

Configure SS7 for ENUM Number Portability

OPERATING INSTRUCTIONS

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1 Introduction

This document is a guideline that provides an example of configuring the Signaling System #7 (SS7) stack layers for IPWorks ENUM Number Portability (NP).

Note: Two options to configure SS7 when IPWorks is already scaled out:

- If the IPWorks capacity is permitted, perform scale-in operation first to be 2 x SCs (SC-1 and SC-2) and 2 x PLs (PL-3 and PL-4) deployment, then configure SS7.
- Contact IPWorks support.

1.1 Target Groups

This document is intended for the installation personnel.

1.2 Related Information

Trademark information, typographic conventions, and definition and explanation of abbreviations and terminology can be found in the following documents:

- Trademark Information
- Typographic Conventions
- Glossary of Terms and Acronyms





2 Prerequisites

This section describes the prerequisites required for the configuration.

2.1 Documents

Before using this document to perform the SS7 configuration, the users are required to read the following documents:

- Signaling Manager User Guide

2.2 Users

The installation personnel are required to have prior knowledge about:

- Intermediate UNIX and Linux skills
- SS7 knowledge

2.3 Tool

The stack can be configured by using the GUI tool:

- Signaling Manager: It is a Java tool delivered with the TE stack.

Note: Ensure that the target host supports GUI mode.

2.4 Condition

- Ensure that the SS7 CAF is installed and running normally.

```
# cmw-status -v su | grep -i ss7 -A 4
```

```
safSu=SC-2,safSg=2N,safApp=ERIC-ss7caf.mgmt
  AdminState=UNLOCKED(1)
  OperState=ENABLED(1)
  PresenceState=INSTANTIATED(3)
  ReadinessState=IN-SERVICE(2)
--
safSu=SC-1,safSg=2N,safApp=ERIC-ss7caf.mgmt
  AdminState=UNLOCKED(1)
  OperState=ENABLED(1)
  PresenceState=INSTANTIATED(3)
  ReadinessState=IN-SERVICE(2)
--
```



```

safSu=PL-4,safSg=NWA,safApp=ERIC-ss7caf.core
  AdminState=UNLOCKED(1)
  OperState=ENABLED(1)
  PresenceState=INSTANTIATED(3)
  ReadinessState=IN-SERVICE(2)
--
safSu=PL-4,safSg=2N,safApp=ERIC-ss7caf.netwcontrol
  AdminState=UNLOCKED(1)
  OperState=ENABLED(1)
  PresenceState=INSTANTIATED(3)
  ReadinessState=IN-SERVICE(2)
--
safSu=PL-3,safSg=NWA,safApp=ERIC-ss7caf.core
  AdminState=UNLOCKED(1)
  OperState=ENABLED(1)
  PresenceState=INSTANTIATED(3)
  ReadinessState=IN-SERVICE(2)
--
safSu=PL-3,safSg=2N,safApp=ERIC-ss7caf.netwcontrol
  AdminState=UNLOCKED(1)
  OperState=ENABLED(1)
  PresenceState=INSTANTIATED(3)
  ReadinessState=IN-SERVICE(2)

```

For how to check IPWorks software information, refer to [View Software Information](#).

2.5 Configuring Signaling Manager

To configure the tool Signaling Manager, do the following:

1. Log on to the SC-1.

```
# ssh root@<SC-1 IP address>
```

2. Configure `cp.manager.address` in the Signaling Manager configuration file `signmgr.cnf`.

```
# vi /opt/sign/etc/signmgr.cnf
```

Configure `cp.manager.address`:

```
cp.manager.address=ss7cafcpmaddress:6669
```

3. Start the Signaling Manager on the SC-1.

```
# /opt/sign/EABss7050/bin/signmgrui -own.conf /opt/sign/etc/signmgr.cnf &
```


**Note:**

- If the JAVA cannot be found, use the command **export JAVA_HOME=/opt/sign/EABss7069/jre**
- If no X11 DISPLAY variable was set, try to log out the SC-1, and then log on again by using the -X option:

```
# ssh -X root@<SC-1 IP Address>
```

2.6 Configuring ERH SS7

To configure the ERH SS7, do the following:

