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MTAS Signaling Traffic Performance Indicators

Abstract

This document covers MTAS signaling traffic performance indicators intended for PM reports supporting IMS.

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1 Revision history

Rev.	Date	Responsible	Description
PA1	2015-11-03	XANGTAN	New document for MTAS 4.0 (3/154 43-AVA 901 09/9 Uen)
A	2015-11-03	XANGTAN	New document for MTAS 4.0

2 Introduction

2.1 Purpose

This document defines performance measures and formulas (KPI:s and PI:s) mainly for signaling traffic, based on available counters in MTAS with the intention to support the making of PM reports for IMS performance management.

2.2 Scope

Performance management is the process to produce, transfer, collect, store and present data, which can be used to verify the physical and logical configuration of the network and to locate potential problems as early as possible. The performance indicators specified in this document has the purpose to enable verification of the applied signalling traffic model in the deployed network, supervise the resource utilization and capacity indicators for licensing.

The following performance management areas are supported:

- Licensing based on capacity parameters. Performance Indicators for monitoring of capacity based licenses.
- Resource utilization; CPU, Memory and Disk utilization
- Signaling traffic; Signaling traffic performance indicators and formulas are reported to support the dimensioning process, according to the Ericsson default traffic model for IMS

This document covers Multi Media Telephony (MMTel) services.

2.3 General information

2.3.1 Formula naming

General information about formulas, for example:

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Equation 1. IMS Registration Set-up Success Ratio

$$IMSRegSetupSuccRatio = \frac{cscfAcceptedRegistrations}{cscfAcceptedRegistrations + cscfRejectedRegistrations}$$

Equation name, in this case IMS Registration Set-up Success Ratio, is used as label for the in KPI presentation and therefore needs to be unique.

The formula end result, in this case *IMSRegSetupSuccRatio* is not presented and used as placeholder in the formula.

2.3.2 Service and node availability

The accessibility formulas in this document cover the accessibility of a system service as such. If the complete accessibility with the node availability is considered, then the system service accessibility shall be multiplied with the availability of the node.

Example:

$$IMSRegSuccRatio_{Total} = IMSRegSuccRatio * nodeAvailability$$

2.3.3 Aggregation on system level

The node measurements are delivered on a per node basis. The performance indicators have an interest both on node level and system level. It is not stated in the formulas whether they cover node or system level, it is an assumption that both levels are available in a PM report package.

2.3.4 Trend analysis

The performance indicators and formulas specified in this document are mainly intended for trend analysis. Due to the nature of the the subnetwork manager performance manager application collection, storage and presentation mechanisms, real time graphs are not supported.

2.3.5 Busy hour performance indicators

The busy hour performance indicators are calculated from measurements reported per granularity period over a one hour sliding window, obtaining the busy hour values. The busy hour calculation is not indicated in the formulas, it is assumed to be a generic function of the subnetwork manager performance manager application.

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2.3.6 General for formulas on intensities

In this document, formulas on intensities, meaning events per time unit are generally expressed as events per second or in some few cases, events per hour. A reporting tool may select any time resolution, where events per second and events per hour are the most prioritized.

2.3.7 Formula and measurement names and the formula editor

The formula editor used for this document uses presentation conventions in formula and measurement names that introduce possible confusions. Reserved function names, for example $\tan()$, Re is presented with a specific format also for formula and measurement names. These function presentations shall be neglected. Example, the formula name IMSRegSuccRatio is presented as *IMS Re gSuccRatio*. The intended formula name is IMSRegSuccRatio.

3 Licensing

This chapter specifies the performance indicators supporting capacity licensing options in MTAS.

3.1 MTAS Capacity

The MTAS capacity license is based on the number of active simultaneous MMTel sessions. The license limit is reached when the MMTel traffic exceeds the license limit continuously for 30 minutes. When the MTAS license limit is reached a capacity alarm is sent and the excess traffic is rejected.

3.1.1 Formula

Equation 1. IMS MTAS Sessions

$$\text{IMSMTASActiveUsers} = \text{MtasFuncOngoingSess}$$

IMSMTASActiveUsers is the current number of active users on node level. The indicator is the maximum value in a 30 minutes sliding window. The measurement is reported per granularity period over a 30 minutes sliding window, obtaining the 30 minutes value, see also section 2.3.5, Busy hour performance indicators.

Equation 2. IMS MTAS Mobile Service Sessions

$$\text{IMSMTASMobileSess} = \text{MtasFuncOngoingMobileSess}$$

IMSMTASMobileSess is the current number of simultaneous mobile service sessions (half calls) on node level. The measurement is reported per granularity period over a 30 minutes sliding window, obtaining the 30 minutes value, see also section 2.3.5, Busy hour performance indicators.

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Equation 3. IMS MTAS FCD Sessions

$$IMSMTASFcdSess = MtasFcdOngoingSessions$$

IMSMTASFcdSess is the current number of simultaneous Flexible Communication Distribution (FCD) service sessions (half calls) on node level. The measurement is reported per granularity period over a 30 minutes sliding window, obtaining the 30 minutes value, see also section 2.3.5, Busy hour performance indicators.

Equation 4. IMS MTAS Number of Conference Participants

$$IMSMTASConfParticipants = MtasConfParticipants$$

IMSMTASConfParticipants contains the number of conference participants involved in conferences with 4 or more participants.

Counter Name	Definition
MtasFuncOngoingSess	The current number of active users on node level. Counter on MTAS node.
MtasFuncOngoingMobileSess	The current number of simultaneous Mobile Services sessions (half calls) on node level. Counter on MTAS node.
MtasFcdOngoingSessions	Counter for the number of ongoing Flexible Communication Distribution (FCD) Service Sessions. Counter on MTAS node.
MtasConfParticipants	Contains the number of conference participants involved in conferences with 4 or more participants. Counter on MTAS node.

Reference [1].

4 Signaling Traffic Performance Indicators

This chapter covers signaling traffic Performance Indicators supporting the dimensioning and capacity planning of the IMS. Signaling traffic Performance Indicators are listed at node level. The formulas in this chapter are all assumed to be reported per busy hour.

4.1 MTAS

Performance indicators at MTAS node level supporting the dimensioning and capacity planning of the MTAS node. The MMTel signalling traffic model is used for the selection of performance indicators. This chapter is structured according to two sections; the MMTel Use Cases and MMTel Interface Summary, where the protocol level is covered.

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4.1.1 MMTel Use Cases

T = measured/reported time in seconds

4.1.1.1 Registration procedure

Equation 5. IMS MTAS Initial Registrations [per second]

$$IMSMTASInitial\ Registrations = \left(\frac{MtasSubsDataInitialRegOk + MtasSubsDataAutoRegOk}{T} \right)$$

Equation 6. IMS MTAS Re-registration [per second]

$$IMSMTAS\ Re\ Registrations = \left(\frac{MtasSubsDataReregOk}{T} \right)$$

Equation 7. IMS MTAS De-registration [per second]

$$IMSMTASDe\ Registrations = \left(\frac{MtasSubsDataDeregOk}{T} \right)$$

Counter Name	Definition
Registration Procedures	
MtasSubsDataInitialRegOk	The number of initial registration procedures that were completed successfully. Counter on MTAS node.
MtasSubsDataAutoRegOk	The number of automatically performed registrations that were completed successfully. Counter on MTAS node.
MtasSubsDataReregOk	The number of reregistration procedures that were completed successfully. Counter on MTAS node.
MtasSubsDataDeregOk	The number of deregistration procedures that were completed successfully. Counter on MTAS node.

Reference [1].

4.1.1.2 Sh reference point

Equation 8. IMS MMTel AS Notification of change [per second]

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$$IMSMMTelASNotifChange = \left(\frac{MtasShNotifOk}{T} \right)$$

Equation 9. IMS MMTel AS Update User conf data [per second]

$$IMSMMTelASUpdateUserConfData = \left(\frac{MtasShUpdateOk}{T} \right)$$

MtasShPullOk

Equation 10. IMS MMTel AS Pull User conf data [per second]

$$IMSMMTelASPullUserConfData = \left(\frac{MtasShPullOk}{T} \right)$$

Equation 11. IMS MMTel AS Sh-Subs-Notif operations [per second]

$$IMSMMTelASSubsNotif = \left(\frac{MtasShSubsNotifOk}{T} \right)$$

Counter Name	Definition
Sh reference point	
MtasShNotifOk	The number of Sh-Notif requests that were processed successfully. The counter is keyed on the Stack instance and either HSS destination host name (taken from the Request message) or HSS origin host name (taken from the Answer message). The format: <Stack_instance>;<Destination_Host> or <Stack_instance>;<Origin-Host>. Counter on MTAS node.
MtasShUpdateOk	The number of Sh-Update operations that were completed successfully. The counter is keyed on the Stack instance and either HSS destination host name (taken from the Request message) or HSS origin host name (taken from the Answer message). The format: <Stack_instance>;<Destination_Host> or <Stack_instance>;<Origin-Host>. Counter on MTAS node.

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Counter Name	Definition
MtasShPullOk	The number of Sh-Pull operations that were completed successfully. The counter is keyed on the Stack instance and either HSS destination host name (taken from the Request message) or HSS origin host name (taken from the Answer message). The format: <Stack_instance>;<Destination_Host> or <Stack_instance>;<Origin-Host>. Counter on MTAS node.
MtasShSubsNotifOk	The number of Sh-Subs-Notif operations that were completed successfully. The counter is keyed on the Stack instance and either HSS destination host name (taken from the Request message) or HSS origin host name (taken from the Answer message). The format: <Stack_instance>;<Destination_Host> or <Stack_instance>;<Origin-Host>. Counter on MTAS node.

Reference [1].

4.1.1.3 CAI3G provisioning

Equation 12. IMS MTAS Update User conf data (MTAS-CAI3G) [per second]

$$IMSMTASUpdateUserConfDataCAI3G = \left(\frac{MtasXdmsCai3gSetOk}{T} \right)$$

Equation 13. IMS MTAS Add User conf data (MTAS-CAI3G) [per second]

$$IMSMTASAddUserConfDataCAI3G = \left(\frac{MtasXdmsCai3gCreateOk}{T} \right)$$

Equation 14. IMS MTAS Delete User conf data (MTAS-CAI3G) [per second]

$$IMSMTASDeleteUserConfDataCAI3G = \left(\frac{MtasXdmsCai3gDeleteOk}{T} \right)$$

Equation 15. IMS MTAS Read User conf data (MTAS-CAI3G) [per second]

$$IMSMTASReadUserConfDataCAI3G = \left(\frac{MtasXdmsCai3gGetOk}{T} \right)$$

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Counter Name	Definition
CAI3G provisiong	
MtasXdmsCai3gSetOk	Contains the number of provisioning CAI3G Set requests that resulted in a successful response. The counter is keyed on the IP address of CAI3G Manager. Counter on MTAS node.
MtasXdmsCai3gCreateOk	Contains the number of provisioning CAI3G Create requests that resulted in a successful response. The counter is keyed on the IP address of CAI3G Manager. Counter on MTAS node.
MtasXdmsCai3gDeleteOk	Contains the number of CAI3G Delete requests that resulted in a successful response. Counter on MTAS node.
MtasXdmsCai3gGetOk	Contains the number of CAI3G Get requests that resulted in a successful response. Counter on MTAS node.

Reference [1].

