Oracle® Communications Convergent Charging Controller

SIGTRAN Technical Guide

Release 12.0.0

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Contents

About This Document

Scope

The scope of this document includes all the information required to install, configure and administer the SIGTRAN Interfaces application.

Audience

This guide was written primarily for system administrators and persons installing and administering the SIGTRAN Interfaces application. The documentation assumes that the person using this guide has a good technical knowledge of the system.

Prerequisites

Although there are no prerequisites for using this guide, familiarity with the target platform would be an advantage.

A solid understanding of Unix and a familiarity with IN concepts are an essential prerequisite for safely using the information contained in this technical guide. Attempting to install, remove, configure or otherwise alter the described system without the appropriate background skills, could cause damage to the system; including temporary or permanent incorrect operation, loss of service, and may render your system beyond recovery.

This manual describes system tasks that should only be carried out by suitably trained operators.

Related Documents

The following documents are related to this document:

- *Service Logic Execution Environment Technical Guide*
- *Service Management System Technical Guide*

Document Conventions

Typographical Conventions

The following terms and typographical conventions are used in the Oracle Communications Convergent Charging Controller documentation.

Formatting Convention	Type of Information
Special Bold	Items you must select, such as names of tabs. Names of database tables and fields.
Italics	Name of a document, chapter, topic or other publication. Emphasis within text.
Button	The name of a button to click or a key to press. **Example:** To close the window, either click **Close**, or press **Esc**.
Key+Key	Key combinations for which the user must press and hold down one key and then press another. Example: **Ctrl+P** or **Alt+F4**.
`Monospace`	Examples of code or standard output.
`Monospace Bold`	Text that you must enter.
variable	Used to indicate variables or text that should be replaced with an actual value.
menu option > menu option >	Used to indicate the cascading menu option to be selected. Example: **Operator Functions > Report Functions**
hypertext link	Used to indicate a hypertext link.

Specialized terms and acronyms are defined in the glossary at the end of this guide.

Chapter 1

System Overview

Overview

Introduction

This chapter provides a high-level overview of the application. It explains the basic functionality of the system and lists the main components.

It is not intended to advise on any specific Oracle Communications Convergent Charging Controller network or service implications of the product.

In this Chapter

This chapter contains the following topics.

Introduction to SLEE TCAP Interfaces

Introduction

The Oracle SIGTRAN TCAP Interface is a SLEE interface that enables the SLEE to inter-work with a TCAP Protocol stack.

The interface converts messages arriving from the TCAP Protocol stack and converts them into SLEE events. The SLEE events are then sent to the application which is configured to handle the call. The SIGTRAN TCAP Interface also converts SLEE events coming from a SLEE application back into a form the TCAP Protocol stack can understand.

For more information about SLEE events and applications, see *SLEE Technical Guide*.

Service routing and message correlation

The SIGTRAN TCAP Interface also has a role in routing calls to services on the platform.

It routes the message setting one of the following:

- The SLEE service key for the message
- A correlation ID which matches the message to one sent to the SLEE earlier (in this case, the second message will use the same service key as the first)

TCAP Protocol stack

A TCAP Protocol stack is a software implementation of a networking protocol suite. It involves a group of protocols working together to allow Oracle platform software and hardware to communicate with a telecommunications network.

The protocols are:

- TCAP
- underlying protocols such as SCCP/MTP or SUA/SCTP/IP

The hardware is Network Interface Cards on an applicable high-performance server-based platform.

The networks typically support Intelligent Network-type Signaling Control and other associated or similar functions.

TCAP Interface layers

The SIGTRAN TCAP Interface used in a specific installation will depend on the requirements of the network and the type of physical interface and network protocols used.

Generally, the SIGTRAN TCAP Interface which will be installed is built from underlying layers of smaller protocol stacks which sit below the TCAP layer. These layers may be comprised of TCP/IP or SIGTRAN protocols (SUA/SCCP/M3UA). They may be provided and supported by Oracle and/or third party vendors.

Available TCAP Interfaces

This table lists the available SIGTRAN TCAP Interfaces.

Stack name	Protocol	Interface name
SIGTRAN	SCCP	sua_if
	M3UA	m3ua_if

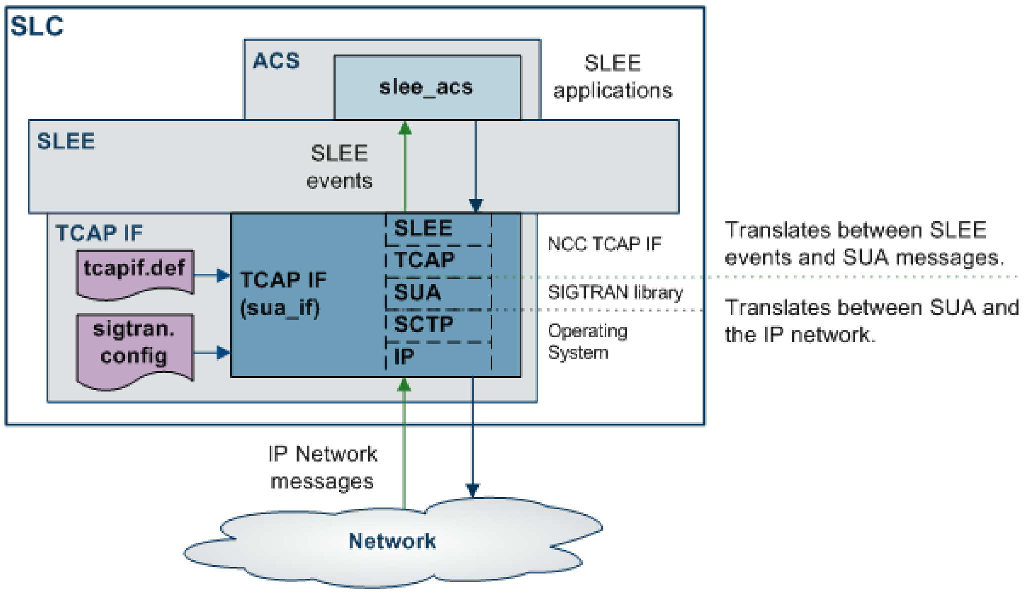
SCCP Level TCAP Interfaces

Introduction

The SIGTRAN TCAP Interface stack can be used to translate to a third party SCCP/SUA implementation.

SIGTRAN SCCP/SUA interface diagram

This diagram shows the SIGTRAN SCCP/SUA interface on a SLC.



SIGTRAN/SUA interface components

This table describes the main components in the SUA version of the SIGTRAN TCAP Interface.

Process	Role	Further information
sua_if	Interface between the SLEE and the network. **Note:** This process includes the SIGTRAN libraries which interface to the network.	*sua_if* (on page 51).
SLEE	Real-time interface between the interfaces and applications which have been configured to communicate through the SLEE.	*Service Logic Execution Environment Technical Guide*.
sua_if.sh	Shell Startup script used to set the command line parameters for configuring sua_if.	*Configuration Overview* (on page 9).
tcapif.def	Optional configuration file for sua_if. Can be used to set some command line parameters.	*Configuring tcapif.def* (on page 12).
sigtran.config	Main configuration file for sua_if.	*Configuring sigtran.config* (on page 20).
sccp_YYYYMMDD_hhmm.log	The SCCP-level message log file.	*log* (on page 26).

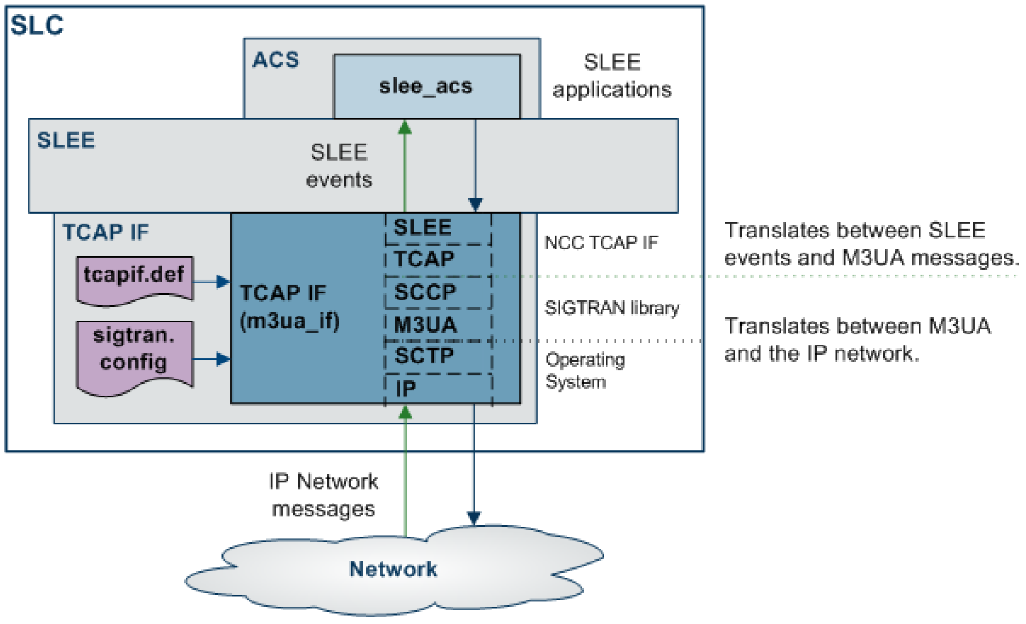
M3UA Level TCAP Interfaces

Introduction

The SIGTRAN TCAP stack can be used to translate to a third party SCCP/M3UA implementation.