1. Log on to the ECLI on an active SC.

```
# ssh <username>@<active SC IP address> -t -s cli
```

2. Configure the ErhSs7 MO.

```
>configure
(config)> dn ManagedElement=<Node Name>,IpworksFunction=1,IpworksDnsRoot=1,IpworksEnumRoot=1,EnumServer=1,Erh=1,ErhSs7=1
(config-ErhSs7=1)>cpManager=ss7cafcpmaddress:6669
(config-ErhSs7=1)>numOfBindBEs=10
(config-ErhSs7=1)>numOfErh=10
(config-ErhSs7=1)>Log=1,level=LOG_LEVEL_INFO
(config-ErhSs7=1)>commit
```

3. Verify the changes.

Example:



```
(config-ErhSs7=1)>show -v
ErhSs7=1
ainQualityOfService=3 <default>
cpInstanceId="PL-3:1|PL-4:2" <default> <obsolete>
cpManager="ss7cafcpmaddress:6669" <default>
cpManagerPeerHost="127.0.0.1:6669" <default> <obsolete>
enableCustomizedDigTable=false <default>
enableHA=true <default> <obsolete>
erhSs7Id="1"
formatFlag=false <default>
inapApplicationContextType=CS1 <default>
inapDigitTable="0x0=0,0x1=1,0x2=2,0x3=3,0x4=4,0x5=5,0x6=6,0x7=7,0x8=8,0x9=9,0xA= ,0xB=b,0xC=c,
inapFilterRNOofDestRoutingAddr=false <default>
InterrogationType=BASIC <default>
logFileName="ipwerh.log" <default>
mapDigitTable="0x0=0,0x1=1,0x2=2,0x3=3,0x4=4,0x5=5,0x6=6,0x7=7,0x8=8,0x9=9,0xA=*,0xB=#,0xC=a,0
MAPMessage=MAP_ATI <default>
mcc3bitMNCPAIR="302-656|374-130|374-140|714-020" <default>
mccWith3bitMNC="310|311|316|334|338|342|344|346|348|365|376|708|722|732|750" <default>
MSRMode=NOFURTHERHANDLING <default>
numOfBindBEs=10 <default>
numOfErh=10 <default>
remoteSSN=0 <default>
returnWholeMSRN=RONLY <default>
RNLength=[] <empty>
Log=1
```

4. Exit the ECLI session.
5. Log on to a PL board, and restart the ENUM server.

```
#ssh <username>@<PL IP Address>
```

```
#ipw-ctr stop enum <PL hostname>
```

```
#ipw-ctr start enum <PL hostname>
```



3 Procedure

This section provides an example of configuring ENUM Number Portability.

3.1 Presupposition Value

The section lists the presupposition value that is used as an example for the configuration.

- Standard: ITU Network
- SS7 Scenario: HD
- SS7 Configuration: SIGTRAN
- Signaling Protocol: Choose one of the following protocols:
 - INAP
 - MAP
 - AIN
- Use “national format”
- Local Host
 - Local Host name: PL-3
 - Local Host SS7 eVIP Traffic IP Address: 10.170.57.95
- Partner Host
 - Partner Host Name: PL-4
 - Partner Host SS7 eVIP Traffic IP Address: 10.170.57.95

For more information about the eVIP Traffic IP address (<VIP_SS7_IP1>), refer to the section Exported IP Addresses in document [IPWorks Network Connectivity Overview](#).

- Remote Host
 - Remote Host Name: linux-yt49
 - Remote SP IP Address: 10.0.50.18
 - Local Port Number: 2905, 2906
 - Remote Port Number: 2905



- Local SSN:
 - For MAP: 8
 - For INAP: 7
- Local SPC: 200
- Remote SSN: 6
- Remote SPC: 100
- GT Translation Type: 123

3.2 Starting from Template Configuration File

To start from the configuration template, do the following:

1. Log on to SC-1, and copy the template files from PL-3 to SC-1.

```
# ssh root@<SC-1 IP address>
```

```
# scp root@PL-3:/opt/ipworks/enum/others/Ss7caf_hd_inap.cim  
/opt/sign/cnf_template/
```

```
# scp root@PL-3:/opt/ipworks/enum/others/Ss7caf_hd_map.cim  
/opt/sign/cnf_template/
```

```
# scp root@PL-3:/opt/ipworks/enum/others/Ss7caf_hd_ain.cim  
/opt/sign/cnf_template/
```

2. After the main Signaling Manager window pops up, select **File > New** from the menu bar.
3. Choose a .cim file in the **Template** tab.
 - If the signaling protocol is INAP, choose /opt/sign/cnf_template/Ss7caf_hd_inap.cim.
 - If the signaling protocol is MAP, choose /opt/sign/cnf_template/Ss7caf_hd_map.cim.
 - If the signaling protocol is AIN, choose /opt/sign/cnf_template/Ss7caf_hd_ain.cim.
4. Select **Tools > Expert Mode** and **Tools > Configuration Mode > Initial**.