4.1.1.4 Session procedures (QoS)

Equation 16. IMS MMTel AS Originating Session Set-up Attempts [per second]

$$IMSMMTelASOrgSessSetupAtt = \frac{(MtasFuncInitOrigSessOk + MtasFuncInitOrigSessNokI + MtasFuncInitOrigSessNokE)}{T}$$

Equation 17. IMS MMTel AS Terminating Session Set-up Attempts [per second]

$$IMSMMTelASTermSessSetupAtt = \frac{(MtasFuncInitTermSessOk + MtasFuncInitTermSessNokI + MtasFuncInitTermSessNokE)}{T}$$

Equation 18. IMS MMTel AS Unregistered Originating Session Set-up Attempts[per second]

$$IMSMMTelASUnregSessSetupAtt = \frac{(MtasFuncInitOrigUnregSessOk + MtasFuncInitOrigUnregSessNokI + MtasFuncInitOrigUnregSessNokE)}{T}$$

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Equation 19. IMS MMTel AS Unregistered Terminating Session Set-up Attempts[per second]

$$\text{IMSMMTelASUnregTermSessSetupAtt} = \frac{(\text{MtasFuncInitTermUnregSessOk} + \text{MtasFuncInitTermSessNOkI} + \text{MtasFuncInitTermSessNOkE})}{T}$$

Equation 20. IMS MMTel AS Unanswered Call Originating AS [per second]

$$\text{IMSMMTelASUnansweredCallOrigAS} = \frac{(\text{MtasMmtOrigFailedAttemptCause}(\text{key} : 486) + \text{MtasMmtOrigUnregFailedAttemptCause}(\text{key} : 486) + \text{MtasMmtOrigFailedAttemptCause}(\text{key} : 408) + \text{MtasMmtOrigUnregFailedAttemptCause}(\text{key} : 408))}{T}$$

The IMSMMTelASUnansweredCallOrigAS is the sum of registered and un-registered originating call attempts which got 486, Busy Here and 408 Request Timeout (No Reply) response codes.

Equation 21. IMS MMTel AS Unanswered Call Terminating AS [per second]

$$\text{IMSMMTelASUnansweredCallTermAS} = \frac{(\text{MtasMmtTermFailedAttemptCause}(\text{key} : 486) + \text{MtasMmtTermUnregFailedAttemptCause}(\text{key} : 486) + \text{MtasMmtTermFailedAttemptCause}(\text{key} : 408) + \text{MtasMmtTermUnregFailedAttemptCause}(\text{key} : 408))}{T}$$

The IMSMMTelASUnansweredCallTermAS is the sum of registered and un-registered terminating call attempts which got 486, Busy Here and 408 Request Timeout (No Reply) response codes.

Equation 22. IMS ST AS Originating Session Set-up Attempts [per second]

$$\text{IMSSTASOrgSessSetupAttempts} = \frac{(\text{MtasStOrigSuccAttempt} + \text{MtasStOrigFailedAttempt})}{T}$$

Equation 23. IMS ST AS Terminating Session Set-up Attempts [per second]

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$$IMSSTASTermSessSetupAttempts = \frac{(MtasStTermSuccAttempt + MtasStTermFailedAttempt)}{T}$$

Counter Name	Definition
Session procedures	
MtasFuncInitOrigSessOk	The accumulated number of session attempts, in the originating MTAS, which was either answered, not answered or was rejected by a service due to operator or user configuration. Counter on MTAS node.
MtasFuncInitOrigSessNOkl	The accumulated number of session attempts, in the originating MTAS, which did not become stable due to node internal reasons. The counter is incremented by 1 if the INVITE was rejected due to processor, memory shortage or by other node internal reason. Counter on MTAS node.
MtasFuncInitOrigSessNOKE	The accumulated number of session attempts, in the originating MTAS, which did not become stable due to node external reasons. The counter is incremented by 1 in the originating MTAS, if the INVITE-ACK transaction did not conclude successfully or receiving a 4xx, 5xx, or 6xx as the final response, or any signaling transactions to external nodes failed or timed out and the configuration of the MTAS required the interaction with the external node to be successful in order to proceed the session. The counter will only be stepped for one of the reasons (once, that is) for a particular session setup. Counter on MTAS node.
MtasFuncInitTermSessOk	The accumulated number of session attempts, in the terminating MTAS, which was either answered, not answered or was rejected by a service due to operator or user configuration. Counter on MTAS node.
MtasFuncInitTermSessNOkl	The accumulated number of session attempts, in the terminating MTAS, which was rejected due to node internal reasons. The counter is incremented by 1 if the INVITE was rejected due to processor, memory shortage or by other node internal reason Counter on MTAS node.

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Counter Name	Definition
MtasFuncInitTermSessNOkE	The accumulated number of session attempts, in the terminating MTAS, which was rejected due to node external reasons. The counter is incremented by 1 in the terminating MTAS if; the INVITE-ACK transaction did not conclude successfully or any signaling transactions to external nodes failed or timed out and the configuration of the MTAS required the interaction with the external node to be successful in order to proceed the session. The counter will only be stepped for one of the reasons (once, that is) for a particular session setup. Counter on MTAS node.
MtasFuncInitOrigUnregSessOk	The total number of call attempts, in the originating MTAS from an unregistered user, which were either answered, not answered or were rejected by a service due to operator or user configuration. Incremented by 1 in the originating MTAS when the INVITE-ACK transaction has concluded after receiving the final response or when the INVITE was rejected by a service due to operator or user configuration. Counter on MTAS node.
MtasFuncInitOrigUnregSessNOkI	The total number of call attempts, in originating MTAS from an unregistered user, which were rejected due to node internal reasons. The counter is incremented by 1 if the INVITE was rejected due to processor, memory shortage or by other node internal reason. Counter on MTAS node.
MtasFuncInitOrigUnregSessNOkE	The total number of call attempts, in originating unregistered MTAS, which were rejected due to node external reasons. Incremented by 1 in originating MTAS if; The INVITE-ACK transaction did not conclude successfully or any signaling transactions towards external nodes failed or timed out and the configuration of MTAS required the interaction with the external node to be successful in order to proceed the call. The counter will only be stepped for one of the reasons (i.e. once) for a particular call setup. Counter on MTAS node.
MtasFuncInitTermUnregSessOk	The accumulated number of session attempts, in the terminating MTAS, to an unregistered Public User Identity (PUI), which was either answered, not answered, or was rejected by a service due to operator or user configuration. Counter on MTAS node.

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Counter Name	Definition
MtasFuncInitTermSessNOkl	The accumulated number of session attempts, in the terminating MTAS, which was rejected due to node internal reasons. The counter is incremented by 1 if the INVITE was rejected due to processor, memory shortage or by other node internal reason. Counter on MTAS node.
MtasFuncInitTermSessNOkE	The accumulated number of session attempts, in the terminating MTAS, which was rejected due to node external reasons. The counter is incremented by 1 in the terminating MTAS if; the INVITE-ACK transaction did not conclude successfully or any signaling transactions to external nodes failed or timed out and the configuration of the MTAS required the interaction with the external node to be successful in order to proceed the session. The counter will only be stepped for one of the reasons (once, that is) for a particular session setup. Counter on MTAS node.
MtasMmtOrigFailedAttemptCause	The accumulated number of failed MMTel INVITEs, counted by the originating MTAS. The cause code and reason is used as key. Counter on MTAS node.
MtasMmtOrigUnregFailedAttemptCause	Number of received 3xx/4xx/5xx/6xx messages, by the originating unregistered MTAS. The counter is keyed with Status-code from 3xx-6xx response and Reason phrase. Counter on MTAS node.
MtasMmtTermFailedAttemptCause	The accumulated number of failed MMTel INVITEs made to registered PUIs, counted by the terminating MTAS. The cause code and reason is used as key. Counter on MTAS node.
MtasMmtTermUnregFailedAttemptCause	The accumulated number of failed MMTel INVITEs made to unregistered PUIs, counted by the terminating MTAS. The cause code and reason is used as key. Counter on MTAS node.
MtasStOrigSuccAttempt	The number of INVITEs successfully sent, counted by the originating ST AS. The counter is incremented when receiving the 180 Ringing message or when receiving the 200 OK message if no 180 Ringing message has been received. Counter on MTAS node.
MtasStOrigFailedAttempt	Counters for counting the total number of received 3xx/4xx/5xx/6xx messages in originating ST AS. Counter on MTAS node.

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Counter Name	Definition
MtasStTermSuccAttempt	The number of INVITEs successfully sent, counted by the terminating ST AS. The counter is incremented when receiving the 180 Ringing message or when receiving the 200 OK message if no 180 Ringing message has been received. Counter on MTAS node.
MtasStTermFailedAttempt	Counters for counting the total number of received 3xx/4xx/5xx/6xx messages in terminating ST AS. Counter on MTAS node.

Reference [1].

4.1.1.5 Communication Diversion

Equation 24. IMS MMTel AS Communication Diversions [per second]

$$IMSMMTelASCallUnregUserTermAS = \left(\frac{MtasCDivNumberOfCdivOk}{T} \right)$$

Counter Name	Definition
Communication Diversion	
MtasCDivNumberOfCdivOk	A performance measurement (PM) counter that is incremented each time Communication Diversion (CDiv) successfully establishes communication following diversion of an incoming communication. There is one counter for the entire node. The counter is keyed by type of diversion: CFU, CFB, CFNR, CFNL, CDar, CDwr, CFNRc, DNDCF. Counter on MTAS node.

Reference [1].

4.1.1.6 Communication Barring

Equation 25. IMS MMTel AS Outgoing Communication Barring (OCB) [per second]

$$IMSMMTelASOutCommBarred = \left(\frac{MtasCBOCBBarred}{T} \right)$$

Equation 26. IMS MMTel AS Incoming Communication Barring (ICB) [per second]

$$IMSMMTelASInCommBarred = \left(\frac{MtasCBICBBarred}{T} \right)$$

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Equation 27. IMS MMTel AS Outgoing Communication Barring Media (OCB) [per second]

$$IMSMMTelASOutCommBarredMedia = \left(\frac{MtasCBOCBBarredMedia}{T} \right)$$

Equation 28. IMS MMTel AS Incoming Communication Barring Media (ICB) [per second]

$$IMSMMTelASInCommBarredMedia = \left(\frac{MtasCBICBBarredMedia}{T} \right)$$

Counter Name	Definition
Communication Barring	
MtasCBOCBBarred	The number of barred outgoing communications. Counter on MTAS node.
MtasCBICBBarred	A performance measurement (PM) counter that is incremented each time Incoming Communication Barring (ICB) successfully bars an incoming communication. There is one counter for the entire node. In the case where Do Not Disturb Communication Barring (DNDCB) successfully bars an incoming communication, this counter is incremented by 1 and is keyed with "DNDCB". Counter on MTAS node.
MtasCBICBBarredMedia	A performance measurement (PM) counter that is incremented when Communication Barring service successfully bars a Media Renegotiation due to ICB rules. The counter is keyed with the name of the SIP event that trigger Communication Barring service in those cases when charging event is generated. This includes INVITE, UPDATE and RR (reliable response) on an established session. The PM is incremented without a key for scenarios with Communication Barring on early session - scenarios that do not generate charging events. There is one counter for the entire node. The counter is incremented when Communication Barring service blocks Media Renegotiation in UPDATE or re-INVITE on early or confirmed sessions. The counter is also incremented when Communication Barring service blocks individual media streams in SDP offers in reliable responses.