SIGTRAN m3ua interface diagram

This diagram shows the SIGTRAN M3UA interface on a SLC.



SIGTRAN m3ua interface components

This table describes the main components in the M3UA version of the SIGTRAN TCAP Interface.

Process	Role	Further information
m3ua_if	Interface between the SLEE and the network. **Note:** This process includes the SIGTRAN libraries which interface to the network.	*m3ua_if* (on page 52).
SLEE	Real-time interface between the interfaces and applications which have been configured to communicate through the SLEE.	*Service Logic Execution Environment Technical Guide*.
m3ua_if.sh	Shell Startup script used to set the command line parameters for configuring m3ua_if.	*Configuration Overview* (on page 9).
tcapif.def	Optional configuration file for sua_if. Can be used to set some command line parameters.	*Configuring tcapif.def* (on page 12).
sigtran.config	Main configuration file for m3ua_if.	*Configuring sigtran.config* (on page 20).
sccp_YYYYMMDD_hhmm.log	The SCCP-level message log file.	*log* (on page 26).

Routing to Services

Introduction

When the SIGTRAN TCAP Interface receives a new TCAP message (TC-BEGIN), it determines what SLEE service key it should use when sending the message on. SLEE service keys are used by the SLEE to determine where to route the message to. For more information about how SLEE routes calls, see *SLEE Technical Guide*.

Note: If the message is an assistRequestInstructions, sua_if/m3ua_if will send the message to the SLEE with a correlation ID. The SLEE will then route based on only correlation ID. For more information about correlation IDs and how they are processed, see *Correlation IDs* (on page 6).

Routing process

This table describes how SIGTRAN TCAP Interface constructs the SLEE service key for an incoming message.

Stage	Description
1	TC-BEGIN arrives at sua_if/m3ua_if.
2	sua_if/m3ua_if determines which protocol the message is using by matching the SSN the message arrived from to the ssn details in its command line or tcapif.def configuration. For more information about setting which SSNs correspond to which protocols, see *tcapif parameters* (on page 13).
3	If the protocol is INAP, sua_if/m3ua_if will check whether the operation is assistRequestInstructions. If it is, it will set a correlation ID in the message and send it to the SLEE. No further action is taken.
4	If the protocol is not INAP, or it is INAP but the operation is an InitialDP, sua_if/m3ua_if will construct the SLEE service key.
5	sua_if/m3ua_if sends the message on to the SLEE, where it will be routed according to

Stage	Description
	the rules defined for service keys in SLEE.cfg.

SLEE service key construction

The SLEE service key constructed by sua_if/m3ua_if is made up from the following elements:

Byte	MSB 8	7	6	5	4	3	2	LSB 1
Sourced from	Base service key value defined by *sleekey* (on page 18).			Dest SSN (SCCP)	Depends on the protocol of incoming message:			
Example 1	`0x1`			`0xd0`	`00000009`			
Example 2	`0x123456`			`0x05`	`fffffffe`			

Protocol	Value
INAP IDP	IDP's ServiceKey value
INAP Initiate CallAttempt	fffffffe
MAP	MAP Operation ID value
CAMEL GPRS	CAP_InitialDPGPRS Servicekey value, or DestinationReference for other operations
CAMEL SMS	CAP_InitialDPSMS Servicekey value
any other	ffffffff

Note: The base service key (bytes 6-8) is not padded with leading zeros. Bytes 1 to 4, and byte 5 are padded with leading zeros.

Example SLEE service keys

Example 1:

If sua_if/m3ua_if is using the default base key of 0x1, and the TC-BEGIN has INAP SSN = 13 (that is, 0xd) and service key = 8: the SLEE service key will be 0x10d00000008.

The message can then be routed to INAPService1 on App1 by the following lines in **SLEE.cfg**:

```
SERVICEKEY=INTEGER 0x10d00000008 INAPService1
SERVICE=INAPService1 1 App1 INAPService1
```

Example 2:

If sua_if/m3ua_if is using a non-default base key of 0x1234, and the TC-BEGIN has INAP SSN = 112 (that is, 0x70) and service key = 10: the SLEE service key will be 0x12347000000010.

The message can then be routed to INAPService2 on App2 by the following lines in **SLEE.cfg**:

```
SERVICEKEY=INTEGER 0x12347000000010 INAPService2
SERVICE=INAPService2 1 App2 INAPService2
```

Example 3:

If sua_if/m3ua_if is using the default base key of 0x1, and the TC-BEGIN has MAP SSN = 5 and operation ID = 5: the SLEE service key will be 0x10500000005.

The message can then be routed to MAPService on App2 by the following lines in **SLEE.cfg**:

```
SERVICEKEY=INTEGER 0x10500000005 MAPService
SERVICE=MAPService 1 App2 MAPService
```

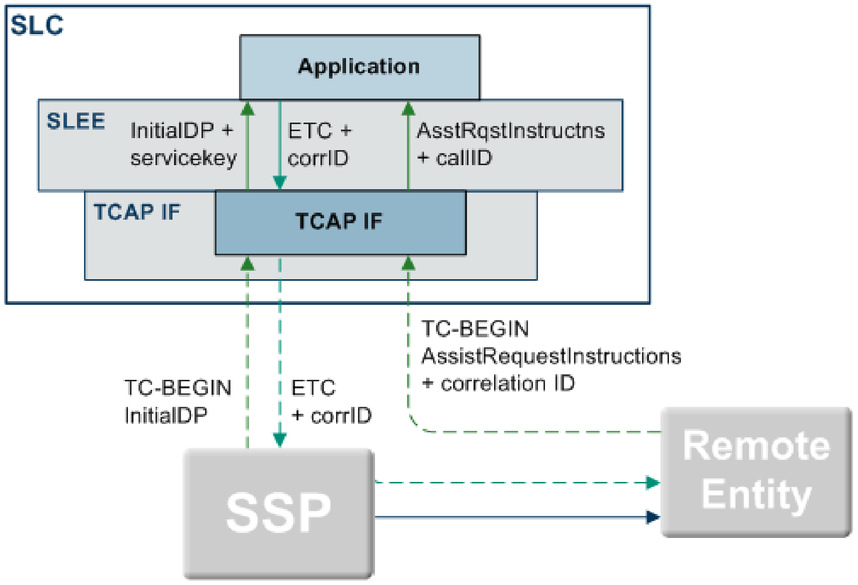
Correlation IDs

In some circumstances, a message arriving at sua_if/m3ua_if will need to be matched to an earlier message. For example, when a play announcement node has requested an Intelligent Peripheral to play a message to a caller, and the IP is reporting the result of the action.

In this case, the second message received by sua_if/m3ua_if (sent by the IP) will be an INAP AssistRequestInstructions (ARI) operation, and will contain a correlation ID. sua_if/m3ua_if will attempt to initiate a SLEE dialog using the correlation ID instead of a service key. The correlation ID will be a decimal conversion of the digits from the ARI's correlationID parameter.

SLEE Correlation ID diagram

This diagram shows how correlation IDs are linked across the system.



Matching SLEE correlation IDs

These are the steps involved in matching correlation IDs.

Stage	Description
1	On an SLC, an InitialDP is sent across the SLEE. (Usually sent by an interface such as sua_if/m3ua_if to a service application such as slee_acs). The SLEE assigns it a call ID.
2	The SLEE service application which received the InitialDP requests the SLEE to assign a correlation ID to the InitialDP. The SLEE allocates a correlation ID and returns it to the SLEE service application.
3	The SLEE service application sends an INAP ETC operation over the SLEE to an interface. The operation contains the Address of an external network entity and the correlation ID.
4	The interface sends the operation o the switch which forwards it to the remote entity specified in the Address (usually an Intelligent Peripheral).
5	The remote entity sends the interface on the SLC an INAP TC-BEGIN containing an AssistRequestInstructions (ARI) and the original correlation ID.
6	When sua_if/m3ua_if receives the ARI, it initiates a new SLEE dialog using the correlation

Stage	Description
	ID. The correlation ID is matched to the call ID assigned in Stage 1, and the same service key routing rules are applied (this means the ARI will be delivered to the SLEE service application which sent the ETC). The correlation ID must be read from within the TCAP component which holds the conveyed protocol's first message.
7	The SLEE service application receives the message with the call ID assigned to the InitialDP and correlates the messages.

For an example of how correlation IDs are used by ACS when playing announcements, see *Advanced Control Services Technical Guide*.

Chapter 2

Configuration

Overview

Introduction

This chapter explains how to configure the Oracle Communications Convergent Charging Controller application.

In this chapter

This chapter contains the following topics.

Configuration Overview

Introduction

This topic provides a high level overview of how the SIGTRAN TCAP Interfaces are configured.

sua_if/m3ua_if are configured using the following options set in the:

- Startup shell script and/or **tcapif.def**
- **sigtran.config** file

Configuration components

TCAP Interface is configured by the following components:

Component	**Locations**	**Description**	**Further Information**
Environmental variables	any machine connected to a switch	Set in startup scripts.	*Environmental variables* (on page 10).
Command line variables	any machine connected to a switch	Set in startup scripts or tcapif.def.	*Configuring tcapif.def* (on page 12).
tcapif.def	any machine connected to a switch	Optional file that sets the configuration parameters which are shared with other types of TCAP Interface.	*Configuring tcapif.def* (on page 12).
sigtran.config	any machine connected to a switch	This file sets the configuration parameters which are specific to SIGTRAN TCAP Interface.	*Configuring sigtran.config* (on page 20).

Configuration process overview

This table describes the steps involved in configuring the SIGTRAN TCAP Interface for the first time.