Note: **Expert Mode** enables all properties to be visible in the Signaling Manager.



3.3 Configuring INAP (Only for INAP)

Note: Follow the step if the signaling protocol is INAP; otherwise, skip the step.

Set the value of INAP according to the following table:

Table 1 Configure INAP

Navigation Pane	Operation Pane Properties	Value
INAP > INAP > INAP Subsystems > INAP Subsystem:7	Tcap Subsystem	TCAP Subsystem:7

3.4 Configuring ETSI MAP (Only for MAP)

Note: Follow the step if the signaling protocol is MAP; otherwise, skip the step.

Set the value of ETSI MAP according to the following table:

Table 2 Configure ETSI MAP

Navigation Pane	Operation Pane	Value
ETSI MAP > ETSIMAP > ETSIMAP Subsystems > ETSIMAP Subsystem:8	Tcap Subsystem	TCAP Subsystem:8
ETSI MAP > ETSIMAP	ML Timer	600

3.5 Configuring System Components

Set the value of system components according to the following table:

Before configuring system components, ensure that the Expert Mode is activated from Tools menu.

Table 3 Configure System Components

Navigation Pane	Operation Pane Properties	Value
System Components > System Components	CP Manager Address	ss7cafcpmaddress:6669
System Components > System Components > CP > CP	EVIP	On
System Components > System Components > CP > CP	If Alias	On
System Components > System Components > CP > CP	Msg Conn Time Wait	25
System Components > System Components > ECM > ECM	Connection Time Wait	25
System Components > System Components > ECM > ECM > Process Classes > SCTP FEP	Command	/opt/sign/EABss7052/bin/f e_sctp -e 255 -u 161 -a 1 -o 5 -w 5



Navigation Pane	Operation Pane Properties	Value
System Components > System Components > ECM > ECM > Process Classes > GEN RP	Command	/opt/sign/EABss7053/bin/be -b 3 -u 161 -a 5 -o 1 -d 0 -w 5
System Components > System Components > ECM > ECM > Process Classes > NMP	Command	/opt/sign/EABss7053/bin/be -b 2 -e 255 -u 161 -a 1 -w 5
System Components > System Components > ECM > ECM > Process Classes > OAMP	Command	/opt/sign/EABss7049/bin/oam -m -c /opt/sign/etc/oam.cnf -w 5
System Components > System Components > ECM > ECM > Process Classes > LOGD	Command	/opt/sign/EABss7049/bin/logd
System Components > System Components > ECM > ECM > Process Classes > SAFOAM	Command	/opt/sign/EABss7038/bin/cm-agent --mode=ntf-agent

3.6 Configuring TCAP (Only for INAP and MAP)

Note: Follow the step if the signaling protocol is INAP or MAP; otherwise, skip the step.

Set the value of TCAP according to the following table:

Table 4 Configure TCAP (Only for INAP)

Navigation Pane	Operation Pane Properties	Value
TCAP > TCAP > TCAP Subsystems > TCAP Subsystem:7	Subsystem Number	7
	Sccp Sap	SSN:7

Table 5 Configure TCAP (Only for MAP)

Navigation Pane	Operation Pane Properties	Value
TCAP > TCAP > TCAP Subsystems > TCAP Subsystem:8	Subsystem Number	8
	Sccp Sap	SSN:8

3.7 Configuring TCAP ANSI (Only for AIN)

Note: Follow the step if the signaling protocol is AIN; otherwise, skip the step.

