

MTAS SS7 Management Guide

MTAS

USER GUIDE

Copyright

© Ericsson AB 2016. All rights reserved. No part of this document may be reproduced in any form without the written permission of the copyright owner.

Disclaimer

The contents of this document are subject to revision without notice due to continued progress in methodology, design and manufacturing. Ericsson shall have no liability for any error or damage of any kind resulting from the use of this document.

Trademark List

All trademarks mentioned herein are the property of their respective owners. These are shown in the document Trademark Information.



Contents

1	Introduction	1
1.1	Prerequisites	1
2	Overview	3
3	SS7 and SCTP Configuration	5
3.1	Get Started	5
3.2	Signalling Network Configuration	5
3.3	Configure TCAP	6
3.4	CAP and MAP Configuration	8
3.5	Configure SCTP	10
3.6	Activate the Configuration Changes	12
3.7	SCTP Link Failure	12





1 Introduction

This document describes how to enable and configure Signaling System 7 (SS7) stack for the MTAS.

1.1 Prerequisites

It is assumed that the user of this document is familiar with the Operation and Maintenance (O&M) area, in general.

The SS7 signaling network, up to SCCP-layer in the SS7 stack, is configured in the MTAS node.

1.1.1 Licenses

Not applicable.

1.1.2 Documents

Before starting any procedure in this document, ensure that the following documents are available:

- *Ericsson Command-Line Interface User Guide*
- *Managed Object Model (MOM)*
- *Signaling Manager User Guide*

1.1.3 Conditions

The following conditions must apply:

- An Ericsson Command-Line Interface (ECLI) session in Exec mode is in progress.
- The Signaling Manager is connected.





2 Overview

In MTAS, the transfer of CAMEL Application Part (CAP) and ETSI Mobile Application Part (MAP) operations is done through Signaling Transport over IP (SIGTRAN), that is, SS7 together with Stream Control Transmission Protocol (SCTP). Therefore MTAS can be configured with the SS7 stack using SCTP, Message Transfer Part User Adapt Layer (M3UA), Signalling Connection Control Part (SCCP), Transaction Capabilities Application Part (TCAP), IN Application Part (INAP) to enable CAP traffic and ETSI Mobile Application Part (MAP) to enable ETSI MAP traffic.

Throughout the document when “MAP” is used, it implies “ETSI MAP”.

Plain SCTP, that is without SS7, is used as the transport protocol in the H.248-based Mp interface. The interface is used between the integrated Media Resource Function Controller (MRFC) in MTAS and external Multimedia Resource Function Processors (MRFP) whenever multimedia session manipulation is needed.

The configuration of plain SCTP used for the H.248-based Mp interface is done during the installation of MTAS.

Note: One Front-End (FE) is required per node (both System Controllers and Payloads), where the first two FEs, that is, FE:1 and FE:2 are configured for SS7. The remaining FEs, that is, FE:3 to FE:N are configured for H.248. Same IP addresses (“tasvip”) are required on each FE for H.248. Distinct IP addresses are required for FE:1 and FE:2 for SS7. The two FEs configured for SS7 can either be configured for load sharing or redundancy.





3 SS7 and SCTP Configuration

The configuration of SS7 and SCTP is done using the Signaling Manager GUI and includes configuring Back Ends with the SS7 stack layers and connected Front Ends with SCTP.

The following scenarios are to be considered:

- Configure CAP/INAP when the MTAS node is deployed as an SCC AS and acts as a gsmSCF for Service Domain Selection (SDS), to assist MSC to select IMS as service domain for ICS users.
- Configure ETSI MAP when the MTAS node is deployed as an SCC AS without interface to HSS (IMS) and acts as a GMSC to interwork with HLR to retrieve MSRN routing number.
- Configure CAP/INAP when the MTAS node is deployed as an MMTel Telephony AS and it acts as a gsmSSF when interworking with IN services.

3.1 Get Started

This section describes activities for getting started with configuration.

3.1.1 Enable Expert Mode

Before continuing with the SS7 Configurations, make sure that the expert mode is enabled in the Signaling Manager.

To enable expert mode:

1. Open the Signaling Manager GUI.
2. Go to **Tools** and click the **Expert Mode** check box.

3.2 Signalling Network Configuration

A prerequisite is that the SS7 signaling network is configured before performing the tasks in the following sections. This configuration includes the following stack layers:

- M3UA
- SCCP

How to connect M3UA and SCTP is described briefly in Section 3.5 Configure SCTP on page 10.