Stage	Description
1	The environment sua_if/m3ua_if will run in must be configured correctly. This includes: • Setting the location of the SLEE base directory (if this is different from default) • Configuring the name of the main configuration file • Configuring the location of the SCCP log file For more information about configuring environmental variables, see Environmental variables.
2	Changing the default startup variables in the **SLEE.cfg** file, especially service keys.
3	Any non-default command line parameters must be added to one of the following: • The relevant sua_if/m3ua_if startup shell script(s): sua_if.sh or m3ua_if.sh • (if supported) **tcapif.def**
4	Configuration data must be configured for sua_if/m3ua_if in **sigtran.config.**

Environmental variables

The following UNIX shell environment variables can be set.

`SCCP_LOG_FILE`

Syntax:	`SCCP_LOG_FILE=`*`filename`*
Description:	File name prefix, including path, of the optional SCCP log file. A timestamp and **.log** suffix is added.
Type:	String
Optionality:	Optional, default used if not set.
Allowed:	
Default:	/tmp/sccp
Notes:	Using the default value for example, the resulting file name in the output of log files have names in the format **/tmp/sccp**_*yyyymmdd_hhmm*.**log**. By default a new log file, with a different timestamp, is created every 10 minutes. Other intervals can be specified using the SCCP_LOG_TIME environment variable.
Example:	`SCCP_LOG_FILE=/var/tmp/sua_if_sccp`

`SCCP_LOG_TIME`

Syntax:	`SCCP_LOG_TIME = `*`value`*
Description:	The interval, in minutes, between starting an SCCP_LOG_FILE log file.
Type:	Integer
Optionality:	Optional (default used if not set).
Allowed:	
Default:	10 (minutes)

Notes:	If SCCP_LOG_TIME is defined as 20 then, if logging is enabled, new log files will be created every 20 minutes on the hour, 20 past and 40 past the hour with names like: `/var/tmp/sccp_20091225_1500.log`
Example:	`SCCP_LOG_TIME = 20`

SLEE_ETC_DIR

Syntax:	`SLEE_ETC_DIR=`*`path`*
Description:	Full path name of the SLEE's etc directory.
Type:	Integer
Optionality:	Optional, default used if not set.
Allowed:	
Default:	../etc
Notes:	SLEE's etc directory is where **tcapif.def** resides.
Example:	`SLEE_ETC_DIR=../../SLEE/etc`

TCAPIF_DEF

Syntax:	`TCAPIF_DEF=`*`filename`*
Description:	Defines the name of configuration file which contains TCAP Interface parameters common to all TCAP Interfaces.
Type:	String
Optionality:	Optional, default used if not set.
Allowed:	
Default:	tcapif.def
Notes:	
Example:	`TCAPIF_DEF=sua_tcapif.def`

ESERV_CONFIG_FILE

Syntax:	`ESERV_CONFIG_FILE=`*`filename`*
Description:	Name of configuration file which contains SIGTRAN TCAP Interface-specific parameters.
Type:	String
Optionality:	Optional, default used if not set.
Allowed:	Any valid filename.
Default:	sigtran.config
Notes:	
Example:	`ESERV_CONFIG_FILE=sigtran.config`

SIGTRAN_CONFIG_SECTION

Syntax:	`SIGTRAN_CONFIG_SECTION=`*`str`*
Description:	The name of the section in the ESERV_CONFIG_FILE configuration file which holds the Sigtran Tcap Interface-specific configuration.
Type:	String
Optionality:	Optional (default used if not set).
Allowed:	ASCII text.

Default:	For m3ua_if: M3UA. For sua_if: SUA
Notes:	
Example:	`SIGTRAN_CONFIG_SECTION=M3UA`

Configuring tcapif.def

Setting parameters

Each parameter has a default that will be used if the parameter is not defined.

Parameters may be defined in two ways:

1 The command line
2 In the **tcapif.def** file

Note: If a parameter is set in both the command line and the **tcapif.def** file, the command line setting will be used.

Defining the parameters

For a parameter 'param val', the value may be set in the configuration file with a line such as:

```
PARAM VAL=value
```

Note: Spaces can be inserted into the parameter name in **tcapif.def** without effect.

Or the parameter may be defined on the command line, for example:

- `sua_if -paramval` *value*
- `m3ua_if -paramval` *value*

Note: Spaces can not be inserted into the parameter names on the command line, and command line parameter names are case sensitive.

Setting command line parameters

Since the executable is started by the SLEE, the only way to set the command line parameters is via an intermediate startup shell script. This shell script is pointed to in **SLEE.cfg**.

Example 1: Startup script:

```
#!/bin/sh
exec sua_if -ssns 123 -proto inap -tcap ccitt
```

Example 2: Startup script:

```
#!/bin/sh
exec sua_if -pc 160 -ssns 123 -proto inap -tcap \
ccitt
```

Note: To split over a line (as shown in Example 2), use "\" at the end of the line.

tcapif.def

The **tcapif.def** file can be used to define common configuration for all TCAP interfaces running on the same system.

Where different TCAP Interfaces require different configuration, the file-set configuration options can be overridden on the command line on a binary by binary basis. Command line options are set in the startup shell scripts. Every option in the **tcap.def** file can be overridden in this way.

Note: In the file, the options are all uppercase. On the command line, they are lowercase.

tcapif parameters

The generic configuration variables applicable to all TCAP interfaces are listed below:

Note: If any of the following parameters are set (all default to not set) then the TCAP Interface will use a default SCCP Origination Address in the first TC-CONTINUE that it sends out. By default the TCAP Interface will use the SCCP destination address of the first incoming message. This capability can be used to ensure any subsequent messages sent by the far end in the same dialog will be routed to this address. This can be useful when initial messages are sent to aliased addresses and round-robin routed by an STP to a series of SLCs.

`alwayssendaddr`

Syntax:	`-alwayssendaddr` *true*|*false*	
Description:	Which messages to send the SCCP destination address in.	
Type:	Boolean	
Optionality:		
Allowed:	true	Send the SCCP destination address in all messages.
	false	Send the SCCP destination address in only the initial message received in a dialog.
Default:	false	
Notes:	If this parameter and sendorigaddr are both set to true, the TCAP Interface will send the destination and origination addresses.	
Example:	`-alwayssendaddr true`	

`autoac`

Syntax:	`-autoac` *yes*|*no*	
Description:	Whether to use the Application context of a CCITT white book TCAP message received in the response to the message if the SLEE application does not supply one. In addition, dialogs initiated by the interface will use the default application context defined by the `defoutac` variable below.	
Type:	Boolean	
Optionality:		
Allowed:	yes	Use the Application context from the TCAP message if none is supplied when a SLEE application responds to a message.
	no	Do not attempt to supply an Application context if none is provided.
Default:	yes	
Notes:	Setting to yes, effectively acknowledges the white book application context used. If defoutac is set, sua_if/m3ua_if will add the default application context if one is not set by the SLEE application or in the TCAP message.	
Example:	`-autoac no`	

defoutac

Syntax:	`-defoutac value`	
Description:	The default application context to use if no application context is supplied by the SLEE application or set by autoac.	
Type:	String	
Optionality:		
Allowed:	none	Missing application contexts will not be set to a default.
	oid1,*oid2*...	The default CCITT white book TCAP application context to use for dialogs initiated by sua_if/m3ua_if.
Default:	none	
Notes:		
Example:	`-defoutac 1,2,3`	

displaymonitors

Syntax:	`-displaymonitors true|false`	
Description:	Whether to log CAPS.	
Type:	Boolean	
Optionality:		
Allowed:	true	New call attempt rates (CAPS) will be logged to stdout at period defined by `-reportperiod`.
	false	
Default:	false	
Notes:		
Example:	`-displaymonitors true`	

dpause

Syntax:	`-dpause seconds`
Description:	Number of seconds to sleep at startup.
Type:	Integer
Optionality:	
Allowed:	
Default:	0
Notes:	Allows a global session to be attached to the process.
Example:	`-dpause 7`

inapssns

Syntax:	`-inapssns value1,value2,...`
Description:	A comma-separated list of the SCCP subsystem numbers (SSNs) that sua_if/m3ua_if will treat as INAP (regardless of the default protocol defined by `–proto`).
Type:	Integer
Optionality:	Mandatory
Allowed:	0-255
Default:	Empty set
Notes:	

Example:	`-inapssns 33,45,99`

mapssns

Syntax:	`-mapssns` *`value1`*`,`*`value2`*`,...`
Description:	A comma-separated list of the SCCP subsystem numbers (SSNs) that sua_if/m3ua_if will treat as MAP (regardless of the default protocol defined by `-proto`).
Type:	Integer
Optionality:	Mandatory
Allowed:	0-255
Default:	Empty set
Notes:	
Example:	`-mapssns 22,26`

monitorperiod

Syntax:	`-monitorperiod` *`milliseconds`*
Description:	Period call rate rejection monitoring occurs in.
Type:	Integer (number of milli-seconds)
Optionality:	
Allowed:	
Default:	1000
Notes:	Default of 1 sec allows `-rejectlevel` to represent CAPS.
Example:	`-monitorperiod 1000`

polltime

Syntax:	`-polltime` *`microseconds`*
Description:	Interval between polling interface.
Type:	Integer (micro seconds)
Optionality:	
Allowed:	
Default:	1000
Notes:	
Example:	`-polltime 500`

proto

Syntax:	`-proto =` *`protocol`*
Description:	Defines the default protocol to use when the interface (sua_if/m3ua_if) constructs a SLEE service key. This parameter is used only when an incoming TCAP message SCCP Subsystem Number (SSN) is not mapped to a protocol.
Type:	String
Optionality:	Optional (default used if not set)