Set the value of TCAP ANSI according to the following table:

Table 6 Configure TCAP ANSI

Navigation Pane	Operation Pane Properties	Value
TCAP ANSI > TCAP ANSI > TCAP ANSI Subsystems > TCAP ANSI Subsystem:7	Subsystem Number	7
	Sccp Sap	SSN:7



3.8 Configuring Sign Networks

Set the value of Sign Networks according to the following table:

Table 7 Configure Sign Networks

Navigation Pane	Operation Pane Properties	Value
Sign Networks > Network #1 > SCCP SAPs > Network #1, SSN:8	Subsystem Number	8
Sign Networks > Network #1 > Remote Sign Points > NetworkID: 1, RemoteSPC: 100	Remote SPC	100
Sign Networks > Network #1 > Local Sign Points > NodeID:0, LocalSPC: 200	Local SPC	200
Sign Networks > Network #1 > Local Sign Points > Local SPC: 200 > SCCP Sign Point > SCCP > Local SAPs > LocalSPC: 200, SSN 8	Subsystem Number	8
	Sccp Sap	NetworkID # 1, SSN: 8
Sign Networks > Network #1 > Local Sign Points > Local SPC: 200 > SCCP Sign Point > SCCP > Remote SAPs > RemoteSPC: 100, SSN 6	Remote SPC	100
	Subsystem Number	6
	Remote Sign Point	NetworkID: 1, RemoteSPC: 100
Sign Networks > Network #1 > Local Sign Points > Local SPC: 200 > SCCP Sign Point > SCCP > Entitysets > Prim:RemoteSPC: 100 SSN: 6	Primary Sap	RemoteSPC: 100, SSN: 6
Sign Networks > Network #1 > Local Sign Points > Local SPC: 200 > SCCP Sign Point > SCCP > GT Translators > 2,123,*-->Prim:RemoteSPC: 100, SSN: 6	Translation Type ⁽¹⁾	123
	Numbering Plan	Not Used ⁽²⁾
	Nature of Address	Not Used ⁽³⁾
	Number Series ⁽⁴⁾	*
	Primary Termination Indicator	Change to 'Route On SSN'.
	Entityset	Prim:RemoteSPC: 100 SSN: 6

(1) The value must be the same as the **Translation Type Value** specified when uses create MAPData through ipwcli. It is related to provisioning, and users can refer to **ITU-T Rec. Q.713**.

(2) If the users assign the attribute **Nature of to Address** as **International number** for SCCP layer in SS7, must select **E163 / E164 (ISDN)** from the **Numbering Plan** list.

(3) If the users only want to apply the “international format” for SCCP layer in SS7, must select **International number** from the **Nature of Address** list.

(4) Set the Number Series, Primary Termination Indicator, and Entityset by referring to **Reconfiguring SS7 Network, Creating and Defining GT Routing**

3.9 Configuring SCTPs

Set the value of Sctp according to the following table:



Table 8 Configure SCTPs

Navigation Pane	Operation Pane Properties	Value
SCTPs > Sctp FE > Sctp End Points > FE : Local Address Table #1	Port Number	2905 ⁽¹⁾
SCTPs > Sctp FE > Sctp End Points > FE : Local Address Table #1	Used By M3	No
SCTPs > Sctp FE > Sctp End Points > FE : Local Address Table #1	Sctp End Point Profile	Sctp End Point Profile #0
SCTPs > Sctp FE > Sctp End Points > FE : IP Address Table #1 > Sctp Local Address	Address	10.170.57.95
SCTPs > Sctp FE > Sctp End Points > FE : Local Address Table #2	Port Number	2906 ⁽¹⁾
SCTPs > Sctp FE > Sctp End Points > FE : Local Address Table #2	Used By M3	No
SCTPs > Sctp FE > Sctp End Points > FE : Local Address Table #2	Sctp End Point Profile	Sctp End Point Profile #0
SCTPs > Sctp FE > Sctp End Points > FE : Local Address Table #2 > SctpLocal Address	Address	10.170.57.95

(1) IPWorks Dynamic Sctp default port for SS7CAF, which is used in SIP with restricted range as 1025-65535.

