

Configuring SS7 TCAP

OPERATING INSTRUCTION

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1 Overview

1.1 Description

This operating instruction describes, using an example, how to configure Signaling System 7 defined by Transaction Capabilities Application Part (TCAP) for the following standards:

- International Telecommunication Union (ITU)
- China
- Telecommunication Technology Committee (TTC)
- American National Standards Institute (ANSI)

The procedure described in this example shows a complete configuration with usable values. For a specific customer configuration, other values may be relevant.

Note: All examples in this document are using the ITU/China/TTC TCAP. However, the same procedures can be applied to ANSI TCAP.

1.2 Prerequisites

1.2.1 Documents

For configuration parameter information, see ITU/China/TTC TCAP or ANSI TCAP Information Model.

Not applicable.

1.2.2 Tools

Not applicable.

1.2.3 Conditions

Before starting this procedure, ensure that the following conditions are met:

- Configuration has been performed according to “Configuring SS7 Signaling Network, SCCP, M3”.

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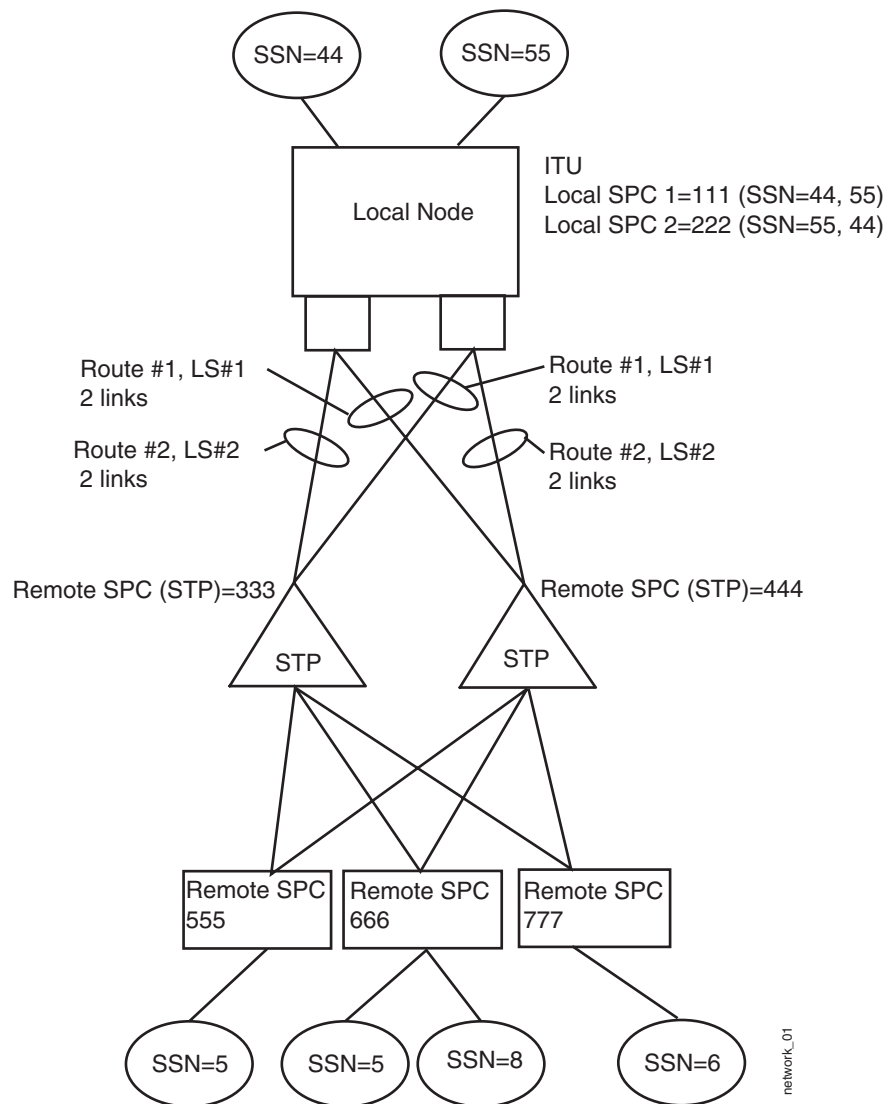


Figure 1 Example of a Network Configuration



2 Procedure

2.1 Configuring TCAP

1. Add element on **TCAP**. An instance of a **TCAP** is added.
2. Select the added **TCAP** element to edit its properties.