Allowed:	• inap – INAP interface • map – MAP interface • is41d – IS41D interface • any – Uses a value of eight Fs (ffffffff) in its SLEE service key construction. This allows service routing of the message with the unknown protocol to a SLEE service for further processing, if needed.
Default:	inap
Notes:	A combination of the incoming SSN, the interface's SSN/protocol mapping, and its `-sleekey` value (default `0x1`) are used to route incoming calls to a SLEE service.
Example:	`-proto = map`

`rejectlevel`

Syntax:	`-rejectlevel` *`max number of calls`*
Description:	If more than 0, this sets the maximum number of new call attempts that will be processed within a given interval (as determined by `-monitorperiod`).
Type:	Integer
Optionality:	
Allowed:	
Default:	0
Notes:	In conjunction with `-monitorperiod` it provides a call limiter for the interface.
Example:	`-rejectlevel 4000`

`reportperiod`

Syntax:	`-reportperiod` *`reject logging period`*
Description:	How often: • rejection indications are logged to the alarm system (if rejections are occurring), and • call rates are logged (if `-displaymonitors` is set).
Type:	Integer (seconds)
Optionality:	
Allowed:	
Default:	30
Notes:	
Example:	`-reportperiod 25`

`retgt`

Syntax:	`-retgt "`*`str`*`"`
Description:	If set to something other than **none**, a default SCCP Origination Address will be used which will contain this Global Title.
Type:	String
Optionality:	
Allowed:	none "1,*noa*,*address_digits*" "2,*trans_type*,*address_digits*" "3,*trans_type*,*num_plan*,*address_digits*" "4,*trans_type*,*num_plan*,*noa*,*address_digits*"

Default: none

Notes: The variables used in the gt are:

<noa>	Nature of Address
<address_digits>	Destination/Called Party Number
<trans_type>	Transmission Type
<num_plan>	Number Plan

Example: `-retgt "1,1,123456789"`

retni

Syntax: `-retni = 0|1`

Description: Sets the National Indicator in a return address (an ANSI SCCP address rather than an ITU one), created using the retssn/ retpc/ retgt config parameters.

Type: Integer

Optionality:

Allowed:

0	Set the NI to 0 (ITU).
1	Set the NI to 1 (ANSI).

Default:

Notes: The National Indicator is the first bit of the return address (that is, the SCCP address).

Example: `-retni = 1`

retpc

Syntax: `-retpc point code value`

Description: If set to a non-zero value, a default SCCP Origination Address will be used which will contain this Point Code.

Type: Hex or decimal integer

Optionality:

Allowed:

Default: 0

Notes:

Example: `-retpc 55`

retri

Syntax: `-retri Routing Indicator`

Description: Default SCCP Origination Address's routing indicator.

Type: Integer

Optionality:

Allowed:

0	route on GT
1	route on PC

Default: 0

Notes: Used in conjunction with `retssn`, `retpc` and `retgt` options.

Example: `-retri 1`

`retssn`

Syntax:	`-retssn` *`SSN`*
Description:	If set to a non-zero value, a default SCCP Origination Address will be used in the first outgoing TC-CONTINUE message which will contain this SSN.
Type:	Integer
Optionality:	
Allowed:	0-255
Default:	0
Notes:	
Example:	`-retssn 20`

`sendorigaddr`

Syntax:	`-sendorigaddr` *`true`*`|`*`false`*
Description:	Whether to send the SCCP origination address in addition to the destination address.
Type:	Boolean
Optionality:	
Allowed:	true — Send the SCCP origination address. false — Do not send the SCCP origination address.
Default:	false
Notes:	If `statsif` is defined, `sendorigaddr` is set to true regardless of the configuration value set here.
Example:	`-sendorigaddr true`

`sleekey`

Syntax:	`-sleekey` *`SLEE_Service_Key`*
Description:	Base SLEE service key value to use in base key (bytes 6-8) part of the SLEE service key created by sua_if/m3ua_if to enable the SLEE to route the message to the correct service.
Type:	Integer
Optionality:	Optional, default will be used if not set.
Allowed:	A single value or a range of values (in hex or decimal integers)
Default:	0x1
Notes:	For more information about how sleekey is used to construct the base key in the SLEE service key, see *Routing process* (on page 4).

Examples:	`-sleekey 0x89abcd`
	In this example, the base key in all SLEE service keys created by this sua_if/m3ua_if will be 0x89abcd.
	
	`-sleekey 0x1-0x5`
	In this example, the base key of SLEE service keys created by sua_if/m3ua_if will range between 0x1 and 0x5 picked in a round-robin.

`ssns`

Syntax:	`-ssns` *`ssn1`*`,`*`ssn2`*`,...`
Description:	A comma separated list of SCCP subsystem numbers (SSNs) that the TCAP Interface will register to.

Type:	Decimal integer
Optionality:	
Allowed:	0 to 255
Default:	19
Notes:	
Example:	`-ssns 12,33`

statsif

Syntax:	`-statsif` *none|slee_if_name*
Description:	SLEE interface to which all initial messages in a TCAP dialog are copied to allow statistics monitoring.
Type:	String
Optionality:	
Allowed:	none — don't copy initial messages SLEE interface name — SLEE interface to copy initial messages to. Must match interfaceName in SLEE.cfg.
Default:	none
Notes:	Currently this is only used with the SLEE Callmapping solution. If `statsif` is not none, `sendorigaddr`'s value is over-ridden and set to true. For more information about SLEE interfaces including the statistics interface, see *Service Logic Execution Environment Technical Guide*.
Example:	`-statsif none`

stderron

Syntax:	`-stderron` *0|1*
Description:	Whether syslog messages generated by the interface class should be printed to stderr as well as the system log file.
Type:	Boolean
Optionality:	
Allowed:	0 — print to syslog only 1 — print to stderr and syslog
Default:	0
Notes:	
Example:	`-stderron 1`

stps

Syntax:	`-stps` *pc1*,*pc2*,...
Description:	Comma-separated list of STP point codes to which sua_if/m3ua_if should round-robin route outward messages.
Type:	Decimal integer
Optionality:	

Allowed:	none	Packets will only be sent to addresses that have a direct route set up.
	comma-separated list of STP point codes (decimal integers)	List of STP point codes to send messages to in round robin.
Default:	none	
Notes:	Each PC will be substituted into the MTP destination addresses.	
Example:	`-stps 2,5,7`	

Configuring sigtran.config

Introduction

This topic explains the configuration options and parameters for sua_if/m3ua_if in the **sigtran.config** file.

Note: Unlike the parameters set in **tcapif.def**. These parameter cannot be set on the command line.

sigtran.config example

SIGTRAN TCAP Interface is installed with two **sigtran.config** files:

File	Description
sigtran.config.example	A full set of parameters showing example configuration with explanations.
sigtran.config.simple	Two very simple configurations. This file shows minimal configuration and does not include all available parameters.

You can use either of these files as a source to create the **sigtran.config** file which will actually be used by sua_if/m3ua_if.

Note: Some specific parameters (for example host names) will need to be amended in **sigtran.config** to run sua_if/m3ua_if correctly.

Using eserv.config instead of sigtran.config

You can put the **sigtran.config** configuration into the main **eserv.config** file for the machine you are running sua_if/m3ua_if on. If you do this, you will need to change the ESERV_CONFIG_FILE environmental variable in the Interface's startup script. For more information about the ESERV_CONFIG_FILE environmental variable, see *ESERV_CONFIG_FILE* (on page 11).

Editing the File

Open the configuration file on your system using a standard text editor. Do not use text editors, such as Microsoft Word, that attach control characters. These can be, for example, Microsoft DOS or Windows line termination characters (for example, ^M), which are not visible to the user, at the end of each row. This causes file errors when the application tries to read the configuration file.

Always keep a backup of your file before making any changes to it. This ensures you have a working copy to which you can return.

Loading configuration changes

If you change the configuration, you must send a SIGHUP to sua_if/m3ua_if to enable the new options to take effect.

sigtran.config structure

This text shows the structure of the **sigtran.config** file.

```
SUA = {
    ansi = true|false
    maxSLS = int
    maxDids = int
    rejectTimeout = secs
    invokeTimers = true|false
    log = true|false
    xudtHopCount = int
    retAddrAll = true|false
    qos = int
    opc = dec int
    stpPCs = [ pc[, pc, ...] ]
    statisticsInterval = secs
    networkDebug = true|false

    connections = {
        name = {
            remote_host = [ "itp"[, "itp"] ]]
            [remote_port = port]
            [local_host = [ "host"[, "host"] ]]
            [local_port = port]
            [remote_role = "sg|as|as_only|*"]

            routing_context = int
            traffic_mode_type = "mode"
            [message_priority = int]
            [importance = 0|1]
            [network_indicator = 0|1]
            [network_appearance = int]
            [asp_identifier = int]
            [application_server = "str"]
            [transport = "sctp|tcp"]
            [initiation = "str"]
            [rcvbuf = bytes]
            [sndbuf = bytes]
            [sctp_ostreams = int]
            [sctp_istreams = int]
            [sctp_hbinterval = millisecs]
            [sctp_init_timeout = secs]
            [default_gt = "gt"]
            [activate = "down|up|active"]
            [segment_size = bytes]
            [asp_identifier = int]
            [use = "name"]

            [gtt_pc = pc]
            [gtt_ssn = ssn]
            [gtt_remove = true|false]
            [gtt_route_pc = true|false]
            [gtt_np = int]
        }
        [...]
    }

    routes = [
        {
            [first = pc|gt last = pc|gt]
            [peer = pc]
            [priority = int]
            [label = "str"]
            [use = "str"]
            [connection parameters]
            [connection parameters]
        }
        [...]
    ]

    classifiers = [
        {
            [routing_indicator = int]
            [address_indicator = int]
            [subsystem_number = ssn]
            [point_code = pc]
            [gti = int]
            [trans_type = int]
            [num_plan = int]
            [nature_of_add = noa]

            [source_routing_indicator = int]
            [source_address_indicator = int]
            [source_subsystem_number = ssn]
            [source_point_code = pc]
            [source_gti = int]
            [source_trans_type = int]
            [source_num_plan = int]
            [source_nature_of_add = noa]

            label = "str"
        }
        [...]
    ]
}

M3UA = {
    sigtran.config parameters
    japanese_sccp = true|false
    connections = {
        {
            other connection parameters
            mtp3_dpc = pc
        }
        [...]
    }
    routes = [
        routes
    ]
    [classifiers = [class matches]]
}
```

sigtran.config parameters

The configuration variables available in **sigtran.config** for sua_if and m3ua_if are listed below.