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Counter Name	Definition
MtasCBOCBBarredMedia	<p>A performance measurement (PM) counter that is incremented when Communication Barring service successfully bars a Media Renegotiation due to OCB rules. The counter is keyed with the name of the SIP event that triggered Communication Barring service in those cases when charging event is generated. This includes INVITE, UPDATE and RR (reliable response) on an established session. The PM is incremented without a key for scenarios with Communication Barring on early session - scenarios that do not generate charging events. There is one counter for the entire node.</p> <p>The counter is incremented when Communication Barring service blocks Media Renegotiation in UPDATE or re-INVITE on early or confirmed sessions. The counter is also incremented when Communication Barring service blocks individual media streams in SDP offers in reliable responses.</p>

Reference [1].

4.1.1.7 Service Settings via Feature Access Codes

Equation 29. IMS MMTel AS Settings via Feature Access Codes [per second]

$$\begin{aligned}
 &IMSMMTelASSettingsFeatAccCodes = \\
 &\frac{\sum_{\text{Codem}} (\text{MtasSSCodesActxxxOk} + \text{MtasSSCodesDeactxxxOk} + \text{MtasSSCodesIntxxxOk})}{T}
 \end{aligned}$$

Reference: MTAS Performance Measurements, 1/1553-AVA 90109/, ref. [1].

4.1.1.8 Supplementary Service Code (SSC) Invocations

Equation 30. IMS MMTel AS Supplementary Service Code Invocation [per second]

$$\begin{aligned}
 &IMSMMTelASSSCInvocations = \\
 &\frac{(\text{MtasGenSscInvOk} + \text{MtasGenSscInvNOkE} + \text{MtasGenSscInvNOkI})}{T}
 \end{aligned}$$

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Counter Name	Definition
MtasGenSscInvOk	The number of successful invocations for Generic SSC service. Counter on MTAS node.
MtasGenSscInvNOkE	The number of invocations failed for Generic SSC service due to error in interworking node. Counter on MTAS node.
MtasGenSscInvNOkI	The number of invocations failed for Generic SSC service due to internal MTAS fault. Counter on MTAS node.

Reference [1].

4.1.1.9 Abbreviated Dialing Function

Equation 31. IMS MMTel AS Abbreviated Dialing Function Invocations [per second]

$$\frac{IMSMMTelASAbbrDialFuncInvocations}{T} = (MtasAbDialOk + MtasAbDialNOk)$$

Counter Name	Definition
Abbreviated Dialing Function	
MtasAbDialOk	The total number of successful invocation of the Abbreviated Dialing function. Counter on MTAS node.
MtasAbDialNOk	The total number of unsuccessful invocation of the Abbreviated Dialing function. Counter on MTAS node.

Reference [1].

4.1.1.10 Conference Service

Equation 32. IMS MMTel AS Conference Service Invocations [per second]

$$\frac{IMSMMTelASConfServInvocations}{T} = (MtasConfCreationOk + MtasConfDialOutOk)$$

Counter Name	Definition
Conference Service	

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Counter Name	Definition
MtasConfCreationOk	The number of successfully created conference sessions. Counter on MTAS node.
MtasConfDialOutOk	The number of successfully joined conference participants through dial-out. Counter on MTAS node.

Reference [1].

4.1.1.11 Stream Service

Equation 33. IMS MMTel AS Audio Stream operations [per second]

$$IMSMMTelASAudioStreams = \frac{(\text{MtasMmtAudioStreamSetup} + \text{MtasMmtAudioStreamAdded} + \text{MtasMmtAudioStreamDropped})}{T}$$

Equation 34. IMS MMTel AS Video Stream operations [per second]

$$IMSMMTelASVideoStreams = \frac{(\text{MtasMmtVideoStreamSetup} + \text{MtasMmtVideoStreamAdded} + \text{MtasMmtVideoStreamDropped})}{T}$$

Equation 35. IMS MMTel AS Fax Stream operations [per second]

$$IMSMMTelASFaxStreams = \frac{(\text{MtasMmtFaxStreamSetup} + \text{MtasMmtFaxStreamAdded} + \text{MtasMmtFaxStreamDropped})}{T}$$

Equation 36. IMS MMTel AS Message Stream operations [per second]

$$IMSMMTelASMessageStreams = \frac{(\text{MtasMmtMessageStreamSetup} + \text{MtasMmtMessageStreamAdded} + \text{MtasMmtMessageStreamDropped})}{T}$$

Equation 37. IMS MMTel AS Real-time Text operations [per second]

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$$\begin{aligned}
 &IMSMMTelAS Re altimeText = \\
 & (MtasMmtTextStreamSetup + MtasMmtTextStreamAdded + \\
 & MtasMmtTextStreamDropped) \\
 & \quad \quad \quad T
 \end{aligned}$$

Counter Name	Definition
Stream Service	
MtasMmtAudioStreamSetup	The number of initial audio streams. Counter on MTAS node.
MtasMmtAudioStreamAdded	The number of added audio streams after initial setup. Counter on MTAS node.
MtasMmtAudioStreamDropped	The number of dropped audio streams after initial setup. Counter on MTAS node
MtasMmtVideoStreamSetup	The number of initial video streams. Counter on MTAS node.
MtasMmtVideoStreamAdded	The number of added video streams after the initial setup. Counter on MTAS node.
MtasMmtVideoStreamDropped	The number of dropped video streams after the initial setup. Counter on MTAS node
MtasMmtFaxStreamSetup	The number of initial fax streams. Counter on MTAS node.
MtasMmtFaxStreamAdded	The number of added fax streams after the initial setup. Counter on MTAS node.
MtasMmtFaxStreamDropped	The number of dropped fax streams after the initial setup. Counter on MTAS node
MtasMmtMessageStreamSetup	The number of initial message streams. Counter on MTAS node.
MtasMmtMessageStreamAdded	The number of added message streams after initial setup. Counter on MTAS node.
MtasMmtMessageStreamDropped	The number of dropped message streams after initial setup. Counter on MTAS node
MtasMmtTextStreamSetup	The number of initial text streams. Counter on MTAS node.
MtasMmtTextStreamAdded	The number of added text streams after initial setup. Counter on MTAS node.
MtasMmtTextStreamDropped	The number of dropped text streams after initial setup. Counter on MTAS node.

Reference [1].

4.1.1.12 Hold/Resume

Equation 38. IMS MMTel AS Hold/Resume Operations [per second]

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$$\text{IMSMMTelASHold ResumeOperations} = \frac{(\text{MtasHoldInitiatedHold} + \text{MtasHoldInitiatedResume})}{T}$$

Counter Name	Definition
Hold/Resume	
MtasHoldInitiatedHold	The number of initiated Hold in the MTAS for invoking UA. Counter on MTAS node.
MtasHoldInitiatedResume	The number of initiated Resumes in the MTAS for invoking UA. Counter on MTAS node.

Reference [1].

4.1.1.13 AS Interworking

Equation 39. IMS MMTel AS Interworking Invocations [per second]

$$\text{IMSMMTelASASIWInvocations} = \frac{(\text{MtasAsIwDivInvRec} + \text{MtasAsIwInvRecHistAdd} + \text{MtasAsInvSentDivAdd})}{T}$$

Counter Name	Definition
AS Interworking	
MtasAsIwDivInvRec	Counts the total number of INVITE requests received which contain Diversion headers. This counter is incremented regardless of the value of mtasAsIwAdministrativeState. Counter on MTAS node.
MtasAsIwInvRecHistAdd	Counts the total number of INVITE Requests received which contain Diversion headers for which History-Info header entries have been created. Counter on MTAS node.
MtasAsInvSentDivAdd	Counts the total number of INVITE Requests sent which contain History-Info header entries for which Diversion headers have been created. Counter on MTAS node.

Reference [1].

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4.1.1.14 Identity Presentations and Identity Presentation Restrictions

Equation 40. IMS MMTel AS Calling Name Identification Presentation (CNIP) Services [per second]

$$IMSMMTelASCNIP = \frac{(MtasIdPresCnip)}{T}$$

Equation 41. IMS MMTel AS Originating CNIP Successful Invocations [per second]

$$IMSMMTelASSuccOrgCNIP = \frac{MtasIdPresOCnip}{T}$$

Equation 42. IMS MMTel AS CNIP Present Callers Name [per second]

$$IMSMMTelASCNIP PresentName = \frac{MtasIdPresCnipPresentName}{T}$$

Equation 43. IMS MMTel AS CNIP Restrict Callers Name [per second]

$$IMSMMTelASCNIP Restrictname = \frac{MtasIdPresCnipRestrictName}{T}$$

Equation 44. IMS MMTel AS Originating Identity Presentations (OIP) [per second]

$$IMSMMTelASOIP Pres = \frac{(MtasIdPresOip + MtasIdPresOirOverride)}{T}$$

Equation 45. IMS MMTel AS Originating Identity Presentation (OIP) Restrictions [per second]

$$IMSMMTelASOIP Pres Restricted = \frac{(MtasIdPresOipIdRestAll + MtasIdPresOipIdRestSome)}{T}$$

Equation 46. IMS MMTel AS Originating Identity Restriction (OIR) Presentation Enabled [per second]

$$IMSMMTelASOIR PresEnabled = \frac{(MtasIdPresOirIdPres + MtasIdPresOirTempIdPres + MtasIdPresOirSscTempIdPres)}{T}$$

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Equation 47. IMS MMTel AS Originating Identity Restrictions (OIR) Presentation Restricted [per second]

$$IMSMMTelASOIR \text{ Pr es Re stricted} = \frac{(MtasIdPresOirPerm + MtasIdPresOirIdRestAll + MtasIdPresOirIdRestAll + MtasIdPresOirTempIdRest + MtasIdPresOirSscTempIdRest)}{T}$$

Equation 48. IMS MMTel AS Terminating Identity Presentations (TIP) [per second]

$$IMSMMTelASTIP \text{ Pr es} = \frac{(MtasIdPresTip + MtasIdPresTirOverride)}{T}$$

Equation 49. IMS MMTel AS Terminating Identity Presentation (TIP) Restrictions [per second]

$$IMSMMTelASTIP \text{ Pr es Re stricted} = \frac{MtasIdPresTipIdRestAll}{T}$$

Equation 50. IMS MMTel AS Terminating Identity Restriction (TIR) Presentation Enabled [per second]

$$IMSMMTelASTermId \text{ Pr es} = \frac{(MtasIdPresTirIdPres + MtasIdPresTirTempIdPres)}{T}$$

Equation 51. IMS MMTel AS Terminating Identity Restrictions (TIR) Presentation Restricted [per second]

$$IMSMMTelASTermId \text{ Pr es Re stricted} = \frac{(MtasIdPresTirPerm + MtasIdPresTirIdRestAll + MtasIdPresTirTempIdRest)}{T}$$

Counter Name	Definition
Identity Presentation	
MtasIdPresCnip	The number of invocations of the CNIP service. Counter on MTAS node.
MtasIdPresOCnip	The number of invocations of the OCNIP service. Counter on MTAS node.