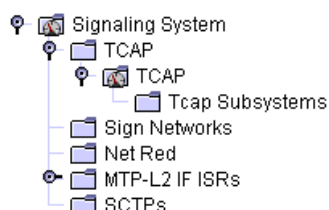


Figure 2 Added TCAP in Signaling Manager Navigation Pane

3. Set **Standard** and other properties according to the recommendations in Section 3 on page 7.

Note: You don't need to define **TCAP Subsystem** if you are not configuring TCAP for Loadsharing, or want to use orders on TCAP Subsystems.

2.2 TCAP Loadsharing

TCAP Loadsharing increases the signaling capacity between two end-points beyond 16 signaling links. When loadsharing is active, the dialogue is alternately initiated over the link sets. A prerequisite for loadsharing is that multiple point codes are configured in MTP-L3. A TC-user has two ways to use loadsharing, by setting the routing indicator flag to route on SSN or GT.

Follow the instructions in this section if you want to configure TCAP for loadsharing.

2.2.1 Configure TCAP for Loadsharing

In order to use loadsharing functionality in TCAP, you need to configure **TCAP Subsystem**.

1. Add element on **TCAP Subsystems**. An instance of a TcapSystem called **TCAP SubSystem:[undef]** is added.

Note: As it is seen in the name of the added **TCAP SubSystem:[undef]**, the **SCCP SAP** reference is not set by default.

2. Select the added **TCAP SubSystem:[undef]**, and assign the **SCCP SAP** reference.

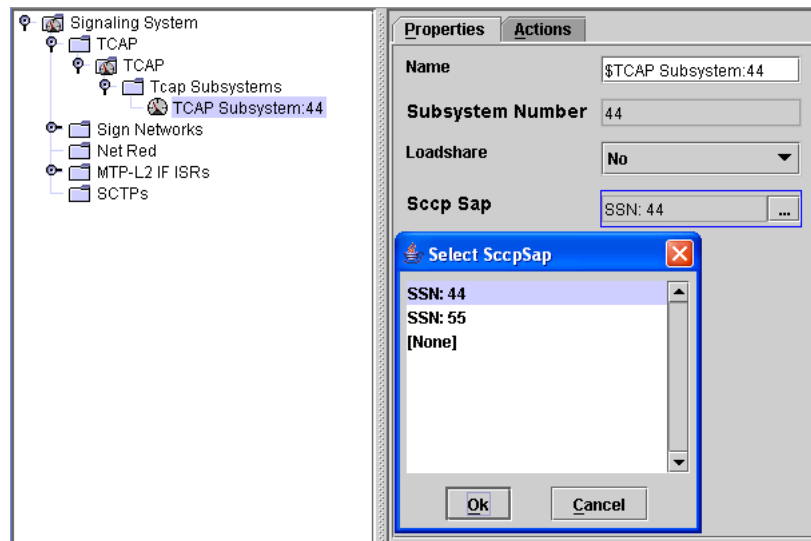


Figure 3 Select SCCP SAP Instances

3. Edit Loadsharing property.

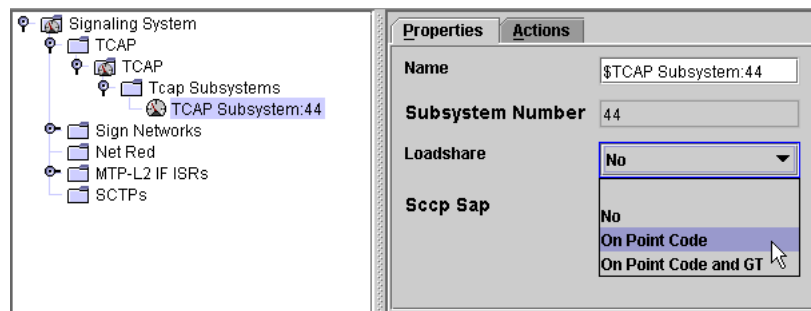


Figure 4 Loadsharing Option Values

4. Select **On Point Code**, when only using OPC in Calling Party Address of the SCCP message (CgPA). Application may not set the Routing Indicator to "Route on GT".
5. Select **On Point Code and GT**, when using OPC or GT in CgPA depending on how the Routing Indicator in the Address Indicator field of the SCCP Message is set by the application.