ansi

Syntax:	`ansi = true|false`	
Description:	Use ANSI or ITU addressing selection.	
Type:	Boolean	
Optionality:		
Allowed:	true	ANSI addressing
	false	ITU addressing

Default:	false
Notes:	This is only used when converting a SUA address in a received packet into an SCCP address. In all other cases, the national indicator field of the address is used for that purpose.
Example:	`ansi = false`

asn1_validate

Syntax:	`asn1_validate =` *`value`*
Description:	How to validate incoming ASN.1 data.
Type:	Integer
Optionality:	Optional (default used if not set).
Allowed:	0 to 3
Default:	3
Notes:	Options are: 0 = no validation. 1 = validate but silently discard broken packets. 2 = validate and short syslog message for broken packets. 3 = validate and syslog broken packet contents.
Example:	`asn1_validate = 2`

classifiers

Syntax:	`classifiers = [{`*`class1`*`}{`*`class2`*`}...]`
Description:	Defines the classification match patterns.
Type:	Array
Optionality:	Optional (if not set, all matching done in Route section).
Allowed:	
Default:	None
Notes:	For more information about the configuration available for classifiers, see *Classifier parameters* (on page 43).

Example:

```
classifier = [
     {
         trans_type = 9
         label = "message-class-1"
     }
     {
         trans_type = 9
         num_plan = 1
         label = "message-class-2"
     }
]
```

connections

Syntax:

```
connections = {
     name = {parameters)
     [name = {parameters}]
     [...]
}
```

Description: This section defines how packets are passed from sua_if to the destination ITP/STP.

Type:	Array
Optionality:	Mandatory
Allowed:	
Default:	None

Notes: The same connection can be used for multiple routes. This removes the need to configure the same connection information each time the connection is used by a route.

Connections can inherit details from other connections using the 'use' parameter. If this is done, you can override inherited details by re-specifying a parameter within the inheriting connection.

Routes use connections by inheriting the connection details using the 'use' parameter. Like connections, you can override inherited details by specifying them within the route.

Only connections listed in the routes section are actually used.

For details of the parameters which can be used to define a connection, see *Connection parameters* (on page 30).

Example:

```
connections = {
    default = {
        remote_host = "supitp1"
        remote_port = 15000
        local_port = 14001
    )
    secondary = {
        use = "default"
        remote_host = "supitp2"
        asp_identifier = 1234
    }
}
```

default_retgt

Syntax: `default_retgt = "str"`

Description: Defines the default return Global Title which will be used when retgt_mapping is set and a match cannot be found for the return address.

Type:	String
Optionality:	Optional
Allowed:	none
	"1,*noa*,*address_digits*"
	"2,*trans_type*,*address_digits*"
	"3,*trans_type*,*num_plan*,*address_digits*"
	"4,*trans_type*,*num_plan*,*noa*,*address_digits*"
Default:	none

Notes: The variables used in the gt are:

noa	Nature of Address
address_digit	Destination/Called Party Number
trans_type	Transmission Type
num_plan	Number Plan

Example: `default_retgt = "4,0,1,2,44321456"`

retgt_mapping

Syntax:

```
retgt_mapping = [
   { from="str", to = "str"},
   { from="str", to = "str"},
]
```

Description: Used to map return addresses. The mapping will be applied to every outgoing message. If there is no match for the return address then the value defined for `default_retgt` will be used.

Type: Array

Optionality: Optional.

Allowed: "str" can be replaced with:

"1,*noa*,*address_digits*"

"2,*trans_type*,*address_digits*"

"3,*trans_type*,*num_plan*,*address_digits*"

"4,*trans_type*,*num_plan*,*noa*,*address_digits*"

Default: Defaults to mapping set in default_retgt

Notes: Variables used are:

noa	Nature of Address
address_digits	Destination/Called Party Number
trans_type	Transmission Type
num_plan	Number Plan

Example:

```
retgt_mapping = [
    { from="4,0,1,4,123", to = "4,0,1,4,441482255436"},
    { from="4,0,1,4,4414782255436", to = "4,0,1,4,441482255436"},
]
```

Note: In this example, the first entry maps the 123 address to the 441482255436 address. The second entry ensures this address is used in the future. Otherwise the setting from `default_retgt` will be used.

invokeTimers

Syntax: `invokeTimers = true|false`

Description: Whether to run invoke timers or not.

Type: Boolean

Optionality:

Allowed:

true	Run invoke timers.
false	Do not run invoke timers.

Important: Turning off invoke timers will cause extremely non-standard TCAP behavior. It should only be done in highly specialized circumstances after careful consideration of the consequences. Do not set invokeTimers to false without detailed consultation with Oracle about possible effects.

Default: true

Notes: For more information about invoke timers, see *Q.774 3.2.1.1.3*.

Example: `invokeTimers = true`

`invokeTimerOverride`

Syntax:	`invokeTimerOverride = `*`seconds`*
Description:	Override invoke timers with a default global value in seconds.
Type:	Integer
Optionality:	Optional (default used if not set).
Allowed:	Valid values are 0 - 3600. See Q.774 3.2.1.1.3.
Default:	0
Notes:	0 = Do not override invoke timers. This configuration item is normally used for services that require interactions which last for >30 seconds (for example, some USSD services).
Example:	`invokeTimerOverride = 0`

Warning: This configuration item is normally used for services that require interactions which last for >30 seconds (for example some USSD services).

Changing invoke timers will cause extremely non-standard TCAP behavior, and this should only be done in highly specialized circumstances after careful consideration of the consequences. Do not change invokeTimerOverride without detailed consultation with Oracle as to the resultant behavior.

`log`

Syntax:	`log = `*`true|false`*
Description:	Controls SCCP logging.
Type:	Boolean
Optionality:	
Allowed:	true — All SCCP level traffic is logged to **/tmp**. false — SCCP logging is not done.
Default:	false
Notes:	This may be toggled at run-time by sending a SIGUSR1 to the TCAP Interface. SCCP logging is done at the SCCP level for both SUA and M3UA.
Example:	`log = false`

`maxDids`

Syntax:	`maxDids = `*`int`*
Description:	Maximum number of in-progress transactions.
Type:	Integer
Optionality:	Optional
Allowed:	Positive integer
Default:	100000
Notes:	This parameter is not reloaded on SIGHUP.
Example:	`maxDids = 100000`

`maxSLS`

Syntax:	`maxSLS = `*`int`*
Description:	Maximum Signalling Link Selection to use.
Type:	Integer
Optionality:	Optional
Allowed:	Positive integer
Default:	255

Notes:	The SLS determines the: • Specific SS7 link that an ITP will send a packet over • SCTP stream the TCAP Interface will use.
Example:	`maxSLS = 255`

networkDebug

Syntax:	`networkDebug = `*`true`*`|`*`false`*
Description:	Whether or not to turn on the sigtran_network debug facility.
Type:	Boolean
Optionality:	Optional (if not specified, the sigtran_network setting from the DEBUG environment variable is used).
Allowed:	true — Use the sigtran_network debug. false — Use the sigtran_network setting from the DEBUG environment variable.
Default:	false
Notes:	The debug produces is one line per packet of debug info and some per-connection stats approximately once per second.
Example:	`networkDebug = true`

opc

Syntax:	`opc = `*`dec int`*
Description:	Local point code for outgoing messages.
Type:	Decimal integer
Optionality:	Mandatory
Allowed:	any valid point code — This point code will be set as the local point code in outgoing messages. -1 — Use other methods to set local point code. If you use this, you must be careful to make sure that all outgoing messages get a valid originating address. **Note:** Only valid for SUA.
Default:	
Notes:	Parameter is given as an integer.
Example:	An ITU point code of 1-1-1 is configured as: `opc = 2057`

qos

Syntax:	`qos = `*`int`*
Description:	SCCP/SUA protocol class.
Type:	Decimal integer
Optionality:	
Allowed:	0 — unordered delivery, no error returns 1 — ordered delivery, no error returns 128 — unordered delivery, return on error 129 — ordered delivery, return on error

Default:	1
Notes:	If you wish to have your packets randomly re-ordered, set to 0. Otherwise leave as the default 1.
Example:	`qos = 1`

rejectTimeout

Syntax: `rejectTimeout = `*`secs`*

Description: Reject timeout as specified in Q.774 3.2.1.1.3.