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Counter Name	Definition
MtasIdPresCnipPresentName	The number of CNIP external query responses containing a caller display name that is allowed to be presented. Counter on MTAS node.
MtasIdPresCnipRestrictName	The number of CNIP external query responses indicating that presentation of the caller's name is restricted. Counter on MTAS node.
Originating Identity Presentation (OIP)	
MtasIdPresOip	The number of OIP invocations when the caller identity is presented. Counter on MTAS node.
MtasIdPresOirOverride	The number of invocations of OIP with OIR override Counter on MTAS node.
MtasIdPresOipIdRestAll	The number of OIP invocations where the caller identity is restricted throughout the entire call setup phase. Counter on MTAS node.
MtasIdPresOipIdRestSome	The number of OIP invocations where the caller identity is restricted in some message(s) and not in others during the call setup phase. Counter on MTAS node.
Originating Identity Restriction (OIR)	
MtasIdPresOirPerm	The number of invocations of OIR in permanent mode. Counter on MTAS node.
MtasIdPresOirIdPres	The number of invocations of OIR in temporary mode, default Restrict Identity, and identity presentation is allowed by Privacy header value "none" in the INVITE. Counter on MTAS node.
MtasIdPresOirIdRestAll	The number of invocations of OIR in temporary mode, default Not Restricted, when the user restricts identity presentation throughout the call-setup phase. Counter on MTAS node.
MtasIdPresOirIdRestSome	The number of invocations of OIR in temporary mode, default Not Restricted, when the user restricts identity presentation in some message(s) but not in all. Counter on MTAS node.
MtasIdPresOirTempIdPres	The number of invocations of OIR in temporary mode, default Identity Not Restricted, when the identity is always presented. Counter on MTAS node.
MtasIdPresOirSscTempIdPres	The number of invocations of OIR in temporary mode, default Identity Not Restricted, when the identity is always presented. Counter on MTAS node.

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Counter Name	Definition
MtasIdPresOirTempIdRest	The number of invocations of OIR in temporary mode, default Identity Restricted, when the identity is never presented. Counter on MTAS node.
MtasIdPresOirSscTempIdRest	The number of invocations of OIR in temporary mode where an Ad Hoc Supplementary Service Code is used to disable identity presentation. Counter on MTAS node.
Terminating Identity Presentation (TIP)	
MtasIdPresTip	The number of TIP invocations when the callee identity is presented. Counter on MTAS node.
MtasIdPresTirOverride	The number of successful invocations of TIP with TIR Override. Counter on MTAS node.
MtasIdPresTipIdRestAll	The number of TIP invocations when the callee identity is restricted throughout the call setup phase. Counter on MTAS node.
MtasIdPresTipIdRestSome	The number of TIP invocations when the callee identity is restricted in some but not all messages during the call setup phase. Counter on MTAS node.
Terminating Identity Restriction (TIR)	
MtasIdPresTirPerm	The number of invocations with TIR in permanent mode. Counter on MTAS node.
MtasIdPresTirIdPres	The number invocations of TIR in temporary mode, default Identity Not Restricted, when presentation of the identity is always done. Counter on MTAS node.
MtasIdPresTirIdRestAll	The number of invocations of TIR in temporary mode, default Identity Not Restricted, when the user has restricted identity presentation throughout the entire call setup phase. Counter on MTAS node.
MtasIdPresTirIdRestSome	The number of invocations of TIR in temporary mode, default Identity Not Restricted, when the user has restricted identity presentation in some but not all messages during the call setup phase.
MtasIdPresTirTempIdPres	The number of invocations of TIR in temporary mode, default Identity Not Restricted, when the user does not restrict identity presentation by Privacy header. Counter on MTAS node.
MtasIdPresTirTempIdRest	The number of invocations of TIR in temporary mode, default Identity Restricted, when the user never allows identity presentation by Privacy header. Counter on MTAS node.

Reference [1].

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4.1.1.15 Communication Waiting

Equation 52. IMS MMTel AS Communication Waiting Attempts [per second]

$$IMSMMTelASCommWaitAttempts = \frac{MtasCwUsed}{T}$$

Counter Name	Definition
Call Waiting	
MtasCwAccepted	Number of waiting communications that have been accepted by Communication Waiting subscribers. Counter on MTAS node.
MtasCwUsed	Number of times the Communication Waiting has been used by Communication Waiting Subscribers. Counter on MTAS node.
MtasCwTimeout	Number of waiting communications that have exceeded the timeout on the alerting phase. Counter on MTAS node.

Reference [1].

4.1.1.16 Carrier Select Service

Equation 53. IMS MMTel AS Carrier Select Real Carrier Call Attempts [per second]

$$IMSMMTelASCVirtualCarrierCalls = \frac{MtasCsVirtualCarrierCalls}{T}$$

Equation 54. IMS MMTel AS Carrier Select Virtual Carrier Call Attempts [per second]

$$IMSMMTelASCRealCarrierCalls = \frac{MtasCsRealCarrierCalls}{T}$$

Equation 55. IMS MMTel AS Carrier Pre-select Real Carrier Call Attempts [per second]

$$IMSMMTelASCPSVirtualCarrierCalls = \frac{MtasCpsVirtualCarrierCalls}{T}$$

Equation 56. IMS MMTel AS Carrier Pre-select Virtual Carrier Call Attempts [per second]

$$IMSMMTelASCPSRealCarrierCalls = \frac{MtasCpsRealCarrierCalls}{T}$$

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Counter Name	Definition
Carrier Select	
MtasCsVirtualCarrierCalls	This counter is the accumulated number of communication attempts, where the originating or transit MTAS applied the Carrier Select service, and selected a virtual carrier. Counter on MTAS node.
MtasCsRealCarrierCalls	This counter is the accumulated number of communication attempts, where the originating or transit MTAS applied the Carrier Select service, and selected a real carrier. Counter on MTAS node.
MtasCpsVirtualCarrierCalls	This counter is the accumulated number of communication attempts, where the originating or transit MTAS applied the Carrier Pre Select service, and selected a virtual carrier. Counter on MTAS node.
MtasCpsVirtualCarrierCalls	This counter is the accumulated number of communication attempts, where the originating or transit MTAS applied the Carrier Pre Select service, and selected a virtual carrier. Counter on MTAS node.
MtasMrfcInitiatedAnnOk	The number of successfully initiated playing of announcement. The counter is keyed on announcement code. Counter on MTAS node.
MtasMrfcInitiatedAnnNOkI	The number of unsuccessfully initiated playing of announcement due to internal error in MTAS. The counter is keyed on announcement code. Counter on MTAS node.
MtasMrfcInitiatedAnnNOkE	The number of unsuccessfully initiated playing of announcement, due to external error, e.g. in the MRFP. Counter on MTAS node.

Reference [1].

4.1.1.17 Playing of Announcement Service

Equation 57. IMS MMTel AS Playing of Announcements Attempts [per second]

$$\begin{aligned}
 &IMSMMTelASAnnouncements = \\
 & \frac{(MtasMrfcInitiatedAnnOkMtas + MrfcInitiatedAnnNOkI + \\
 & MtasMrfcInitiatedAnnNOkE)}{T}
 \end{aligned}$$

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4.1.1.18 Dial Tone Management Service

Equation 58. IMS MMTel AS Dial Tone Management NOTIFY Attempts [per second]

$$IMSMTSDTMNotifyAttempts = \frac{(MtasDtmNotifyOk + MtasDtmNotifyNOkI + MtasDtmNotifyNOkE)}{T}$$

Counter Name	Definition
Dial Tone Management (DTM)	
MtasDtmNotifyOk	MtasDtmNotifyOk contains the count of the total number of NOTIFY messages sent for dial tone pattern. Counter on MTAS node.
MtasDtmNotifyNOkI	MtasDtmNotifyNOkI contains the count of the total number of unsuccessful NOTIFY messages sent for dial tone pattern. Counter on MTAS node.
MtasDtmNotifyNOkE	MtasDtmNotifyNOkE contains the count of the total number of successful NOTIFY (dial-tone-pattern) messages sent, that get no reply or a failure response. If the failure is due to absence of a valid DTM license, the counter is keyed by "LICENSES". Counter on MTAS node.

Reference [1].

4.1.1.19 Call Admission Control (CAC) Service

Equation 59. IMS MMTel AS User Call Admission Control (CAC) Rejects [per second]

$$IMSMMTelASUserCACRejects = \frac{(MtasUCacOrigRejected + MtasUCacTermRejected)}{T}$$

Note: Originating and Terminating User Call Admission Control (CAC) Rejects**Equation 60. IMS MMTel AS Group Call Admission Control (CAC) Rejects [per second]**

$$IMSMMTelASGroupCACRejects = \frac{(MtasGCacOrigRejected + MtasGCacTermRejected)}{T}$$

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Note: Originating and Terminating Group Call Admission Control (CAC) Rejects.

Counter Name	Definition
Call Admission Control Service	
MtasUCacOrigRejected	The total number of originating session initiations that were rejected by the User Call Admission Control service.
MtasUCacTermRejected	The total number of terminating session initiations that were rejected by the User Call Admission Control service.
MtasGCacOrigRejected	The total number of originating session initiations that were rejected by the Group Call Admission Control service.
MtasGCacTermRejected	The total number of terminating session initiations that were rejected by the Group Call Admission Control service.

Reference [1].

4.1.1.20 Advice of Charge Service

Equation 61. IMS MMTel AS Advice of Charge Start (AoC-S) Attempts [per second]

$$\text{IMSMMTelASAOCTestAttempts} = \frac{(\text{MtasAocStartOk} + \text{MtasAocStartNOkI} + \text{MtasAocStartNOkE})}{T}$$

Equation 62. IMS MMTel AS Advice of Charge During (AoC-D) Attempts [per second]

$$\text{IMSMMTelASAOCDuringAttempts} = \frac{(\text{MtasAocDuringOk} + \text{MtasAocDuringNOkI} + \text{MtasAocDuringNOkE})}{T}$$

Equation 63. IMS MMTel AS Advice of Charge End (AoC-E) Attempts [per second]

$$\text{IMSMMTelASAOCEndAttempts} = \frac{(\text{MtasAocEndOk} + \text{MtasAocEndNOkI} + \text{MtasAocEndNOkE})}{T}$$

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Counter Name	Definition
Advice of Charge	
MtasAocStartOk	The Advice of Charge-Start (AoC-S) service type has been successfully executed at the start of a communication. Counter on MTAS node.
MtasAocStartNOkl	Due to an internal error, MTAS failed provide the required AoC-S tariff data at communication set-up. Counter on MTAS node. Counter on MTAS node.
MtasAocStartNOkE	MTAS failed to provide the required AoC-S tariff data at communication set-up due to an external error. An external error includes the receipt of an incomplete tariff or a missing tariff. Counter on MTAS node.
MtasAocDuringOk	The Advice of Charge-During (AoC-D) service type indicating the cost incurred to date has been successfully executed. Counter on MTAS node.
MtasAocDuringNOkl	The Advice of Charge-During (AoC-D) service type indicating the cost incurred to date, fails to complete, due to an external error. Counter on MTAS node.
MtasAocDuringNOkE	The Advice of Charge-During (AoC-D) service type indicating the cost incurred to date, fails to complete, due to an external error. Counter on MTAS node.
MtasAocEndOk	The Advice of Charge-End (AoC-E) service type indicating the cost of an event has been successfully executed. Counter on MTAS node.
MtasAocEndNOkl	The Advice of Charge-End (AoC-E) service type indicating the cost, fails to complete, due to an internal error. Counter on MTAS node.
MtasAocEndNOkE	The Advice of Charge-End (AoC-E) service type indicating the cost, fails to complete, due to an external error. Counter on MTAS node.

Reference [1].

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4.1.1.21 Communication Completion

Equation 64. IMS MMTel AS Communication Completion Busy Subscriber (CCBS) Invocation Attempts [per second]

$$\frac{IMSMMTelASCCBSInvocationAttempts}{T} = (MtasCcbsInvocationOrigOk)$$

Equation 65. IMS MMTel AS Communication Completion No Reply (CCNR) Invocation Attempts [per second]

$$\frac{IMSMMTelASCCNRInvocationAttempts}{T} = (MtasCcnrInvocationOrigOk)$$

Counter Name	Definition
MtasCcbsInvocationOrigOk	The total number of successful originating Call Completion Busy Subscriber (CCBS) invocations. Counter on MTAS node.
MtasCcnrInvocationOrigOk	The total number of successful originating Call Completion No Reply (CCNR) invocations. Counter on MTAS node.