2.2.2

Limitations

When Loadsharing "On Point Code and GT" is used, there are some limitations on the SCCP configuration:

- Each Local Subsystem must be addressed by exactly one GT per Local Point Code.
- No wildcards ('*' or '?'), may be used in the **Address Info** of this GT.



- A GT translation to Local Sign. Point may also be used. In this case it is important that the remote application specify SSN in the CdPA.





3 Recommended SS7 Parameters

This section contains information about specific SS7 parameters or options. Most of these values will work for an SS7 stack in a running network and are not described specifically here. In some case though, parameters may need to be modified. These parameters or options are described in Table 1.

3.1 TCAP

The following properties can be found in **Signaling System/TCAP/TCAP** or **Signaling System/TCAP ANSI/TCAP ANSI**.

Table 1 TCAP Properties

Property Name	Recommended Value		Comments
Max Length per Dialogue Message	ITU SCCP	3488	Defines the maximum amount of data that TCAP may send to or receive from SCCP in an N_UNITDATA_req / ind primitive. This will affect the max length of the user data that may be sent by the TC-User.
	Chinese SCCP	3456	
	ANSI SCCP	3488	
	TTC SCCP	3520	
	Blue ITU-T	<255	All the values are correctly set by default, except for Blue ITU-T.



Table 1 TCAP Properties

Property Name	Recommended Value	Comments
Max Number of Concurrent Operations per Dialogue	See comments	<p>Defines the maximum number of concurrent operations per dialogue that may be invoked by a local TC-user. The value depends on the application. A higher value requires more memory.</p> <p>Recommended value for VPN: 10⁽¹⁾</p> <p>Recommended value for CCN: 10⁽²⁾</p> <p>Multiparty call: The value is dependent on how the application is handling the different parties. If the parties are handled simultaneously then the value must be greater than if the parties are handled one at a time. This formula can be used: "Number of concurrent operations" * "Number of simultaneous parties".</p>
Max Number of Dialogues per subsystem	See comments	<p>Defines the maximum number of dialogues per subsystem for one BE instance. The examples below are for a maxi system supporting N + 1 redundancy. This means that we have 6 BEs but must support one BE failure. The value depends on the application. A higher value requires more memory.</p> <p>Recommended value for VPN: 500 (200calls/s * 10s / 5 BEs = 400 + 25% reserve)</p> <p>Recommended value for CCN: 9000 (400calls/s * 90s / 5 BEs = 7200 + 25% reserve)</p> <p>Recommended value for HLR: 375 (3000calls/s * 0.5s / 5 BEs = 300 + 25% reserve)</p>



Table 1 TCAP Properties

Property Name	Recommended Value	Comments
Max number of subsystems	See comments	<p>Defines the maximum number of concurrent TCAP subsystems. The value depends on the application.</p> <p>Recommended value for VPN: 3 (INAP, MAP, and 1 as reserve).</p> <p>Recommended value for CCN: 3 (CAP, INAP, and 1 as reserve).</p>
Max Number of TC-users per Subsystem	See comments	<p>Defines the maximum number of concurrent TC-users that may bind per subsystem and BE instance.</p> <p>The examples below are for a maxi system. This means that we have 6 BEs. It is also recommended that each TC-User binds to 2 BEs (2 connections). If one BE fails the TC-User will try to connect to the same BE and not an other BE.</p> <p>Recommended value for VPN/CCN/HLR: 15 (~30 TCAP-users per SSN in maxi system * 2 connections / 6 BEs + 5 in reserve)</p>
In ITU/ETSI/TTC/China TCAP: Standard	See comments	<p>Recommended value for ITU and China TCAP: ITU</p> <p>Recommended value for TTC TCAP: TTC</p>
In ANSI TCAP: Use Hop Counter	No	<p>Default: Yes</p> <p>This configuration parameter defines how TCAP sets the primitive parameter Use Hop Counter when an N_UNITDATA_req primitive is sent to SCCP.</p>

(1) VPN is a service running during call setup, the call setup takes in average 10s. VPN uses two protocols INAP and MAP. The VPN service shall be able to handle 200 calls/s. Assumes that 10 outstanding operations are sufficient.