3.10 Configuring M3UA IETF

Set the value of the M3UA IETF according to the following table:

Table 9 Configure M3UA IETF

Navigation Pane	Operation Pane Properties	Value
M3UA IETF > M3UA	Distributed End Point Support	On
M3UA IETF > M3UA > Local ASes > LocalAS#1 LocalSPC:200	Local Sign Point	NodeID: 0, LocalSPC: 200
M3UA IETF > M3UA > Local ASes > LocalAS#1 LocalSPC:200 > Local Routing Key > RK#1 NA:0 > Groupings > Grouping OPC:200 > Destination SPCs > RemoteSPC:100 in RoutingKeyID:1	Remote Sign Point	NetworkID: 1, RemoteSPC: 100
M3UA IETF > M3UA > Local SPs > LocalSP#1 TYPE:	Sctp End Point	FE: Local Address Table #1
M3UA IETF > M3UA > Local SPs > LocalSP#2 TYPE:	Sctp End Point	FE: Local Address Table #2
M3UA IETF > M3UA > Remote SPs > RemoteSP#1 Type:IPSP serves RemoteAS#40001 > Remote SP Address	Address	10.0.50.18
M3UA IETF > M3UA > Remote SPs > RemoteSP#2 Type:IPSP serves RemoteAS#40001 > Remote SP Address	Address	10.0.50.18
M3UA IETF > M3UA > Remote SPs > RemoteSP#1 Type:IPSP serves RemoteAS#40001	Port Number	2905 ⁽¹⁾



Navigation Pane	Operation Pane Properties	Value
M3UA IETF > M3UA > Remote SPs > RemoteSP#1 Type:IPSP serves RemoteAS#40001	Primary Local Ip Address	10.170.57.95
	Primary Remote Ip Address	10.0.50.18
M3UA IETF > M3UA > Remote SPs > RemoteSP#2 Type:IPSP serves RemoteAS#40001	Port Number	2905 ⁽¹⁾
M3UA IETF > M3UA > Remote SPs > RemoteSP#2 Type:IPSP serves RemoteAS#40001	Primary Local Ip Address	10.170.57.95
	Primary Remote Ip Address	10.0.50.18

(1) The port number of the Remote Server Process (RemoteSP). Default: 2905.

3.11 Validating and Restarting SS7 Stack

To validate and restart the SS7 stack, do the following:

1. Validate the configuration by choosing **Edit > Validate**.
2. If there are validation errors, click **Results** to view error description and go to the respective configuration.
3. Select **Process View...** in the **Tools** menu, then click the **Configure** button in the process view dialog box and choose **Initial Configuration**.
4. Generate the configuration files on the GEP machine in Signaling Manager.

Select **Tools>Process View...>Configure**

5. Restart the SS7 Stack according to different deployment scenarios.

```
SC-X: # amf-adm restart safSu=SC-1,safSg=2N,safApp=ERIC-ss7caf.mgmt
```

```
SC-X: # amf-adm restart safSu=SC-2,safSg=2N,safApp=ERIC-ss7caf.mgmt
```

```
SC-X: # amf-adm restart safSu=PL-3,safSg=2N,safApp=ERIC-ss7caf.netwcontrol
```

```
SC-X: # amf-adm restart safSu=PL-3,safSg=NWA,safApp=ERIC-ss7caf.core
```

```
SC-X: # amf-adm restart safSu=PL-4,safSg=2N,safApp=ERIC-ss7caf.netwcontrol
```

```
SC-X: # amf-adm restart safSu=PL-4,safSg=NWA,safApp=ERIC-ss7caf.core
```

6. Select **File > Connect** and make sure that the status is **Active** in the status bar.
7. Select **Process View...** in the **Tools** menu, then click the **Restart stack** button in the process view dialog box. Ensure that all stack processes are running.



8. Save the configuration file as another name by selecting **File> Save As**.

- If the signaling protocol is INAP, save as `ss7hd_inap.cim`.
- If the signaling protocol is MAP, save as `ss7hd_map.cim`.
- If the signaling protocol is AIN, save as `ss7hd_ain.cim`.

9. Close the Signaling Manager.

Note: The configuration of SS7 stack on the remote machine might be different for different vendors. Therefore, the detailed procedure is out of scope of this document.

3.12 Verifying Stack Configuration

Before verifying stack configuration, make sure that the presupposition values in Section 3.1 on page 7 are configured correctly, and all stack processes in remote machine are running.

To verify whether the stack configuration is correct, do the following:

Note: Perform the steps on both the **local** and **remote** machines.

1. Start Signaling Manager.

```
# /opt/sign/EABss7050/bin/signmgrui -own.conf\ /opt/sign/etc/  
signmgr.cnf &
```

2. Select **M3UA IETF > M3UA > Local ASes > LocalAS#1 LocalSPC:200** from the navigation pane.

Click the **Actions** tab in the operation pane, choose **M3IETF-Local AS Status**, and click **Send**.