The MTAS specifics to be considered when configuring the SS7 signaling network is listed in the following subsections:

3.2.1 SCCP Layer

The Subsystem Number (SSN) selected for gsmSSF user in the local SCCP SAP must match with the configured SSN in MTAS, `mtasCsiSsfSubsystemNumber`.

The Subsystem Number (SSN) selected for the remote SCCP SAP must match with the configured SSN in MTAS, `mtasCsiRemoteScfSubsystemNumber`.

The Subsystem Number (SSN) selected for gsmSCF user in the local SCCP SAP must match with the configured SSN in MTAS, `mtasCsiScfSubsystemNumber`.

Based on the configuration description in this document, it is assumed that `mtasCsiSsfSubsystemNumber` and `mtasCsiScfSubsystemNumber` are not configured to same subsystem number.

The Subsystem Number (SSN) selected for GMSC user in the local SCCP SAP must match with the configured SSN in MTAS, `mtasCsiMapGmscSubsystemNumber`.

A GT Translator must be configured for the Local SPC that matches with the global title encoding for called party that is used in the MTAS CSI subsystem.

This process means the following:

- When `mtasCsiMapCdGti=1`: `mtasCsiMapCdNai` must match with configured Nature of Address.
- When `mtasCsiMapCdGti=2`: `mtasCsiMapCdTt` must match with configured Translation Type.
- When `mtasCsiMapCdGti=3`: `mtasCsiMapCdTt` and `mtasCsiMapCdNp` must match with configured Translation Type and Numbering Plan.
- When `mtasCsiMapCdGti=4`: `mtasCsiMapCdTt`, `mtasCsiMapCdNp`, and `mtasCsiMapCdNai` must match with configured Translation Type, Numbering Plan, and Nature of Address.

When creating a Signaling Network for ETSI MAP set the Network Standard same as selected in MTAS CSI subsystem, `mtasCsiMapSccpStandard` (ITU or ANSI).

3.3 Configure TCAP

To configure TCAP layer in the SS7 stack:



1. Open a Signaling Manager GUI.
2. Choose the **Tools** menu and select **Configuration Mode > Initial** in Expert mode.
3. Go to **Signaling System**, select **TCAP**.
4. Check the recommended values are set for TCAP:

Set **Max Number Of Subsystems** to 5.

Three subsystems are currently supported in MTAS and two are used as reserve, that is, this parameter is set to 5.

The **Max Number of TC users per Subsystem** depends the platform size. For a platform with five Payloads, set **Max Number Of TC-users per Subsystem** to 10.

There are five TC users per SSN since there is one TC user per SSN per Payload. There are five connections since each TC user connects to each BE and there one BE per Payload. There are five BEs since one BE per Payload, and five in reserve. The calculation is as follows for node with five Payloads: $5 \times 5 / 5 + 5 = 10$. Follow the same logic when calculating this value for other configurations.

Example

For node with 26 Payloads, set **Max Number of TC users per Subsystem** to 32.

26 TC users per SSN, since one TC user per SSN per Payload.

26 Connections, since each TC user connects to each BE and there is one BE per Payload.

26 BEs since one BE per Payload.

Five in reserve

$26 \times 26 / 26 + 5 = 31$ and round up to 32 for memory alignment.

The **Max Number of Dialogues per Subsystem** depends on the use of CAP and MAP. Below are some examples on how to calculate this value. The examples below are based on engineered call capacity per Payload and average call setup time + 25% reserve or engineered call capacity per Payload and average call length + 25% reserve. CAP or MAP signaling is for some use cases only done during call setup but can, for example, for IN/CAMEL prepaid scenario, be done during the complete call and then same TCAP dialogue ID is kept until call is ended. The operator needs to configure the number of dialogues based on the scenario is used by their system.

Set **Max Number Of Dialogues per Subsystem** to n .

The number n depends on the scenario used by the system and is to be calculated in a similar way as in the following examples.

In the created TCAP Subsystem, set **Max Number Of Dialogues** based on engineered call capacity per TP and the average call setup time + 25% reserve as follows:

- TCAP Subsystem for SCC AS SCF application, $SSN=mtasCsiScfS$ $ubsystemNumber$ the call setup time is the time between incoming CAP IDP request and outgoing CAP CON response, for example:
 $150calls/s * 15ms + 25\% = 3$ or $150calls/s * 30ms + 25\% = 6$
- TCAP Subsystem for SCC AS GMSC application, $SSN=mtasCsiMapGmscSubsystemNumber$ the call setup time is the time to get a response on MAP SRI request from SCC AS to HLR, for example:
 $150calls/s * 0,5s + 25\% = 94$ or $150calls/s * 2s + 25\% = 375$
- TCAP Subsystem for MMTel Telephony AS and IN/CAMEL prepaid scenario, $SSN=mtasCsiSsfSubsystemNumber$, the average call length used here is 195 s, 60 calls/s assumes to give 60% CPU load for CAMEL Prepaid, for example $60calls/s * 195s + 25\% = 14625$
- TCAP Subsystem for MMTel Telephony AS and IN/CAMEL VPN scenario, $SSN=mtasCsiSsfSubsystemNumber$, the average call setup used here is 5 s, 60 calls/s assumes to give 60% CPU load for CAMEL VPN, for example $60calls/s * 5s + 25\% = 375$
- TCAP Subsystem for MMTel Telephony AS and IN/CAMEL Play Announcement (PA) scenario, $SSN=mtasCsiSsfSubsystemNumber$, the average call setup used here is 10 s, a 10 s long announcement is assumed, 60 calls/s assumes to give 60% CPU load for CAMEL PA, for example $60calls/s * 10s + 25\% = 750$

Set **Max Number of Concurrent Operations per Dialogue** to 1000.

Set **Timer Dialogue** to 0 meaning that this timer is not used.

5. Go to **TCAP Subsystems**.
6. Right-click **TCAP Subsystems**, select **Add**.

Create a TCAP Subsystem for each application to be configured.

For example, if SCC AS CAP and MAP and MMTel Telephony AS CAP is to be used in the system, then three TCAP subsystems must be added with the same configured values in the CMs as mentioned in Section 3.2.1 SCCP Layer on page 6.

7. Validate the configuration with **Edit** menu, select **Validate**.

3.4 CAP and MAP Configuration

This section describes how to configure CAP/INAP and ETSI MAP in the SS7 stack.



3.4.1 Configure INAP

This section describes how to add INAP and connect it to a TCAP-subsystem, to bind a CSI subsystem.

To add INAP and connect it to a TCAP-subsystem:

1. Open a Signaling Manager GUI.
2. Choose the **Tools** menu and select **Configuration Mode > Initial** in Expert mode.
3. Go to **Signaling System**, select **INAP**.
4. Check the recommended values are set for INAP:

Set **Max Subsystems** to 3.

Two INAP/CAP applications are currently supported in MTAS and one is added in reserve.

Set **Max Dialogues** in the same way as described in Section 3.3 Configure TCAP on page 6 for **Max Number of Dialogues**.

Set **Unbind At Broken Connection** to **No**, to be able to resume CAP traffic after restart and sudden crash of the `SS7DistributorProcess`. This configuration must be changed to **yes** before running upgrade and changed back to **No** after upgrade.

5. Right-click **INAP > INAP > INAP Subsystem** and select **Add**. Set the same subsystems applicable for INAP, as set in Section 3.2.1 SCCP Layer on page 6 and if both INAP and CAP in SCC AS, that is, the SCF role and INAP/CAP in MMTel Telephony AS, that is, the SSF role are used in the system, then two INAP subsystems must be added
6. Validate the configuration with **Edit** menu and select **Validate**.

3.4.2 Configure ETSI MAP

This section describes how to add ETSI MAP subsystem and connect it to a TCAP subsystem, to bind a CSI subsystem.

To add ETSI MAP and connect it to a TCAP-subsystem:

1. Open a Signaling Manager GUI.
2. Choose the **Tools** menu and select **Configuration Mode > Initial** in Expert mode.
3. Go to **Signaling System**, select **ETSI MAP**.
4. Check the recommended values are set for **ETSI MAP**

Set **Max Subsystems** to 2

One ETSI MAP application is supported in MTAS and one is used as reserve.

Set the **Max Dialogues** in the same way as described in Section 3.3 Configure TCAP on page 6 for **Max Number of Dialogues**.

Set **Unbind At Broken Connection** to **Yes**, to be able to resume MAP traffic after restart, upgrade, and sudden crash of the `SS7MapDistributorProcess`.

5. Right-click **ETSI MAP > ETSIMAP > ETSIMAP Subsystems** and select **Add**. Set the same Subsystems applicable for MAP as set in Section 3.2.1 SCCP Layer on page 6. Only MAP in SCC AS is supported in MTAS, so only one can be configured.
6. Validate the configuration with **Edit** menu and select **Validate**.