Reference [1].

4.1.1.22 Communication Completion Not Logged-in (CCNL)

Equation 66. IMS MMTel AS Originating Communication Completion Not Logged-in Success [per second]

$$IMSMMTelASOrigCCNLSuccess = \frac{(MtasCcnlOrigSuccess)}{T}$$

Equation 67. IMS MMTel AS Terminating Communication Completion Not Logged-in Success [per second]

$$IMSMMTelASTermCCNLSuccess = \frac{(MtasCcnlTermSuccess)}{T}$$

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Counter Name	Definition
MtasCcnlOrigSuccess	The total number of successful originating CCNL invocations. Counter on MTAS node.
MtasCcnlTermSuccess	The total number of successful terminating CCNL invocations. Counter on MTAS node.

Reference [1].

4.1.1.23 Flexible Communication Distribution

Equation 68. IMS MMTel AS Flexible Communication Distribution (FCD) Invocation Attempts [per second]

$$IMSMMTelASFCDInvocationAttempts = \frac{(MtasFcdOk)}{T}$$

Counter Name	Definition
MtasFcdOk	The number of successful FCD invocations. The counter is keyed by the conditions of the matching rule or with DEFAULT if no such exist (unconditional case). Counter on MTAS node.

Reference [1].

4.1.1.24 Short Number Dialing

Equation 69. IMS MMTel AS Originating Short Number Dialing (SND) Invocation Attempts [per second]

$$IMSMMTelASOrgSNDInvocationAttempts = \frac{MtasSndOrigSuccAttempt}{T}$$

Equation 70. IMS MMTel AS Terminating Short Number Dialing (SND) Invocation Attempts [per second]

$$IMSMMTelASTermSNDInvocationAttempts = \frac{MtasSndTermSuccAttempt}{T}$$

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Counter Name	Definition
MtasSndOrigSuccAttempt	Number of received 180 Ringing message or received 2xx (INVITE) if no 180 Ringing message has been received, by the originating MTAS. Counter on MTAS node.
MtasSndTermSuccAttempt	Number of received 180 Ringing message or received 2xx (INVITE) if no 180 Ringing message has been received, by the terminating MTAS. Counter on MTAS node.

Reference [1].

4.1.1.25 Service Centralization and Continuity (SCC)

Equation 71. IMS SCC AS Originating Service Centralization and Continuity (SCC) from CS Invocation Attempts [per second]

$$IMSSCCASCSOrigInvocationAttempts = \frac{(MtasSccInitOrigSessCsOk + MtasSccInitOrigSessCsNOkE + MtasSccInitOrigSessCsNOkI)}{T}$$

Equation 72. IMS SCC AS Originating Service Centralization and Continuity (SCC) from PS Invocation Attempts [per second]

$$IMSSCCASPSOrigInvocationAttempts = \frac{(MtasSccInitOrigSessPsOk + MtasSccInitOrigSessPsNOkE + MtasSccInitOrigSessPsNOkI)}{T}$$

Equation 73. IMS SCC AS Originating Unregistered Service Centralization and Continuity (SCC) from CS Invocation Attempts [per second]

$$IMSSCCASCSOrigUnregInvocationAttempts = \frac{(MtasSccInitOrigUnregSessCsOk + MtasSccInitOrigUnregSessCsNOkE + MtasSccInitOrigUnregSessCsNOkI)}{T}$$

Equation 74. IMS SCC AS Originating Unregistered Service Centralization and Continuity (SCC) from PS Invocation Attempts [per second]

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$$IMSSCCASPSOrigUnregInvocationAttempts = \frac{(MtasSccInitOrigUnregSessPsOk + MtasSccInitOrigUnregSessPsNOkE + MtasSccInitOrigUnregSessPsNOkI)}{T}$$

Equation 75. IMS SCC AS Terminating Service Centralization and Continuity (SCC) Invocation Attempts [per second]

$$IMSSCCASTermInvocationAttempts = \frac{(MtasSccInitTermSessOk + MtasSccInitTermSessNOkE + MtasSccInitTermSessNOkI)}{T}$$

Equation 76. IMS SCC AS Terminating Unregistered Service Centralization and Continuity (SCC) Invocation Attempts [per second]

$$IMSSCCASTermUnregInvocationAttempts = \frac{(MtasSccInitTermUnregSessOk + MtasSccInitTermUnregSessNOkE + MtasSccInitTermUnregSessNOkI)}{T}$$

Equation 77. IMS SCC AS Terminating Service Centralization and Continuity (SCC) to VoLTE CS UE Invocation Attempts [per second]

$$IMSSCCASCSTermInvocationAttempts = \frac{(MtasSccTermCsSuccAttempt + MtasSccTermCsFailedAttempt)}{T}$$

Equation 78. IMS SCC AS Terminating Service Centralization and Continuity (SCC) to VoLTE PS UE Invocation Attempts [per second]

$$IMSSCCASPsTermInvocationAttempts = \frac{(MtasSccTermPsSuccAttempt + MtasSccTermPsFailedAttempt)}{T}$$

Equation 79. IMS SCC AS Terminating Unregistered Service Centralization and Continuity (SCC) to VoLTE CS UE Invocation Attempts [per second]

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$$\frac{IMSSCCASCS\text{TermUnregInvocationAttempts} = (MtasSccTermUnregCsSuccAttempt + MtasSccTermUnregCsFailedAttempt)}{T}$$

Equation 80. IMS SCC AS Terminating Unregistered Service Centralization and Continuity (SCC) to VoLTE PS UE Invocation Attempts [per second]

$$\frac{IMSSCCASPs\text{TermUnregInvocationAttempts} = (MtasSccTermUnregPsSuccAttempt + MtasSccTermUnregPsFailedAttempt)}{T}$$

Counter Name	Definition
MtasScclnitOrigSessCsOk	The accumulated number of SCC session attempts from the CS access domain, in the originating MTAS, which was either answered, not answered, or was rejected by a service due to operator policy. The counter is keyed on the CSCF IP address. Incremented by 1 when the INVITE-ACK transaction has concluded after the final response or when the INVITE was rejected by a service due to operator policy. Counter on MTAS node.
MtasScclnitOrigSessCsNOkE	The accumulated number of SCC session attempts from the CS access domain, in the originating MTAS, which was rejected due to node external reasons. The counter is keyed on the CSCF IP address. Incremented by 1 when the INVITE was rejected due to external reasons, for example invalid feature tag, too many media components in SDP.. Counter on MTAS node.
MtasScclnitOrigSessCsNOkI	The accumulated number of SCC session attempts from the CS access domain, in the originating MTAS, which was rejected due to node internal reasons. The counter is keyed on the CSCF IP address. Incremented by 1 when the INVITE was rejected due to internal reasons, for example processor or memory shortage. Counter on MTAS node.

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Counter Name	Definition
MtasScclnitOrigSessPsOk	The accumulated number of SCC session attempts from the PS access domain, in the originating MTAS, which was either answered, not answered, or was rejected by a service due to operator policy. The counter is keyed on the CSCF IP address. Incremented by 1 when the INVITE-ACK transaction has concluded after the final response or when the INVITE was rejected by a service due to operator policy. Counter on MTAS node.
MtasScclnitOrigSessPsNOKE	The accumulated number of SCC session attempts from the PS access domain, in the originating MTAS, which was rejected due to node external reasons. The counter is keyed on the CSCF IP address. Incremented by 1 when the INVITE was rejected due to external reasons, for example invalid feature tag, too many media components in SDP, ICS UE signalling over Gm when attached to CS is not supported. Counter on MTAS node.
MtasScclnitOrigSessPsNOKI	The accumulated number of SCC session attempts from the PS access domain, in the originating MTAS, which was rejected due to node internal reasons. The counter is keyed on the CSCF IP address. Incremented by 1 when the INVITE was rejected due to internal reasons, for example processor or memory shortage. Counter on MTAS node.
MtasScclnitOrigUnregSessCsOk	The accumulated number of SCC session attempts from an unregistered user in the CS access domain, in the originating MTAS, which was either answered, not answered, or was rejected by a service due to operator policy. The counter is keyed on the CSCF IP address. Incremented by 1 when the INVITE-ACK transaction has concluded after the final response or when the INVITE was rejected by a service due to operator policy. Counter on MTAS node.

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Counter Name	Definition
MtasScclInitOrigUnregSessCsNOKE	<p>The accumulated number of SCC session attempts from an unregistered user on the CS access domain, in the originating MTAS, which was rejected due to node external reasons. The counter is keyed on the CSCF IP address.</p> <p>Incremented by 1 when the INVITE was rejected due to external reasons, for example invalid feature tag, too many media components in SDP. Incremented by 1 when the SCC AS rejects an INVITE unregistered from the CS domain due to external reasons, e.g. request not supported by SCC AS</p> <p>Counter on MTAS node.</p>
MtasScclInitOrigUnregSessCsNOKI	<p>The accumulated number of SCC session attempts from an unregistered user in the CS access domain, in the originating MTAS, which was rejected due to node internal reasons. The counter is keyed on the CSCF IP address.</p> <p>Incremented by 1 when the INVITE was rejected due to internal reasons, for example processor or memory shortage.</p> <p>Counter on MTAS node.</p>
MtasScclInitOrigUnregSessPsOk	<p>The accumulated number of SCC session attempts from an unregistered user on the PS access domain, in the originating MTAS, which was either answered, not answered, or was rejected by a service due to operator policy. The counter is keyed on the CSCF IP address.</p> <p>Incremented by 1 when the INVITE-ACK transaction has concluded after the final response or when the INVITE was rejected by a service due to operator policy.</p> <p>Counter on MTAS node.</p>
MtasScclInitOrigUnregSessPsNOKE	<p>The accumulated number of SCC session attempts from an unregistered user in the PS access domain, in the originating MTAS, which was rejected due to node external reasons. The counter is keyed on the CSCF IP address.</p> <p>Incremented by 1 when the INVITE was rejected due to external reasons, for example invalid feature tag, too many media components in SDP, ICS UE signalling over Gm when attached to CS is not supported.</p> <p>Counter on MTAS node.</p>

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Counter Name	Definition
MtasScclnitOrigUnregSessPsNOkl	<p>The accumulated number of SCC session attempts from an unregistered user in the PS access domain, in the originating MTAS, which was rejected due to node internal reasons. The counter is keyed on the CSCF IP address.</p> <p>Incremented by 1 when the INVITE was rejected due to internal reasons, for example processor or memory shortage.</p> <p>Counter on MTAS node.</p>
MtasScclnitTermSessOk	<p>The accumulated number of SCC session attempts, in the terminating MTAS, which was either answered, not answered, or was rejected by a service due to operator policy. The counter is keyed on the CSCF IP address.</p> <p>Incremented by 1 when the INVITE-ACK transaction has concluded after the final response or when the INVITE was rejected by a service due to operator policy.</p> <p>Counter on MTAS node.</p>
MtasScclnitTermSessNOkE	<p>The accumulated number of SCC session attempts, in the terminating MTAS, which was rejected due to node external reasons. The counter is keyed on the CSCF IP address.</p> <p>The counter is incremented by 1 in the terminating MTAS if; the INVITE-ACK transaction did not conclude successfully or any signaling transactions to external nodes failed or timed out and the configuration of the MTAS required the interaction with the external node to be successful in order to proceed the session. The counter will only be stepped for one of the reasons (once, that is) for a particular session.</p> <p>Counter on MTAS node.</p>
MtasScclnitTermSessNOkl	<p>The accumulated number of SCC session attempts, in the terminating MTAS, which was rejected due to node internal reasons. The counter is keyed on the CSCF IP address.</p> <p>Incremented by 1 when the INVITE was rejected due to internal reasons, for example processor or memory shortage.</p> <p>Counter on MTAS node.</p>