3. Select **M3UA IETF > M3UA > Remote ASes > RemoteAS#40001 RC:0** from the navigation pane.

Click the **Actions** tab in the operation pane, choose **M3IETF-Remote AS Status**, and click **Send**.

4. Check if the selected process status is active in the **Action Results** tab in the information pane.



4 Post Activities

After configuring SS7 on the IPWorks node, configure the SS7 stack on the peer node and check if the two nodes can communicate.

For details, refer to the Checking INAP, Checking AIN, or Checking MAP section in IPWorks Manual Health Check.

Note: When configuring the SS7 stack on the peer node, it is recommended to set the following parameters to the values in Table 10.

Table 10 Recommended Configuration for Peer SS7 Stack

Navigation Pane	Operation Pane Properties	Recommended Value
SCTPs > Sctp FE > Sctp End Point Profile > Sctp End Point Profile #0	Min RTO	200
SCTPs > Sctp FE > Sctp End Point Profile > Sctp End Point Profile #0	Max RTO	800
SCTPs > Sctp FE > Sctp End Point Profile > Sctp End Point Profile #0	Init RTO	200
SCTPs > Sctp FE > Sctp End Point Profile > Sctp End Point Profile #0	Assoc Max RTX	10
SCTPs > Sctp FE > Sctp End Point Profile > Sctp End Point Profile #0	Path Max RTX	5
M3UA IETF > M3UA > Remote SP Profiles > Remote SP Profile #1	Timer Tassoc	100





5 Appendix A: Opening Trace Log

This section describes how to start and use the Trace Viewer Tool (TvTool).

Note: During the operation, if the users receive a message indicating that the command is not found, set the environment variable for Java as follows:

```
# export JAVA_HOME=/opt/sign/EABss7069/jre
```

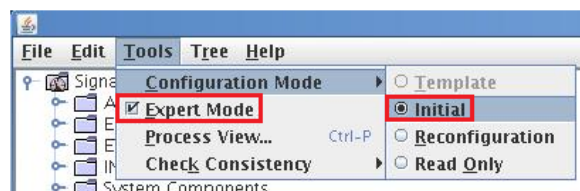
```
# export PATH=$JAVA_HOME/bin:$PATH
```

This setting will be cleared when users log out and in the system.

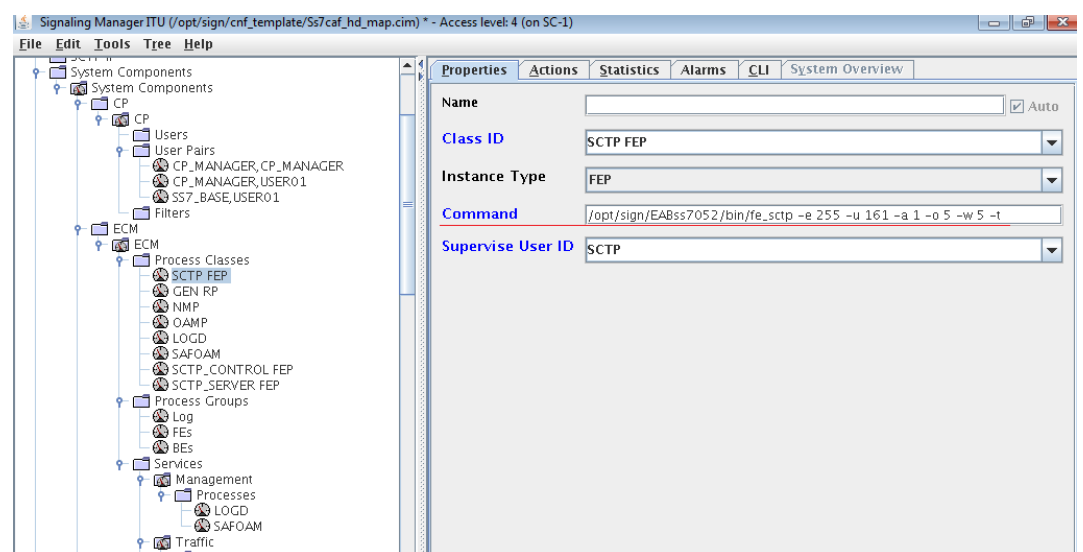
1. Start the Signaling Manager.

```
# /opt/sign/EABss7050/bin/signmgui -own.conf /opt/sign/etc/signmgr.cnf &
```