3.5 Configure SCTP

This section describes the configuration of the SCTP FE instances for SS7 and H.248. The SCTP configuration for H.248 that was automatically done during installation. Before starting the configuration, the following preconditions apply:

- The IP addresses must be known. The local IP address is the assigned Virtual IP (VIP) address for the SCTP FE.
- To use SCTP with H.248, all SCTP (EP) instances need to use the same VIP address.
- To use SCTP with M3UA (SIGTRAN), all SCTP (EP) instances need to have distinct VIP addresses. In case of distributed EPs, each distributed EP has to have distinct VIP addresses.
- For simultaneous use of SCTP with H.248 and M3UA several local IP addresses (VIP), need to add per SCTP (FE) instance, as follows:
 - A local IP address (VIP) for H.248 that is the same in all SCTP instances

The selected VIP must be the same as the traffic VIP as configured during the MTAS installation. Depending on the IP configuration (IPv4 or IPv6), select either the “tasvip4” or the “tasvip6” address.

For information on how to access the traffic VIP, refer to *MTAS SIP Management Guide*.



Note: If any of the following VIPs are defined during MTAS installation, SCTP EPs are created automatically installation time on all SCTP FEs:

- tasvip4
- tasvip6

- A set of local IP addresses (VIP) for M3UA that are different in all SCTP EP or distributed EP instances.

Note: If any of the following VIPs are defined during MTAS installation, distributed SCTP EPs are created automatically installation time on all SCTP FEs:

- sigtran1-vip4
- sigtran1-vip6
- sigtran2-vip4
- sigtran2-vip6

To configure SCTP:

1. Open a Signaling Manager GUI.
2. Choose the **Tools** menu and select **Configuration Mode > Initial in Expert** mode.
3. Go to **Signaling System**.
4. Right-click **SCTP FE:3 > SCTP End Points**, select **Add**. A new **SCTP EP** with a **Local Address Table** is added.
5. In the newly added **SCTP EP**, set the **Used by M3UA** to **Yes**.
6. In the newly added **Local Address Table**, right-click **Expand**. In **Local Address Table > SCTP Local Address > undef**, field **Address**, fill in one of the distinct IP addresses for M3UA, for example the IP addresses of sigtran1-vip4 and sigtran1-vip6 VIPs.
7. Right-click **SCTP FE:3 > SCTP End Points**, select **Add**. A new **SCTP EP** with a **Local Address Table** is added.
8. In the newly added **SCTP EP**, set the **Used by M3UA** to **Yes**.
9. In the newly added **Local Address Table**, right-click **Expand**. In **Local Address Table > SCTP Local Address > undef**, field **Address**, fill in the other distinct IP addresses for M3UA to have a redundant configuration. For example, the IP addresses of sigtran2-vip4 and sigtran2-vip6 VIPs.
10. In **M3UA IETF > M3UA > Local SPs > LocalSp#1 and LocalSp#2**, verify the **Sctp End Point** set with the two distinct IP addresses for M3UA.



11. Repeat the steps 4, 6, 7, and 9 for every **SCTP FE** with the same IP address set.

Note: In case of distributed EPs, it is important to set the same IP address set for all EPs relating to the same distributed EP.

Also important to set only once for each distributed EP, only at **SCTP FE:3** the **Used by M3UA** to **Yes**

12. Validate the configuration with **Edit** menu and select **Validate**.

3.6 Activate the Configuration Changes

To activate the configuration changes:

1. In Signaling Manager GUI, go to **Tools** and select **Process view**
2. Select **Configure > Initial configuration** and click **OK**
3. Select **Restart the stack**

Wait until active indication is shown in the bottom left corner of the Signaling Manager.

4. Make a normal backup to back up the updated cnf files.

3.7 SCTP Link Failure

If there is no traffic on an SCTP link, MTAS detects the SCTP link failure based on the values of SCTP parameters `TimerHeartBeat` and `AssocMaxRTX`.

The `TimerHeartBeat` (time in milliseconds) parameter affects the period to send the SCTP HEARTBEAT message on an inactive SCTP link. A small value decreases the time before detecting an unreachable address. However, sending heartbeat messages often, it can lead to performance penalty.

The `AssocMaxRTX` parameter specifies the maximum number of consecutive retransmissions to a remote peer. If the number of retransmissions becomes greater than this value, the remote peer is considered unreachable and the association is closed down. The `AssocMaxRTX` parameter must be greater than or equal to `PathMaxRTX`. For further details on SCTP parameters in MTAS, refer to *Configuring SS7, SCTP*

For MTAS configuration, the following parameter values are recommended:

- `TimerHeartBeat=6000`
- `AssocMaxRTX=3`
- `PathMaxRTX=3`

With this parameter setting, MTAS detects the SCTP link failure in about 18 seconds.