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Counter Name	Definition
MtasScclnitTermUnregSessOk	The accumulated number of SCC session attempts, in the terminating MTAS to an unregistered user, which was either answered, not answered, or was rejected by a service due to operator policy. The counter is keyed on the CSCF IP address. Incremented by 1 when the INVITE-ACK transaction has concluded after the final response or when the INVITE was rejected by a service due to operator policy. Counter on MTAS node.
MtasScclnitTermUnregSessNOkE	The accumulated number of SCC session attempts, in the terminating MTAS to an unregistered user, which was rejected due to node external reasons. The counter is keyed on the CSCF IP address. The counter is incremented by 1 in the terminating MTAS if; the INVITE-ACK transaction did not conclude successfully or any signaling transactions to external nodes failed or timed out and the configuration of the MTAS required the interaction with the external node to be successful in order to proceed the session. The counter will only be stepped for one of the reasons (once, that is) for a particular session. Counter on MTAS node.
MtasScclnitTermUnregSessNOkI	The accumulated number of SCC session attempts, in the terminating MTAS to an unregistered user, which was rejected due to node internal reasons. The counter is keyed on the CSCF IP address. Incremented by 1 when the INVITE was rejected due to internal reasons, for example processor or memory shortage. Counter on MTAS node.
MtasSccTermCsSuccAttempt	The accumulated number of terminating INVITE requests from SCC AS that were successfully responded by a VoLTE UE on the CS access domain. The counter is incremented when receiving the 180 Ringing message or when receiving the 200 OK message if no 180 Ringing message has been received. Counter on MTAS node.
MtasSccTermCsFailedAttempt	The accumulated number of terminating registered INVITE requests to VoLTE UE on CS domain that were rejected. The CSCF IP address is used as key. The counter is incremented when receiving 3xx/4xx/5xx/6xx message. Counter on MTAS node.

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Counter Name	Definition
MtasSccTermPsSuccAttempt	<p>The accumulated number of terminating INVITE requests from SCC AS that were successfully responded by a VoLTE UE on the PS access domain. The CSCF IP address is used as key.</p> <p>The counter is incremented when receiving the 180 Ringing message or when receiving the 200 OK message if no 180 Ringing message has been received.</p> <p>Counter on MTAS node.</p>
MtasSccTermPsFailedAttempt	<p>This counter is the accumulated number of terminating initial INVITE requests to VoLTE UE on CS domain that were rejected. The CSCF IP address is used as key.</p> <p>The counter is incremented when receiving 3xx/4xx/5xx/6xx message.</p> <p>Counter on MTAS node.</p>
MtasSccTermUnregCsSuccAttempt	<p>The accumulated number of terminating unregistered INVITE requests from SCC AS that were successfully responded by a VoLTE UE on the CS access domain. The CSCF IP address is used as key.</p> <p>The counter is incremented when receiving the 180 Ringing message or when receiving the 200 OK message if no 180 Ringing message has been received.</p> <p>Counter on MTAS node.</p>
MtasSccTermUnregCsFailedAttempt	<p>The accumulated number of terminating unregistered INVITE requests to VoLTE UE on CS domain that were rejected. The CSCF IP address is used as key.</p> <p>The counter is incremented when receiving 3xx/4xx/5xx/6xx message.</p> <p>Counter on MTAS node.</p>
MtasSccTermUnregPsSuccAttempt	<p>The accumulated number of terminating unregistered INVITE requests from SCC AS that were successfully responded by a VoLTE UE on the PS access domain. The CSCF IP address is used as key.</p> <p>The counter is incremented when receiving the 180 Ringing message or when receiving the 200 OK message if no 180 Ringing message has been received.</p> <p>Counter on MTAS node.</p>

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Counter Name	Definition
MtasSccTermUnregPsFailedAttempt	The accumulated number of terminating unregistered INVITE requests from SCC AS that were successfully responded by a VoLTE UE on the PS access domain. The CSCF IP address is used as key. The counter is incremented when receiving the 180 Ringing message or when receiving the 200 OK message if no 180 Ringing message has been received. Counter on MTAS node.

Reference [1].

4.1.1.26 Single Radio Voice Call Continuity (SRVCC)

Equation 81. IMS SCC AS Single Radio Voice Call Continuity (SRVCC) Invocation Attempts [per second]

$$IMSSCCASSRVCCInvocationAttempts = \frac{(MtasSrvccTransferOk + MtasSrvccTransferNOkE + MtasSrvccTransferNOkI)}{T}$$

Counter Name	Definition
MtasSrvccTransferOk	The number of successful access transfers using Single Radio Voice Call Continuity. Counter on MTAS node.
MtasSrvccTransferNOkE	The number of unsuccessful (due to node external error) access transfers attempts using Single Radio Voice Call Continuity. Counter on MTAS node.
MtasSrvccTransferNOkI	The number of unsuccessful (due to node internal error) access transfers attempts using Single Radio Voice Call Continuity. Counter on MTAS node.

Reference [1].

4.1.1.27 Customer Alerting Tones (CAT)

Equation 82. IMS MMTel AS Customer Alerting Tones (CAT) Invocation Attempts [per second]

$$IMSMMTelASCATInvocationAttempts = \frac{(MtasCatSignalOk + MtasCatSignalNOkE + MtasCatSignalNOkI)}{T}$$

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Counter Name	Definition
MtasCatSignalOk	The number of successful Customized Alerting Tones sending requests to the external CAT server. Key is CAT server IP address or FQDN. Counter on MTAS node.
MtasCatSignalNOkE	The number of Customized Alerting Tones sending requests that failed due to external reasons. The counter is incremented when a non-200 response is received from the CAT-S or the request time outs. Key is CAT server IP address or FQDN. Counter on MTAS node.
MtasCatSignalNOkI	The number of Customized Alerting Tones sending requests that failed due to internal reasons. Key is CAT server IP address or FQDN. Counter on MTAS node.

Reference [1].

4.1.1.28 Session Transfer to Own Device (STOD)

Equation 83. IMS MMTel AS Session Transfer to Own Device (STOD) Invocation Attempts [per second]

$$\text{IMSMMTelASSTODInvocationAttempts} = \frac{\text{MtasStodAttempt}}{T}$$

Counter Name	Definition
MtasStodAttempt	The total number of STOD invocations. Counter on MTAS node.

Reference [1].

4.1.1.29 Parlay-X

Equation 84. IMS MMTel AS Parlay-X Request Received [per second]

$$\text{IMSMMTelASPxReceived} = \frac{\text{MtasPxReceivedRequests}}{T}$$

Equation 85. IMS MMTel AS Parlay-X Request Sent [per second]

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$$IMSMMTelASPxSent = \frac{MtasPxSentRequests}{T}$$

Note: Service Parlay-X Session requests may be calculated per Parlay-X server or for the MTAS node.

Counter Name	Definition
MtasPxReceivedRequests	The counter is incremented when receiving a Parlay X Request in MTAS. Key is Parlay-X server. Counter on MTAS node.
MtasPxSentRequests	The number of times Parlay X requests are sent to the Parlay X application. Counter on MTAS node.

Reference [1].

4.1.1.30 Call Return (CR)

Equation 86. IMS MMTel AS Call Return Service Attempts [per second]

$$IMSMMTelASCRAttempts = \frac{(MtasCrInvAnnOk + MtasCrInvNOkE + MtasCrInvNOKI)}{T}$$

Counter Name	Definition
MtasCrInvAnnOk	This counter is the accumulated number of successful Call Return (CR) with announcement attempts. Counter on MTAS node.
MtasCrInvNOkE	This counter is the accumulated number of unsuccessful Call Return (CR) with no announcement attempts (due to node external error). Incremented by 1 when when an INVITE request is NOT sent by MTAS due to a node external error after the caller has invoked the CR service. Counter on MTAS node.
MtasCrInvNOKI	This counter is the accumulated number of unsuccessful Call Return (CR) with no announcement attempts (due to node internal error). Incremented by 1 when when an INVITE request is NOT sent by MTAS due to a node internal error after the caller has invoked the CR service. Counter on MTAS node.

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Reference [1].

4.1.1.31 Closed User Group (CUG)

Equation 87. IMS MMTel AS Closed User Group (CUG) Service Attempts [per second]

$$\frac{IMSMMTelASCUGAttempts}{T} = \frac{(MtasCugOk + MtasCugRejected)}{T}$$

Counter Name	Definition
MtasCugOk	The number of successful calls in a Closed User Group. Counter on MTAS node.
MtasCugRejected	The number of INVITEs rejected by the Closed User Group (CUG) service. Counter on MTAS node.

Reference [1].

4.1.1.32 Operator Controlled Transfer (OCT)

Equation 88. IMS MMTel AS Operator Controlled Transfer (OCT) Service Attempts [per second]

$$\frac{IMSMMTelASOCTAttempts}{T} = \frac{MtasOctTransferAttempt}{T}$$

Counter Name	Definition
MtasOctTransferAttempt	This counter is the accumulated number of call attempt to the target of Operator Controlled Transfer (OCT). The counter is keyed on the phone number to the Operator Transferor. Incremented by 1 when when an INVITE request is sent by MTAS to the target of Operator Controlled Transfer (OCT). Counter on MTAS node.

Reference [1].

4.1.1.33 Ring Back Tone (RBT) Requests

Equation 89. IMS MMTel AS Ring Back Tone Requests [per second]

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$$IMSMMTelASRBT \text{ Requests} = \frac{(MtasRbtOk + MtasRbtNOkE + MtasRbtNOkI)}{T}$$

Counter Name	Definition
MtasRbtOk	The number of successful Ring Back Tones sending requests to the MRFP. Counter on MTAS node.
MtasRbtNOkE	The number of Ring Back Tones sending requests that failed due to external reasons. Counter on MTAS node.
MtasRbtNOkI	The number of Ring Back Tones sending requests that failed due to internal reasons. The counter is incremented when an initial request to the eMRFP is failed due to MTAS internal failure. Counter on MTAS node.

Reference [1].

4.1.1.34 CAMEL Application Part (CAP) Requests

Equation 90. IMS SCC AS CAP Requests [per second]

$$IMSSCCASCAP \text{ Requests} = \frac{(MtasSdsCapInitDPOk + MtasSdsCapInitDPNOkE + MtasSdsCapInitDPNOkI)}{T}$$

Counter Name	Definition
MtasSdsCapInitDPOk	This counter is the accumulated number of CAMEL Application Part (CAP) InitialDP requests processed successfully. Counter on MTAS node.
MtasSdsCapInitDPNOkE	This counter is the accumulated number of CAMEL Application Part (CAP) InitialDP requests that failed because the request message was faulty, for example missing mandatory parameter or parameter having unknown value. Counter on MTAS node.
MtasSdsCapInitDPNOkI	This counter is the accumulated number of CAMEL Application Part (CAP) InitialDP requests that failed because of problems internal to the SCC AS, an IMRN could not be allocated, for example because of no free IMRN. Counter on MTAS node.