Type: Integer

Optionality:

Allowed:

0	No timer. **Important:** Turning off reject timers will cause extremely non-standard TCAP behavior. It should only be done in highly specialized circumstances after careful consideration of the consequences. Do not set rejectTimeout to 0 without detailed consultation with Oracle about possible effects.
Positive integer	Reject timeout.

Default: 1

Notes:

Example: `rejectTimeout = 10`

retAddrAll

Syntax: `retAddrAll = `*`true`*`|`*`false`*

Description: Indicates how to change the return address on a received transaction.

Type: Boolean

Optionality:

Allowed:

false	Apply strict Q.774 logic for changing the return address on a received transaction.
true	The return address may be changed at any stage of the transaction.

Default: false

Notes:

Example: `retAddrAll = true`

routes

Syntax:

```
routes = [
    {route1}
    [{route2}]
    [...]
]
```

Description: Matches details in outgoing packets and sets the packets destination details.

Type: Array

Optionality: Mandatory

Allowed:

Default:	None
Notes:	Each route matches details in outgoing traffic and routes it to a specific destination (usually specified by the connection set by the use parameter). Matching details include one of the following: • A range of point-codes (numeric) • A range of GT prefixes (strings) If two (or more) routes have identical ranges, they are merged and all the end-points used. If one range is strictly contained within another, the narrower range overrides the larger. Outgoing traffic may also match details in the classifiers section, which will then use the route with the same label to define the destination. For more information about the configuration available for routes, see *Route parameters* (on page 41).

Example:

```
routes = [
    {
        first = 0
        last = 16777215
        use = "default"
    }
    {
        first = 0
        last = 16777215
        use = "secondary"
    }
]
```

scmg_ssn

Syntax:	`scmg_ssn = `*`int`*
Description:	The sub-system number for SCMG processing by the M3UA interface.
Type:	Integer
Optionality:	Optional (default used if not set).
Allowed:	Integer value between -1 and 255
Default:	-1. No SCMG processing will take place.
Notes:	
Example:	`scmg_ssn = 1`

statisticsInterval

Syntax:	`statisticsInterval = `*`secs`*
Description:	How often in seconds to notify statistics to syslog.
Type:	Decimal integer
Optionality:	
Allowed:	0 — turn off notification positive integer — notification period
Default:	0
Notes:	
Example:	`statisticsInterval = 0`

stpPCs

Syntax:	`stpPCs = [ stp1[, stp2, ...] ]`
Description:	Failover routing to the routes configured in the routes = [] section.
Type:	Decimal integer
Optionality:	Optional
Allowed:	
Default:	
Notes:	The routing logic follows these steps: **1** Attempt to route a packet directly to its real destination address. **2** If that fails, choose an STP point code from the stpPCs list, and route using that point code. This gives two separate mechanisms for spreading traffic over multiple destinations. The stpPCs list is more limited (because it applies to all destinations) but it is integrated with TCAP dialogs (it ensures multiple packets on the same TCAP dialog use the same STP PC). The STP list can also be specified on the command line. The command line configuration will override any set here. The whitespace used within the square brackets does not affect the parsing of the STP references. For more information about TCAP dialogs, see *Service Logic Execution Environment Technical Guide*.
Example:	`stpPCs = [ 1234, 1235 ]`

xudtHopCount

Syntax:	`xudtHopCount = int`
Description:	The hop count to send on protocols that support it.
Type:	Decimal integer
Optionality:	
Allowed:	-1 Do not set a hop count 1-255 Hop count
Default:	-1
Notes:	For SCCP over M3UA, we send UDTs if the hop count is -1, and XUDTs otherwise.
Example:	`xudtHopCount = -1`

Connection key configuration

These parameter values identify which connection a route uses.

- local_host
- local_port
- remote_host
- remote_port
- transport

Connection parameters

The connections subsection of the **sigtran.config** configuration supports these parameters.

```
connections = {
        name = {
            remote_host = [ "itp"[, "itp"] ]]
            [remote_port = port]
            [local_host = [ "host"[, "host"] ]]
            [local_port = port]
            [remote_role = "sg|as|as_only|*"]

            routing_context = int
            traffic_mode_type = "mode"
            [message_priority = int]
            [importance = 0|1]
            [network_indicator = 0|1]
            [network_appearance = int]
            [asp_identifier = int]
            [application_server = "str"]
            [transport = "sctp|tcp"]
            [initiation = "str"]
            [rcvbuf = bytes]
            [sndbuf = bytes]
            [sctp_ostreams = int]
            [sctp_istreams = int]
            [sctp_hbinterval = millisecs]
            [sctp_init_timeout = secs]
            [default_gt = "gt"]
            [activate = "down|up|active"]
            [segment_size = bytes]
            [asp_identifier = int]
            [use = "name"]

            [gtt_pc = pc]
            [gtt_ssn = ssn]
            [gtt_remove = true|false]
            [gtt_route_pc = true|false]
            [gtt_np = int]
        }
        [...]
    }
```

The parameters in this subsection are described in detail below.

activate

Syntax:	`activate = "down|up|active"`	
Description:	Set the target state for a connection.	
Type:	String	
Optionality:	Optional	
Allowed:	down	Connection is disabled.
	up	Connection will change to UP state (but not ACTIVE). Remote attempts to activate will get a management-blocking error.
	active	Connection will be allowed to change to ACTIVE state following the normal process.
Default:	active	
Notes:		
Example:	`activate = "active"`	

`application_server`

Syntax:	`application_server = "`*`str`*`"`
Description:	The remote peers may be grouped into application servers for override handling. If the peers are override, then we try and maintain only one ASP active in each AS at any one time.
Type:	String
Optionality:	Optional
Allowed:	Any name for the AS to which the ASPs belong.
Default:	By default, the interface attempts to guess the ASP to AS groupings from the routing information.
Notes:	Override default by specifying a name for the AS to which some ASPs belong.
Example:	`application_server = "appserver1"`

`asp_identifier`

Syntax:	`asp_identifier = `*`int`*
Description:	The ASP Identifier sent to the SGP.
Type:	Decimal integer
Optionality:	Optional
Allowed:	
Default:	
Notes:	This is an arbitrary number expected by the remote entity.
Example:	`asp_identifier = 5`

`default_gt`

Syntax:	`default_gt = "`*`gt`*`"`
Description:	Override outgoing calling party address with route on PC/SSN to one of the following: • Route on GT • Using the specified GT
Type:	Numeric string
Optionality:	Optional
Allowed:	
Default:	The default is to not set this parameter (leave PC/SSN routing alone).
Notes:	For most purposes, the *retgt* (on page 16) command line parameter will provide more predictable behaviour.
Example:	`default_gt = "12345678"`

`gtt_pc`

Syntax:	`gtt_pc = `*`pc`*
Description:	Sets point code for Global Title Translation parameters used to set a PC on the destination address.
Type:	Decimal integer
Optionality:	Optional
Allowed:	
Default:	
Notes:	Used for routing an outgoing packet on GT. The PC & SSN supplied by GTT only effect the packet content - it does not

	change where we send it. The GTT will not override a PC and SSN already on the address. The GTT parameters are ignored when routing on PC/SSN.
Example:	`gtt_pc = 1234`

`gtt_np`

Syntax:	`gtt_np =` *`int`*
Description:	Sets NP for Global Title Translation parameters used to set a PC and SSN on the destination address.
Type:	Integer
Optionality:	Optional
Allowed:	
Default:	
Notes:	gtt_np has no effect if gtt_remove is set, or if the GT type does not have an NP. ITU GTI 3 and 4 have NP. ITU GTI 1 and 2 do not have NP.
Example:	

`gtt_remove`

Syntax:	`gtt_remove =` *`true|false`*
Description:	Defines GT details in outgoing message using GT routing.
Type:	Boolean
Optionality:	Optional
Allowed:	true — Remove GT and replace with PC. false — Leave existing GT.
Default:	false
Notes:	
Example:	`gtt_remove = true`

`gtt_route_pc`

Syntax:	`gtt_route_pc =` *`true|false`*
Description:	Whether or not to override routing indicator.
Type:	Boolean
Optionality:	Optional
Allowed:	true — Route on PC. false — Do not change routing indicator.
Default:	false
Notes:	
Example:	`gtt_route_pc = true`

`gtt_ssn`

Syntax:	`gtt_ssn =` *`ssn`*
Description:	Sets Subsystem Number for Global Title Translation parameters used to set an SSN on the destination address.
Type:	Hex integer

Optionality:	Optional
Allowed:	
Default:	
Notes:	Used for routing an outgoing packet on GT. The PC & SSN supplied by GTT only effect the packet content - it does not change where we send it. The GTT will not override a PC and SSN already on the address. The GTT parameters are ignored when routing on PC/SSN.
Example:	`gtt_ssn = 11`

`importance`

Syntax:	`importance = `*`0|1`*
Description:	Sets the SCCP XUDT/LUDT and SUA importance field.
Type:	Boolean
Optionality:	Optional
Allowed:	0 Sets field to 0 (normal) 1 Sets field to 1 (important)
Default:	0
Notes:	
Example:	`importance = 0`

`initiation`

Syntax:	`initiation = "`*`str`*`"`
Description:	Overrides the default action for local and remote ports.
Type:	String
Optionality:	Optional
Allowed:	listen — Listen for incoming connections. connect — Attempt to connect to remote peer. none — Do not listen or attempt to connect. both — Listen for incoming connections and attempt to connect to remote peer.
Default:	By default, if the local_port is specified, TCAP Interface listens for incoming connections, and if the remote_port is given, TCAP Interface attempts to connect.
Notes:	In some circumstances the default behavior may be undesirable. **Examples:** • Where the remote end must use a fixed port number but we want the remote end to initiate the connection). • When using SIGTRAN over TCP, listening on a port means that you can't later connect using that local port.
Example:	`initiation = "connect"`

`local_host`

Syntax:	Either: • `local_host = "`*`localAddr`*`"` • `local_host = [ "`*`localAddr1`*`", "`*`localAddr2`*`"[ ,...] ]`
Description:	IP address or hostname of local host.