2. Open the Expert Mode and Initial Configuration Mode in Signaling Manager.



3. Change the start command line for user's interested module process as shown in the following figure by adding -t.



4. Restart the stack to enable the modification.



5. Copy EABss7049 from PL node to SC node if it is not installed on SC node.

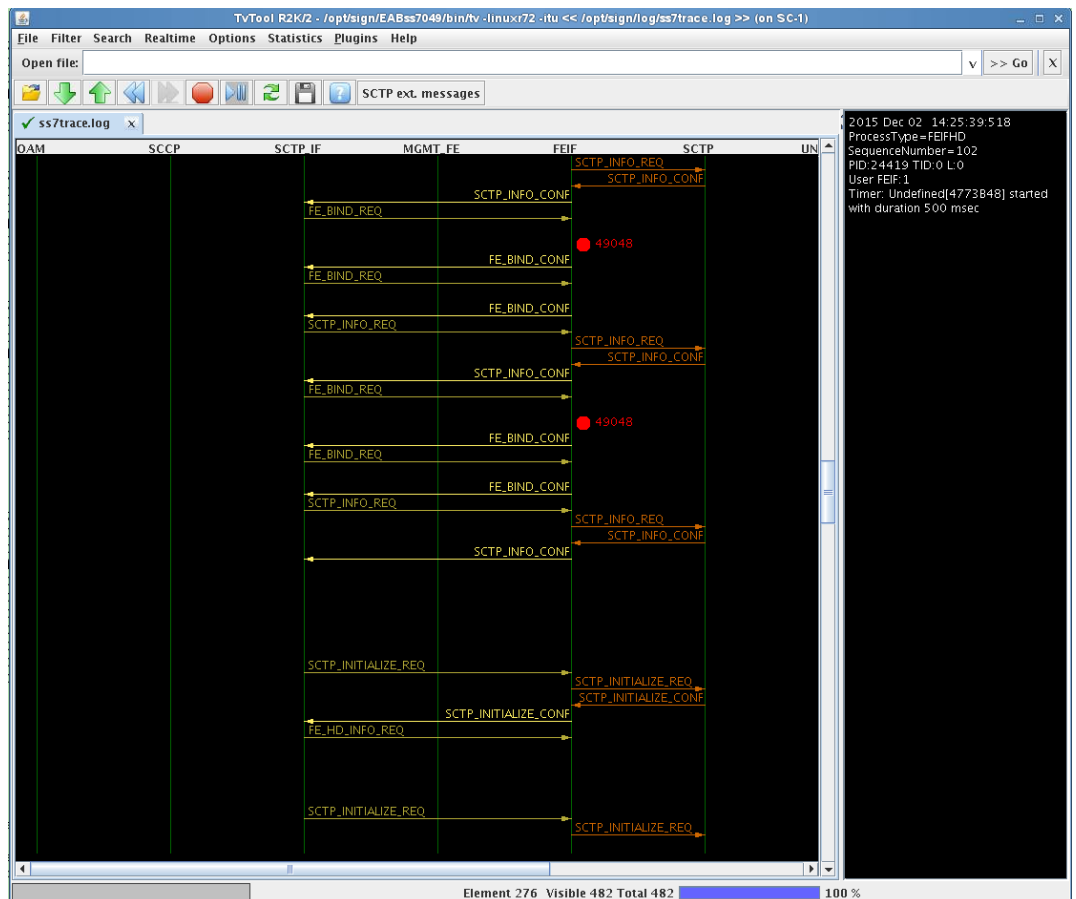
```
# scp -r root@PL-3:/opt/sign/EABss7049 /opt/sign
```

6. The SS7 trace log directory is /opt/sign/log/ss7trace.log. Open the trace log:

```
# /opt/sign/EABss7049/bin/tvtool -f /opt/sign/log/ss7trace.log
```

7. Let the program running in the background:

```
# /opt/sign/EABss7049/bin/tvtool -f /opt/sign/log/ss7trace.log  
&
```





Reference List

Ericsson Documents

- [1] Trademark Information
- [2] Typographic Conventions
- [3] Glossary of Terms and Acronyms
- [4] Reconfiguring SS7 Network, Creating and Defining GT Routing
- [5] IPWorks Manual Health Check