Reference [1].

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4.1.2 MMTel Interface Summary

T = measured/reported time in seconds

Equation 91. IMS MTAS Number of Dh Requests [per second]

$$\text{IMSMtasNumberDh Requests} = \frac{(\text{MtasShRedirect} + \text{MtasShRedirectFailed})}{T}$$

Equation 92. IMS MTAS Number of Sh Requests [per second]

$$\text{IMSMtasNumberSh Requests} = \frac{(\text{MtasShPullOk} + \text{MtasShSubsNotifOk} + \text{MtasShNotifOk} + \text{MtasShUpdateOk})}{T}$$

Note: Formula is expressed per key on Stack instance and HSS destination host name, or HSS realm, could also summarize all directions.

Equation 93. IMS MTAS Number of SIP Requests [per second]

$$\text{IMSMtasNumberSIP Requests} = \frac{(\text{MtasSipSummaryInRequests} + \text{MtasSipSummaryOutRequests})}{T}$$

Equation 94. IMS SCC-AS SIP Orig Requests [per second]

$$\text{IMSSCCASOrgSIP Requests} = \frac{(\text{MtasSipSccOrigRequestIn} + \text{MtasSipSccOrigRequestOut})}{T}$$

Equation 95. IMS SCC-AS SIP Term Requests [per second]

$$\text{IMSSCCASTermSIP Requests} = \frac{(\text{MtasSipSccTermRequestIn} + \text{MtasSipSccTermResponseOut})}{T}$$

Equation 96. IMS MTAS Number of Charging Requests [per second]

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$$\begin{aligned}
 & \text{IMSMtasNumberCharging Requests} = \\
 & (2 * \text{MtasChargingAcrStartOk} + \text{MtasChargingAcrInterimOk} + \\
 & \text{MtasChargingBackupStart} + \text{MtasChargingBackupInterim} + \\
 & \text{MtasChargingBackupStop} + \text{MtasChargingAcrEventOk} + \\
 & 2 * \text{MtasChargingCcrInitOk} + \text{MtasChargingCcrUpdateOk} + \\
 & \text{MtasChargingCcrFailover} + \text{MtasChargingRttiOk}) \\
 & \quad \quad \quad T
 \end{aligned}$$

Comment: For each MtasChargingAcrStartOk, there is a MtasChargingAcrStop and for each MtasChargingCcrInitOk, there will be a MtasChargingCcrTerm for which there are no counters, therefore the MtasChargingAcrStartOk and MtasChargingCcrInitOk values are doubled.
Note: Formula is expressed per key on charging destination (destination realm or destination host), could also summarize all destinations.

Equation 97. IMS MTAS Number of ACR Storage Requests [per second]

$$\begin{aligned}
 & \text{IMSMtasNumberAcrStorage Requests} = \\
 & \text{MtasChargingAcrStorageEvent} + \text{MtasChargingAcrStorageInterim} + \\
 & (\text{MtasChargingAcrStorageStart} + \text{MtasChargingAcrStorageStop}) \\
 & \quad \quad \quad T
 \end{aligned}$$

Equation 98. IMS MTAS Number of XDMS (Ut) Requests [per second]

$$\begin{aligned}
 & \text{IMSMtasNumberXDMSUt Requests} = \\
 & (\text{MtasXdmsXcapGetOk} + \text{MtasXdmsXcapPutOk} + \\
 & \text{MtasXdmsXcapDeleteOk}) \\
 & \quad \quad \quad T
 \end{aligned}$$

Equation 99. IMS MTAS Number of CAI3G Requests [per second]

$$\begin{aligned}
 & \text{IMSMtasNumberCAI3G Requests} = \\
 & (\text{MtasXdmsCai3gLoginOk} + \text{MtasXdmsCai3gCreateOk} + \\
 & \text{MtasXdmsCai3gDeleteOk} + \text{MtasXdmsCai3gGetOk} + \\
 & \text{MtasXdmsCai3gSetOk} + \text{MtasXdmsCai3gValidateCreateOk} + \\
 & \text{MtasXdmsCai3gValidateSetOk}) \\
 & \quad \quad \quad T
 \end{aligned}$$

Equation 100. IMS MTAS Number of XDMS CCMP Conf Requests [per second]

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$$\begin{aligned}
 & \text{IMSMtasNumberXDMSCCMPConf Requests} = \\
 & (\text{MtasXdmsCcmpConfCreateOk} + \\
 & \text{MtasXdmsCcmpConfDeleteOk} + \\
 & \text{MtasXdmsCcmpConfRetrieveOk} + \\
 & \text{MtasXdmsCcmpConfUpdateOk}) \\
 & \hline
 & T
 \end{aligned}$$

CCMP Centralized Conferencing Manipulation Protocol

**Equation 101. IMS MTAS Number of XDMS
CCMP User Requests [per second]**

$$\begin{aligned}
 & \text{IMSMtasNumberXDMSCCMPUser Requests} = \\
 & (\text{MtasXdmsCcmpUserCreateOk} + \\
 & \text{MtasXdmsCcmpUserDeleteOk} + \\
 & \text{MtasXdmsCcmpUserUpdateOk}) \\
 & \hline
 & T
 \end{aligned}$$

CCMP Centralized Conferencing Manipulation Protocol

**Equation 102. IMS MTAS Number of H.248
Requests to MRFP [per second]**

$$\begin{aligned}
 & \text{IMSMtasNumberH248 RequestsToMRFP} = \\
 & (\text{MtasMrfpOkAddReq} + \text{MtasMrfpOkModifyReq} + \\
 & \text{MtasMrfpOkSubtractReq} + \text{MtasMrfpOkAuditReq}) \\
 & \hline
 & T
 \end{aligned}$$

Note: Formula is expressed per key on MRFP ID, could also summarize all MRFP destinations.

**Equation 103. IMS MTAS Number of H.248
Requests from MRFP [per second]**

$$\begin{aligned}
 & \text{IMSMtasNumberH248 RequestsFromMRFP} = \\
 & (\text{MtasMrfpOkNotifyReq} + \text{MtasMrfpOkServiceChangeReq}) \\
 & \hline
 & T
 \end{aligned}$$

Note: Formula is expressed per key on MRFP ID, could also summarize all MRFP destinations.

**Equation 104. IMS MMTel AS Number of SIP
INVITE requests sent to external MRFC [per
second]**

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$$\frac{IMSMMTelASNumberInvitesToExtMRFC = MtasExtMrfcInviteOk}{T}$$

Note: Formula is expressed per key on Contact header field, could also summarize all contacts.

Equation 105. IMS MMTel AS Number of Media Server Control Markup Language (MSCML) requests sent to external MRFC [per second]

$$\frac{IMSMMTelASNumberMSCMLReqToExtMRFC = (MtasExtMrfcRequestOk + MtasExtMrfcRequestNOK)}{T}$$

Equation 106. IMS MMTel AS Number of Parlay X requests sent to Parlay X application [per second]

$$\frac{IMSMMTelASNumberParlayXRequests = MtasPxSentRequests}{T}$$

Note: Formula is expressed per key on interface request name, could also summarize interfaces.

Counter Name	Definition
MtasShRedirect	The number of Sh-Redirect (Dh) operations that were completed successfully. The counter is keyed on the Stack instance and either HSS destination host name (taken from the Request message) or HSS origin host name (taken from the Answer message). The format <Stack_instance>;<Destination_Host> or <Stack_instance>;<Origin_Host>.. Counter on MTAS node.
MtasShRedirectFailed	The number of failed Sh-Redirect (Dh) operations. The counter is keyed on the Stack instance and either HSS destination host name (taken from the Request message) or HSS origin host name (taken from the Answer message). The format <Stack_instance>;<Destination_Host> or <Stack_instance>;<Origin_Host>. Counter on MTAS node.

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Counter Name	Definition
MtasShPullOk	<p>The number of Sh-Pull operations that were completed successfully. The counter is keyed on the Stack instance and either HSS destination host name (taken from the Request message) or HSS origin host name (taken from the Answer message).</p> <p>The format: <Stack_instance>;<Destination_Host> or <Stack_instance>;<Origin-Host>. Counter on MTAS node.</p>
MtasShSubsNotifOk	<p>The number of Sh-Subs-Notif operations that were completed successfully. The counter is keyed on the Stack instance and either HSS destination host name (taken from the Request message) or HSS origin host name (taken from the Answer message).</p> <p>The format: <Stack_instance>;<Destination_Host> or <Stack_instance>;<Origin-Host>.</p>
MtasShNotifOk	<p>The number of Sh-Notif requests that were processed successfully. The counter is keyed on the Stack instance and either HSS destination host name (taken from the Request message) or HSS origin host name (taken from the Answer message).</p> <p>The format: <Stack_instance>;<Destination_Host> or <Stack_instance>;<Origin-Host>. Counter on MTAS node.</p>
MtasShUpdateOk	<p>The number of Sh-Update operations that were completed successfully. The counter is keyed on the Stack instance and either HSS destination host name (taken from the Request message) or HSS origin host name (taken from the Answer message).</p> <p>The format: <Stack_instance>;<Destination_Host> or <Stack_instance>;<Origin-Host>. Counter on MTAS node.</p>
MtasSipSummaryInRequests	<p>The total number of SIP requests received, including retransmissions. Counter on MTAS node.</p>
MtasSipSummaryOutRequests	<p>The total number of SIP request messages sent out (originated and relayed) by the SIP entity. Where a particular message is sent more than once, for example as a retransmission, or as a result of forking, each transmission is counted separately. Counter on MTAS node.</p>

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Counter Name	Definition
MtasSipSccOrigRequestIn	This counter is the total number of SIP requests received in originating SCC AS, including retransmissions. The counter is keyed on request method. Counter on MTAS node.
MtasSipSccOrigRequestOut	This counter is the the total number of SIP request messages sent out by the originating SCC AS. Where a particular message is sent more than once, for example, as a retransmission or as a result of forking, each transmission is counted separately. The counter is keyed on request method. Counter on MTAS node.
MtasSipSccTermRequestIn	This counter is the total number of SIP requests received in terminating SCC AS, including retransmissions. The counter is keyed on request method. Counter on MTAS node.
MtasSipSccTermRequestOut	This counter is the total number of SIP request messages sent out by the terminating SCC AS. Where a particular message is sent more than once, for example, as a retransmission or as a result of forking, each transmission is counted separately. The counter is keyed on request method. Counter on MTAS node.
MtasChargingAcrStartOk	The number of successfully initiated accounting sessions. Keyed on charging destination (destination realm or destination host). Counter on MTAS node.
MtasChargingAcrInterimOk	The number of successful ACR Interim requests. Keyed on charging destination (destination realm or destination host). Counter on MTAS node.
MtasChargingAcrEventOk	Number of successfully handled ACR (Event Record) messages. The counter is keyed on the charging destination (destination realm or destination host). Counter on MTAS node.
MtasChargingBackupStart	The number of charging start requests sent to backup. Keyed on charging destination (destination realm or destination host). Counter on MTAS node.
MtasChargingBackupInterim	The number of charging interim requests sent to backup. Keyed on charging destination (destination realm or destination host). Counter on MTAS node.
MtasChargingBackupStop	The number of charging stop requests sent to backup. Keyed on charging destination (destination realm or destination host). Counter on MTAS node.