(2) CCN is a service running during the whole call, average call time is 90s. CCN uses two protocols CAP and INAP upd/retrieve. The CCN service shall be able to handle 400 calls/s. Assumes that 10 outstanding operations are sufficient.



3.2 Limitation

Maximum memory for TCAP in the single process is limited with 170MB because of limitation on maximum process memory in TelORB. Memory needed for TCAP module can be calculated using these formulas:

Memory needed for TCAP module can be calculated using these formulas:

$$\text{MemoryUsage} = \text{MainVarsSize} + \text{MatrixSize} + \text{TimersSize} + \text{DialoguesPoolSize} + \text{OperationsPoolSize} + \text{SsnsAreaSize} + \text{UsersAreaSize} + \text{DummyDialogueSize} + [\text{ReinitOverhead}] + [\text{ComponentsSize}]$$
$$\text{TimersSize} = S \times D \times O \times \text{OneTimerSize}$$
$$\text{DialoguesPoolSize} = S \times D \times (\text{OneDialogueSize} + \text{CpPoolBlockOverhead})$$
$$\text{OperationsPoolSize} = S \times D \times (O \times \text{OneOperationSize} + \text{CpPoolBlockOverhead})$$
$$\text{SsnsAreaSize} = S \times (\text{SsnDataAreaSize} + 8 \times D)$$
$$\text{UsersAreaSize} = S \times U \times \text{OneUserSize}$$
$$\text{DummyDialogueSize} = \text{OneDialogueSize} + (O + 1) \times \text{OneOperationSize}$$
$$\begin{aligned} \text{ReinitOverhead (in worst case)} = & (\text{New_S} \times \text{New_D} \times \text{New_O} - \text{Old_S} \\ & \times \text{Old_D} \times \text{Old_O}) \times \text{OneTimerSize} + (\text{New_O} \times \text{OneOperationSize} + \\ & \text{CpPoolBlockOverhead}) \times \text{New_S} \times \text{New_D} + (\text{New_S} \times \text{New_D} - \text{Old_S} \times \\ & \text{Old_D}) \times (\text{OneDialogueSize} + \text{CpPoolBlockOverhead}) + (\text{New_S} \times \text{New_D} - \\ & \text{Old_S} \times \text{Old_D}) \times \text{OneUserSize} + (\text{SsnDataAreaSize} + 8 \times \text{New_D}) \times \text{New_S} \end{aligned}$$
$$\text{ComponentsSize} = \text{InitiatedOperations} \times \text{MaxUnitdataSize}$$

Constants (measured on Solaris in bytes):

$$\text{MainVarsSize} = 11456$$
$$\text{MatrixSize} = 2208$$
$$\text{OneTimerSize} = 37$$
$$\text{OneDialogueSize} = 84$$
$$\text{CpPoolBlockOverhead} = 56$$
$$\text{OneOperationSize} = 16$$
$$\text{SsnDataAreaSize} = 18320$$
$$\text{OneUserSize} = 20$$

Where:

[] - an optional element



MaxUnitdataSize - Maximum amount of data that can be sent in an N_UNITDATA_req primitive.

S - Maximum number of Subsystems in config file.

U - Maximum number of TC-users per Subsystem in config file.

D - Maximum number of dialogues per Subsystem in config file + 1.

O - Maximum number of concurrent operations per dialogue in config file.

Note:

- The quantity MaxUnitdataSize will only be allocated if the TC-user has sent a component to the component sublayer.
- ComponentsSize summand should be considered if and only if a TC user initiated InitiatedOperations number of operations.

In the worst case, InitiatedOperations = S x D x O, ReinitOverhead summand should be considered if reinitialization (initialization of already initialized module) occurs.

Example of the configuration:

Maximum number of Subsystems=10

Maximum number of TC-users per Subsystem=10

Maximum number of concurrent operations per dialogue=25

“Maximum number of dialogues per Subsystem” upper limit is 10000. This example leaves some extra memory needed for configuration data, when loadsharing is in use.