerm.404} + \text{SC.FailSessionTerm.484}}{\text{SC.AttSessionTerm}}$$

e) SC.AttSessionOrig

SC.SuccSessionOrig.*sum*

SC.RelBeforeRingOrig

SC.FailSessionOrig.486

SC.FailSessionOrig.600

SC.FailSessionOrig.404

SC.FailSessionOrig.484

SC.AttSessionTerm

SC.SuccSessionTerm.*sum*

SC.RelBeforeRingTerm

SC.FailSessionTerm.486

SC.FailSessionTerm.600

SC.FailSessionTerm.404

SC.FailSessionTerm.484

(See in 3GPP TS 32.409 [2])

f) IMS

g) Accessibility

h) Percentage

i) RATIO

5.2 Retainability KPI

5.2.1 Call Drop Rate of IMS Sessions

a) Call drop rate of IMS sessions

b) This KPI describes the ratio of number of dropped sessions to the number of successful session establishments and is used to evaluate retainability for IMS.

c) This KPI is obtained by the number of dropped sessions divided by the number of successful session establishments.

d) $$\text{SEDR} = \frac{\text{SC.DroppedSession}}{\sum_{type} \text{SC.SuccSession.}type}$$

e) SC.DroppedSession
SC.SuccSession.*type* type: SIP_180, SIP_200_OK.
(See in 3GPP TS 32.409 [2])

f) IMS

g) Retainability

h) Percentage

i) RATIO

5.3 Utilization KPI

5.3.1 Mean Session Utilization

a) Mean simultaneous online and answered sessions utilization

b) This KPI describes the ratio of the mean number of simultaneous online and answered sessions to the maximum number of sessions provided by IMS network, and it is used to evaluate utilization performance of IMS network.

c) This KPI is obtained by the mean number of simultaneous online and answered sessions divided by the system capacity.

d) $MSU = \frac{SC.NbrSimulAnsSessionMean}{Capacity} \times 100\%$

e) SC.NbrSimulAnsSessionMean (See in 3GPP TS 32.409 [2])
Capacity indicates maximum number of sessions provided by IMS node.

Editor notes: Capacity definition is FFS.

f) IMS

g) Utilization

h) Percentage

i) RATIO

Annex A (informative): Use case for KPIs

A.1 Use case for initial registration success rate of S-CSCF related KPI

It is useful to evaluate accessibility performance provided by IMS and network performance. This KPI is helpful to learn the user registration status. This KPI is focusing on network and user view.

A.2 Use case for session setup time (mean) related KPI

It is necessary to evaluate accessibility performance provided by IMS and network performance. This KPI can influence the users" satisfaction directly and reflect network transaction performance. This KPI is focusing on network and user view.

A.3 Use case for session establishment success rate related KPI

It is necessary to evaluate the session establishment performance provided by IMS including user behaviour factors. This KPI is focusing on network and user view. It is necessary to define session establishment success rate (SESR) with differentiating originating and terminating, otherwise when the operator wants to consider SESR from whole IMS network perspective, the value of SESR will be much bigger than real situation due to one success session being counted twice (both at originating side and terminating side).

A.4 Use case for third party registration success rate related KPI

It is useful to evaluate accessibility performance provided by IMS and network performance. Third Party Registration is the process of S-CSCF to inform the Application Server (AS) about the user"s registration status and it is a necessary procedure to perform services involving AS. This KPI (Third Party Registration Success Rate) is defined to fulfil the need of the operator to evaluate the service and network accessibility performance. This KPI is focusing on network and user view.

A.5 Use case for re-registration success rate of S-CSCF related KPI

Periodic application level re-registration is initiated by the UE either to refresh an existing registration or in response to a change in the registration status of the UE. A re-registration procedure can also be initiated when the capabilities of the UE have changed or the IP CAN has changed [3GPP TS 23.228]. This KPI is useful for evaluate accessibility of the IMS network, including the user behaviour factors. This KPI is helpful to learn the user"s re-registration status. This KPI is focusing on network and user view.

A.6 Use case for call drop rate of IMS sessions related KPI

It is necessary to evaluate retainability performance of IMS including user causes, as well as IMS reliability and stability should be reflected. This KPI is focusing on network view.

A.7 Use case for session set-up time originated from CS and IMS related KPI

When IMS operator provides transit functionality to other network operators, in this case the operator is serving as an IMS session based routing backbone for a PSTN operator or another IP network and provides connectivity to both PSTN and IP endpoints. So it is necessary to define session set-up time originated from CS and IMS KPI to indicate accessibility performance of IMS network for other networks, also it is useful for other network operators to do trouble shooting.

This KPI is focusing on network and user view.

A.8 Use case for mean session utilization related KPI

The mean number of simultaneous online and answered sessions together with maximum number of sessions provided by IMS network can reflect system resource utilization. If the value of this KPI is very high, it indicates system capacity is not enough, and needs to be increased.

This KPI is focusing on network view.

A.9 Use case for immediate messaging success rate related KPI

With Immediate messaging the sender expects immediate message delivery in what is perceived as real time. Immediate messaging allows the exchange of any type of multimedia content, now the immediate messaging services are widely used both in the wired and wireless environment. If the immediate messaging success rate is very low, it will impact on the satisfactory of user and service providers. So it is necessary to evaluate immediate messaging success rate performance provided by IMS.

This KPI is focusing on network and user view.

A.10 Use case of the session establishment network success rate related KPI

Sometimes unsuccessful session establishment is caused by user's own behaviour which has nothing to do with network performance. Therefore the user behaviour factors should be excluded to evaluate the real network session establishment success rate. This KPI is focusing on network view different from the KPI, session establishment success rate. Therefore the measurements on the number of release before ringing, UE not found, UE address incomplete and UE busy should be excluded from the failed measurements. This KPI is helpful to evaluate the real network session establishment success rate.

Annex B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Dec 2010	SP-50	SP-100765			Submitted to SA#50 for Information	0.4.1	1.0.0
Mar 2011	SP-51	SP-110116	--	--	Submitted to SA#51 for Approval	1.2.0	2.0.0
Mar 2011	--	--	--	--	Publication	2.0.0	10.0.0
Dec 2011	SP-54	SP-110714	001	2	Add the session establishment network success rate related KPI	10.0.0	11.0.0
2014-10	-	-	-	-	Update to Rel-12 version (MCC)	11.0.0	**12.0.0**
2016-01	-	-	-	-	Update to Rel-13 version (MCC)	12.0.0	**13.0.0**

History

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