Type:	String
Optionality:	Optional
Allowed:	Any valid: • hostname • hostname and domain • ip address
Default:	
Notes:	Using an array of remote hosts provides control over the SCTP multi-home functionality. The local_host list is used to bind the local socket. If you leave the local_host unset, the SCTP will enable multi-homing over all addresses. The connections are identified internally by only the first remote_host.

Examples:	`local_host = "produas01.telcoexample.com"`
	`local_host = [ "localAddr1", "localAddr2" ]`

`local_port`

Syntax:	`local_port =` *`port`*
Description:	Local host port number.
Type:	Decimal integer
Optionality:	At least one of remote_port and local_port must be specified. If using SCTP, both may be specified.
Allowed:	
Default:	If not set, the Operating System will set a port for outgoing messages.
Notes:	
Example:	`local_port = 14001`

`message_priority`

Syntax:	`message_priority =` *`int`*
Description:	Sets the MTP3 message_priority field in outgoing M3UA packets.
Type:	Decimal integer
Optionality:	Optional
Allowed:	
Default:	0
Notes:	If not set, is set to zero in M3UA packets and omitted from SUA packets.
Example:	`message_priority = 0`

`network_appearance`

Syntax:	`network_appearance =` *`int`*
Description:	M3UA network appearance value sent in M3UA packets sent to the network.
Type:	Integer
Optionality:	Optional
Allowed:	
Default:	0
Notes:	If not set, this field is omitted from M3UA packets sent to the network.
Example:	network_appearance = 10

`routing_context`

Syntax:	`routing_context =` *`int`*
Description:	The SIGTRAN routing context.
Type:	Decimal integer
Optionality:	Generally mandatory for SUA. Generally optional for M3UA.
Allowed:	32-bit integers
Default:	
Notes:	The context is derived from the ACTIVE handshake if possible.
Example:	`routing_context = 666`

`network_indicator`

Syntax:	`network_indicator =` *`0`*|*`2`*

Description:	Sets the value of the MTP3 network indicator in outgoing messages.
	`0000 International`
	`0010 National`

Type:	A 4-bit binary field
Optionality:	Mandatory
Allowed:	0, 2
Default:	0
Notes:	As defined by ANSI / ITU-T
Example:	`network_indicator = 0`

`rcvbuf`

Syntax:	`rcvbuf =` *`bytes`*	
Description:	Receive buffer size.	
Type:	Decimal integer	
Optionality:	Optional	
Allowed:	0	Use the OS default.
	positive integer	Set the recvbuf value in outgoing messages. Must not be less than 32768.
Default:	0	

Notes:

Important: This value needs to cover all outstanding unacknowledged SCTP data on the network. If you set these to a non-zero value, it is unlikely to work properly if set to less than 64000.

Do not change this parameter from the default value without calculating the new value based on network conditions. The defaults should work fine in all but the highest traffic conditions.

Example: `rcvbuf = 131072`

`remote_host`

Syntax:	Either: • `remote_host = "`*`itpAddr`*`"` • `remote_host = [ "`*`itpAddr1`*`", "`*`itpAddr2`*`", ... ]`
Description:	Location of the remote host(s).
Type:	String or array of comma-separated strings.
Optionality:	Mandatory
Allowed:	Any valid: • hostname • hostname and domain • ip address
Default:	
Notes:	Using an array of remote hosts provides control over the SCTP multi-home functionality. When connecting, remote_host gives the candidate peer addresses. When listening, and incoming connection matches if it's primary IP address matches any of the remote_hosts. The connections are identified internally by only the first remote_host.

Examples:	`remote_host = "itp"`
	`remote_host = [ "itp1", "itp2" ]`

`remote_port`

Syntax:	`remote_port = `*`port`*
Description:	Port to connect to on remote_host.
Type:	Decimal integer
Optionality:	At least one of remote_port and local_port must be specified. If using SCTP, both may be specified.
Allowed:	
Default:	If not set, the operating system will accept connections from any remote port.
Notes:	
Example:	`remote_port = 26600`

`remote_role`

Syntax:	`remote_role = "`*`sg`*`|`*`as`*`|`*`as_only`*`|`*`*`*`"`
Description:	How UPs and ACTIVEs are expected to flow between TCAP Interface and peer.
Type:	String
Optionality:	Optional, default is used if not set.
Allowed:	sg — Peer is expected to receive UPs and ACTIVEs but not send them to us. as — UPs and ACTIVEs should go both ways. as_only — Peer is expected to send UPs and ACTIVEs but we will not send them to the peer. * — Both ways are attempted, but only one direction needs to be active for data to flow.
Default:	"*"
Notes:	"*" should work in most circumstances.
Example:	`remote_role = "sg"`

sctp_hbinterval

Syntax:	`sctp_hbinterval = `*`millisecs`*
Description:	SCTP heartbeat interval in milliseconds.
Type:	Decimal integer
Optionality:	Optional (default used if not set).
Allowed:	0 — Turn off heartbeat messages. positive integer — Heartbeat interval.
Default:	1000
Notes:	To speed up failover behavior, it may help to reduce some kernel-level parameters using the ndd command, including: • sctp_pp_max_retr • sctp_rto_min • sctp_rto_max • sctp_rto_initial.
Example:	`sctp_hbinterval = 2500`

sctp_init_timeout

Syntax:	`sctp_init_timeout = `*`secs`*
Description:	Gives the maximum time the SIGTRAN stack will allow for an SCTP association to form. If the association fails to form within this time, the attempt is abandoned and a new attempt is begun.
Type:	Decimal integer
Optionality:	Optional (default used if not set).
Allowed:	0 — No timeout will be applied and the operating system's values are all that will be used. positive integer — Length of timeout, in seconds
Default:	5
Notes:	Note that this interacts very heavily with the operating system's SCTP timeout values. Its purpose is to ensure that the SIGTRAN stack will attempt to form a connection at least every time the timeout fires. The default of five seconds means that no matter how the operating system is configured the SIGTRAN stack will attempt to connect every five seconds. This is very useful in case the operating system has not been configured or has been incorrectly configured. In Solaris there are several important configuration items related to this. The key ones are sctp_max_init_retr, which determines how many times the kernel will send the SCTP INIT message (the initial message plus this number of retries) and sctp_rto_max which determines the maximum retry time. Solaris uses an exponential backoff system as it retries. Setting sctp_rto_max to 1000 (the units are milliseconds) will ensure that the connection is retried every second thus giving us the fastest restart time.
Example:	`sctp_init_timeout = 5`

sctp_istreams

Syntax:	`sctp_istreams = `*`int`*
Description:	Number of SCTP input streams per connection.
Type:	Decimal integer
Optionality:	Optional (default used if not set).

Allowed:	0	Use the OS default.
	positive integer	Maximum number of SCTP input streams per connection.
Default:	0	
Notes:		
Example:	sctp_istreams `= 10`	

`sctp_ostreams`

Syntax:	`sctp_ostreams =` *`int`*	
Description:	Number of SCTP output streams per connection.	
Type:	Decimal integer	
Optionality:	Optional (default used if not set).	
Allowed:	0	Use the OS default.
	positive integer	Maximum number of SCTP output streams per connection.
Default:	0	
Notes:		
Example:	`sctp_ostreams = 10`	

`segment_size`

Syntax:	`segment_size =` *`bytes`*
Description:	The maximum number of bytes allowed in a segment in an SCCP payload.
Type:	Decimal integer
Optionality:	Optional
Allowed:	
Default:	If not set, segmentation will not be performed.
Notes:	Over SCCP/M3UA, only used if xudtHopCount is set (so that XUDT packets are sent). If sudtHopCount is not set, then UDT packets are sent, and segment_size is ignored. If set, and network is SUA, segment_size is always applied.
Example:	`segment_size = 255`

`sndbuf`

Syntax:	`sndbuf =` *`bytes`*	
Description:	Send butter size, in bytes.	
Type:	Decimal integer	
Optionality:	Optional	
Allowed:	0	Use the OS default.
	positive integer	Specifies maximum size of buffer for outgoing messages. Must not be less than 32768.
Default:	0	
Notes:	**Important:** This value needs to cover all outstanding unacknowledged SCTP data on the network. If you set these to a non-zero value, it is unlikely to work properly if set to less than 64000. Do not change this parameter from the default value without calculating the new	

value based on network conditions. The defaults should work fine in all but the highest traffic conditions.

Example: `sndbuf = 131072`

traffic_mode_type

Syntax: `traffic_mode_type = "`*`mode`*`"`

Description: Traffic mode type.

Type: String

Optionality: Optional. However, if not set, sua_if/m3ua_if will be using loadshare and peers may not be, which will result in ITPs failing.

Allowed:

override	SIGTRAN override, sua_if/m3ua_if will wait for a request before setting a connection to active.
override_primary	SIGTRAN override, sua_if/m3ua_if will set connections to active as soon as possible.
loadshare	sua_if/m3ua_if will send messages on sequential connections in a round robin (one after the other) pattern.
broadcast	sua_if/m3ua_if will send messages on all applicable connections.

Default: If not specified or negotiated, loadshare is used.