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Counter Name	Definition
MtasChargingCcrInitOk	The number of successfully initiated online charging sessions. Keyed on charging destination (destination realm or destination host). Counter on MTAS node.
MtasChargingCcrUpdateOk	The number of successful CCR Update Requests. Keyed on charging destination (destination realm or destination host). Counter on MTAS node.
MtasChargingCcrFailover	The number of online charging sessions that could not use the charging server in the primary realm, and failed over to the secondary realm. Keyed on charging destination (destination realm or destination host). Counter on MTAS node.
MtasChargingRttiOk	Real-Time Transfer of Tariff Information (RTTI) has been signalled backward to MTAS and successfully provided into the Online Charging System (OCS). The counter is keyed on the DestinationRealm. Counter on MTAS node.
MtasChargingAcrStorageEvent	The number of charging event requests sent for storage. The counter is keyed on the charging destination (destination realm or destination host). The counter is incremented by 1 when a charging event request is sent for ACR storage. Counter on MTAS node.
MtasChargingAcrStorageInterim	The number of charging interim requests sent for storage. The counter is keyed on the charging destination (destination realm or destination host). The counter is incremented by 1 when a charging interim request is sent for storage. Counter on MTAS node.
MtasChargingAcrStorageStart	The number of charging start requests sent for storage. The counter is keyed on the charging destination (destination realm or destination host). The counter is incremented by 1 when a charging start request is sent for ACR storage. Counter on MTAS node.
MtasChargingAcrStorageStop	The number of charging stop requests sent for storage. The counter is keyed on the charging destination (destination realm or destination host). The counter is incremented by 1 when a charging stop request is sent for ACR storage. Counter on MTAS node.
MtasXdmsXcapGetOk	Contains the number of Ut interface XCAP GET requests that resulted in a successful response. Counter on MTAS node.
MtasXdmsXcapPutOk	Contains the number of Ut interface XCAP PUT requests that resulted in a successful response. Counter on MTAS node.

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Counter Name	Definition
MtasXdmsXcapDeleteOk	Contains the number of Ut interface XCAP DELETE requests that resulted in a successful response. Counter on MTAS node.
MtasXdmsCai3gLoginOk	Contains the number of CAI3G Login requests that resulted in a successful response. Counter on MTAS node.
MtasXdmsCai3gCreateOk	Contains the number of provisioning CAI3G Create requests that resulted in a successful response. The counter is keyed on the IP address of CAI3G Manager. Counter on MTAS node.
MtasXdmsCai3gDeleteOk	Contains the number of CAI3G Delete requests that resulted in a successful response. Counter on MTAS node.
MtasXdmsCai3gGetOk	Contains the number of CAI3G Get requests that resulted in a successful response. Counter on MTAS node.
MtasXdmsCai3gSetOk	Contains the number of provisioning CAI3G Set requests that resulted in a successful response. The counter is keyed on the IP address of CAI3G Manager. Counter on MTAS node.
MtasXdmsCai3gValidateCreateOk	Contains the number of Validate CAI3G Create requests that resulted in a successful or unsuccessful, because of not correct document, response. The counter is keyed on the IP address of CAI3G Manager. Counter on MTAS node.
MtasXdmsCai3gValidateSetOk	Contains the number of Validate CAI3G Set requests that resulted in a successful or unsuccessful, because of not correct document, response. The counter is keyed on the IP address of CAI3G Manager. Counter on MTAS node.
MtasXdmsCcmpConfCreateOk	Contains the number of CCMP confRequest operation create, that resulted in a successful response.
MtasXdmsCcmpConfDeleteOk	Contains the number of CCMP confRequest operation delete, that resulted in a successful response.
MtasXdmsCcmpConfRetreiveOk	Contains the number of CCMP confRequest operation retrieve, that resulted in a successful response.
MtasXdmsCcmpConfUpdateOk	Contains the number of CCMP confRequest operation update, that resulted in a successful response.
MtasXdmsCcmpUserCreateOk	Contains the number of CCMP UserRequest operation create, that resulted in a successful response.
MtasXdmsCcmpUserDeleteOk	Contains the number of CCMP UserRequest operation delete, that resulted in a successful response.

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Counter Name	Definition
MtasXdmsCcmpUserUpdateOk	Contains the number of CCMP UserRequest operation update, that resulted in a successful response.
MtasMrfpOkAddReq	Successfully sent AddRequest commands to an external MRFP peer. Keyed on MRFP ID. Counter on MTAS node.
MtasMrfpOkNotifyReq	The number of correct NotifyRequest commands received from an external MRFP peer. Keyed on MRFP ID. Counter on MTAS node.
MtasMrfpOkModifyReq	The number of successfully sent ModifyRequest commands to an MRFP peer. Keyed on MRFP ID. Counter on MTAS node.
MtasMrfpOkSubtractReq	The number of successfully sent SubtractRequest commands to an MRFP peer. Keyed on MRFP ID. Counter on MTAS node.
MtasMrfpOkAuditReq	The number of successfully sent AuditRequest commands to an MRFP peer. Keyed on MRFP ID. Counter on MTAS node.
MtasMrfpOkServiceChangeReq	The number of successfully received ServiceChange commands to an MRFP peer. Keyed on MRFP ID. Counter on MTAS node.
MtasExtMrfcInviteOk	The number of times a SIP INVITE sent to external MRFC is OK. The counter is keyed on the Contact header field received in 200 OK (INVITE). Counter on MTAS node.
MtasExtMrfcInviteRejected	The number of times a SIP INVITE sent to external MRFC is rejected. Counter on MTAS node.
MtasExtMrfcRequestOk	The number of times a Media Server Control Markup Language (MSCML) request is successfully executed by the external MRFC.
MtasExtMrfcRequestNOK	The number of times a Media Server Control Markup Language (MSCML) request is not executed by the external MRFC.
MtasPxSentRequests	The number of times Parlay X requests are sent to the Parlay X application. Counter on MTAS node.

Reference [1].

5 IMS SIP Signaling

SIP being the signalling protocol in IMS is the single most important protocol. The IMS Signaling formulas are supporting quality supervision of IMS signalling.

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5.1 IMS MTAS SIP Signalling Summary

IMS MTAS Signalling Summary indicators give an overall summary of SIP signaling in the MTAS node.

5.1.1 IMS MTAS SIP Client (Outgoing traffic)

T = measured/reported time in seconds

Equation 107. IMS MTAS SIP Requests Sent [per second]

$$IMSMTASSIP Requests Sent = \frac{MtasSipSummaryOutRequests}{T}$$

Equation 108. IMS MTAS SIP Responses Received [per second]

$$IMSMTASSIP Responses Received = \frac{MtasSipSummaryInResponses}{T}$$

5.1.2 IMS MTAS SIP Server (Incoming traffic)

Equation 109. IMS MTAS SIP Requests Received [per second]

$$IMSMTASSIP Requests Received = \frac{MtasSipSummaryInRequests}{T}$$

Equation 110. IMS MTAS SIP Responses Sent [per second]

$$IMSMTASSIP Responses Sent = \frac{MtasSipSummaryOutResponses}{T}$$

5.1.3 IMS SCC-AS SIP Client (Outgoing traffic)

T = measured/reported time in seconds

Equation 111. IMS SCC-AS SIP Requests Sent [per second]

$$IMSSCCASSIPClient Request Sent = \frac{(MtasSipSccOrigRequestOut + MtasSipSccTermRequestOut)}{T}$$

Equation 112. IMS SCC-AS SIP Responses Received [per second]

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$$IMSSCCASSIPClient\ Responses\ Received = \frac{(MtasSipSccOrigResponseIn + MtasSipSccTermResponseIn)}{T}$$

5.1.4 IMS SCC-AS SIP Server (Incoming traffic)

Equation 113. IMS SCC-AS SIP Requests Received [per second]

$$IMSSCCASSIPServer\ Req\ Received = \frac{(MtasSipSccOrigRequestIn + MtasSipSccTermRequestIn)}{T}$$

Equation 114. IMS SCC-AS SIP Responses Sent [per second]

$$IMSSCCASSIPServer\ ResponseSent = \frac{(MtasSipSccOrigResponseOut + MtasSipSccTermResponseOut)}{T}$$

5.1.5 IMS MTAS RS SIP Client (Incoming traffic)

T = measured/reported time in seconds

Equation 115. IMS MTAS RS Requests Received [per second]

$$IMSMTASRSSIP\ ReqIn = \frac{(MtasSipRsRequestIn)}{T}$$

Equation 116. IMS MTAS RS Responses Sent [per second]

$$IMSMTASRSSIP\ RespOut = \frac{(MtasSipRsResponseOut)}{T}$$

5.1.6 IMS MTAS RS SIP Server (Outgoing traffic)

T = measured/reported time in seconds

Equation 117. IMS MTAS RS Requests Sent [per second]

$$IMSMTASRSSIP\ ReqOut = \frac{MtasSipOrigRsRequestOut}{T}$$

Equation 118. IMS MTAS RS Responses Received [per second]

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$$IMSMTASRSSIPRe_{spIn} = \frac{(MtasSipOrigRsResponseIn)}{T}$$

Counter Name	Definition
MtasSipSummaryOutRequests	The total number of SIP request messages sent out (originated and relayed) by the SIP entity. Where a particular message is sent more than once, for example as a retransmission, or as a result of forking, each transmission is counted separately. Counter on MTAS node.
MtasSipSummaryInResponses	The total number of SIP responses received, including retransmissions. Counter on MTAS node.
MtasSipSummaryInRequests	The total number of SIP requests received, including retransmissions. Counter on MTAS node.
MtasSipSummaryOutResponses	The total number of SIP responses sent (originated and relayed), including retransmissions. Counter on MTAS node.
MtasSipSccOrigRequestIn	This counter is the total number of SIP requests received in originating SCC AS, including retransmissions. The counter is keyed on request method. Counter on MTAS node.
MtasSipSccOrigResponseIn	This counter is the total number of SIP responses messages received by the originating SCC AS. Counter on MTAS node.
MtasSipSccOrigRequestOut	This counter is the the total number of SIP request messages sent out by the originating SCC AS. Where a particular message is sent more than once, for example, as a retransmission or as a result of forking, each transmission is counted separately. The counter is keyed on request method. Counter on MTAS node.
MtasSipSccOrigResponseOut	This counter is the total number of SIP response messages sent out by the originating SCC AS. Counter on MTAS node.
MtasSipSccTermRequestIn	This counter is the total number of SIP requests received in terminating SCC AS, including retransmissions. The counter is keyed on request method. Counter on MTAS node.

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Counter Name	Definition
MtasSipSccTermResponseIn	This counter is the total number of SIP responses messages received by the terminating SCC AS. Counter on MTAS node.
MtasSipSccTermRequestOut	This counter is the total number of SIP request messages sent out by the terminating SCC AS. Where a particular message is sent more than once, for example, as a retransmission or as a result of forking, each transmission is counted separately. The counter is keyed on request method. Counter on MTAS node.
MtasSipSccTermResponseOut	This counter is the total number of SIP response messages sent out by the terminating SCC AS. Counter on MTAS node.
MtasSipRsRequestIn	The number of SIP responses received from the RS. Counter on MTAS node.
MtasSipRsResponseOut	The number of SIP responses sent from the RS. Counter on MTAS node.
MtasSipOrigRsRequestOut	The number of SIP requests sent to the RS. Counter on MTAS node.
MtasSipOrigRsResponseIn	The number of SIP responses received from the RS. Counter on MTAS node.

Reference [1].

6

References

- [1] TSP: MTAS Performance Measurements, 1/1553-AVA 90109/8 **
CBA: Managed Object Model (MOM), 155 54-LZN 765 0163/1-V1 **

** See the Customer or Support library for the Application System in question