Notes:

Example: `traffic_mode_type = "loadshare"`

transport

Syntax: `transport = "`*`sctp|tcp`*`"`

Description: The transport type for this connection.

Type: String

Optionality: Optional

Allowed:

sctp	SIGTRAN over SCTP
tcp	SIGTRAN over TCP

Default: sctp

Notes: In normal networks, SCTP is always used.

Example: `transport = "stcp"`

use

Syntax: `use = "`*`name`*`"`

Description: Base this connection configuration on the named connection.

Type: String

Optionality: Optional

Allowed: Any already defined connection name.

Default:

Notes: This enables parameters to be redefined specifically for this connection without the need to repeat the unchanged ones.

Example: `use = "PrimaryConnection"`

Route parameters

The routes subsection of the **sigtran.config** configuration supports these parameters.

Notes:

- All routes have the same parameters available as listed for *Connection parameters* (on page 30), plus those listed below for Route parameters.
- Routes can also use parameters from the *Classifier parameters* (on page 43) section, though this is only recommended for simple routing situations.

```
routes = [
    {
        [first = pc|gt last = pc|gt]
        [peer = pc]
        [priority = int]
        [label = "str"]
        [use = "str"]
        [connection parameters]
        [connection parameters]
    }
    [...]
]
```

The parameters in this subsection are described in detail below.

first

Syntax:	Either: • `first = startPC` • `first = "startGT"`
Description:	The first number (Point Codes) or string (Global Title) in the range of destination addresses.
Type:	Decimal integer or Numeric string
Optionality:	Optional. Must be set if last is set. Must be set if peer is not set. Must not be set if peer is set.
Allowed:	
Default:	
Notes:	This number is inclusive.

Examples:	`first = 0`
	`first = "6441"`

label

Syntax:	`label = "str"`
Description:	If a message has matched a classifier with the same label value as this parameter, the message can use this route.
Type:	String
Optionality:	Optional (not used if not set).
Allowed:	
Default:	None (no label).
Notes:	If this route will be used by messages which have been matched in the *Classifier parameters* (on page 43) section, this string must match a label value exactly. If more than one route has the same label, qualifying messages will follow the usual routing match rules to determine which route to use.

Example:	`label = "itp-special"`

`last`

Syntax:	Either: • `last =` *`endPC`* • `last = "`*`endGT`*`"`
Description:	The last Point Code or Global Title prefix in the range of destination addresses.
Type:	Decimal integer or Numeric string
Optionality:	Optional. Must be set if first is set. Must be set if peer is not set. Must not be set if peer is set.
Allowed:	
Default:	
Notes:	This number is inclusive.

Examples:	`last = 6441`
	`last = "6441"`

`peer`

Syntax:	`peer =` *`pc`*
	`peer = "`*`gt`*`"`

Description:	Point Code or Global Title prefix of the application server to connect to. Routes to a single point code instead of using the first and last parameters.
Type:	Point codes are decimal integer. Global Title prefixes are string.
Optionality:	Optional. Must be set if first or last are not set. Must not be set if first or last are set.
Allowed:	
Default:	None.
Notes:	peer = "all_pc" supplies a route covering all point codes. peer = "*" supplies a route covering all point codes and all global titles.

Examples:	`peer = 131330`
	`peer = "64321"`

`priority`

Syntax:	`priority =` *`priority`*
Description:	The route's priority.
Type:	Decimal integer
Optionality:	
Allowed:	
Default:	0
Notes:	The usable routes with the highest priority will be used for a message. If multiple routes with the same priority are given, they are round-robined (unless a remote ASP specifically requests override mode). The priority is per route, not per-connection, so a priority 1 for a route is not shared with the other routes using the same connection (although an item in the 'connections' section above may be given a priority to be used unless overridden).
Example:	`priority = 1`

use

Syntax:	`use = "`*`route_name`*`"`
Description:	Base this route configuration on the named route.
Type:	String
Optionality:	Optional
Allowed:	Any already defined route name.
Default:	
Notes:	This enables parameters to be redefined specifically for this route without the need to repeat the unchanged ones.
Example:	`use = "PrimaryRoute"`

Classifier parameters

The classifiers section is used to set up routing based on things other than the destination PC or global-tile digits. If one of the classifiers matches a message, then routes with the same 'label' as the classifier are used.

The classifiers are tested in order, and the first matching classifier is used. To match, a message must match all the conditions. If no classifiers match, then the routes with no label parameter are used.

This section is optional. The classifier-matches may be inserted directly into the 'routes' section. For more information about this, see *Route parameters* (on page 41).

```
classifiers = [
    {
        [routing_indicator = int]
        [address_indicator = int]
        [subsystem_number = ssn]
        [point_code = pc]
        [gti = int]
        [trans_type = int]
        [num_plan = int]
        [nature_of_add = noa]

        [source_routing_indicator = int]
        [source_address_indicator = int]
        [source_subsystem_number = ssn]
        [source_point_code = pc]
        [source_gti = int]
        [source_trans_type = int]
        [source_num_plan = int]
        [source_nature_of_add = noa]

        label = "str"
    }
    [...]
]
```

The parameters in this subsection are described in detail below.

address_indicator

Syntax:	`address_indicator = `*`int`*
Description:	For SUA, match against the address indicator field from the destination SUA address. For SCCP, match against the address indicator field from the destination SCCP address (the first byte of the SCCP address).

Type:	Integer
Optionality:	Optional, (if not set, no matching is done against address indicator).
Allowed:	
Default:	None.
Notes:	
Example:	`address_indicator = 2`

gti

Syntax:	`gti =` *`int`*
Description:	For SUA, match against the GTI field from the destination SUA address. For SCCP, match against the GTI field from the destination SCCP address (the middle 4 bits of the address indicator byte).
Type:	Integer
Optionality:	Optional, (if not set, no matching is done against GTI).
Allowed:	For SCCP, only 0 through 4 are used.
Default:	None.
Notes:	
Example:	`gti = 2`

label

Syntax:	`label = "`*`str`*`"`
Description:	Traffic which matches a classifier with this label, will be routed to the route which also specified this label.
Type:	String
Optionality:	Mandatory
Allowed:	
Default:	None.
Notes:	Must be set for each classifier entry. If this value is not set, the traffic will route down the default route.
Example:	`label = "itp-special"`

nature_of_add

Syntax:	`nature_of_add =` *`noa`*
Description:	Match against the NOA field from the destination SUA or SCCP address.
Type:	Integer
Optionality:	Optional, (if not set, no matching is done against NOA).
Allowed:	
Default:	None.
Notes:	
Example:	`nature_of_add = 1`

num_plan

Syntax:	`num_plan =` *`int`*
Description:	For SUA, match against the Number Plan field from the destination SUA address.

	For SCCP, match against the Numbering Plan in the destination SCCP address (the top four bits of the GT numbering plan / encoding scheme byte).
Type:	Integer
Optionality:	Optional, (if not set, no matching is done against number plan).
Allowed:	For SCCP, 0 - 15
Default:	None.
Notes:	
Example:	`num_plan = 2`

point_code

Syntax:	`point_code =` *`pc`*
Description:	Match against the PC field from the destination SUA/SCCP address.
Type:	Integer
Optionality:	Optional, (if not set, no matching is done against point code).
Allowed:	
Default:	None.
Notes:	
Example:	`point_code = 1234`

routing_indicator

Syntax:	`routing_indicator =` *`int`*	
Description:	What details in the destination SUA/SCCP address to match against.	
Type:	Integer	
Optionality:	Optional, (if not set, no matching is done against routing indicator).	
Allowed:	0	Route on GT
	1	Route on PC and SSN.
Default:	None.	
Notes:		
Example:	`routing_indicator = 1`	

subsystem_number

Syntax:	`subsystem_number =` *`ssn`*
Description:	Match against the SSN field from the destination SUA/SCCP address.
Type:	Integer
Optionality:	Optional, (if not set, no matching is done against SSN).
Allowed:	
Default:	None.
Notes:	
Example:	`subsystem_number = 8`

trans_type

Syntax:	`trans_type =` *`int`*
Description:	Match against the translation type field from the destination SUA/SCCP address.
Type:	Integer
Optionality:	Optional (if not set, no matching is done against translation type).

Allowed:	Any valid translation type.
Default:	None.
Notes:	
Example:	`trans_type = 9`

M3UA route parameters

The M3UA configuration is almost identical to the SUA config. The only difference is the additional parameters listed here.

japanese_sccp

Syntax:	`japanese_sccp = true|false`
Description:	Japanese SCCP variant. Specifies whether SCCP addresses include a national-use (ANSI) bit.
Type:	Boolean
Optionality:	Optional
Allowed:	True - SCCP addresses include an additional ANSI bit. The ANSI bit is ignored on incoming SCCP addresses and set on outgoing SCCP addresses. False - SCCP addresses do not include an additional ANSI bit.
Default:	False
Notes:	
Example:	`japanese_sccp = true`

The `connections` subsection of the **sigtran.config** configuration supports these parameters.

```
M3UA = {
    sigtran.config parameters
    japanese_sccp = true|false
    connections = {
        {
            other connection parameters
            mtp3_dpc = pc
        }
        [...]
    }
    routes = [
        routes
    ]
    [classifiers = [class matches]]
}
```

The parameters in this subsection are described in detail below.

mtp3_dpc

Syntax:	`mtp3_dpc = pc`
Description:	The destination point code required in MTP3 header.
Type:	Decimal integer
Optionality:	
Allowed:	
Default:	
Notes:	There are three possible sources:

- The SCCP address
- The gtt_pc (when routing on GT)
- Explicitly configured

Example: `mtp3_dpc = 3245`

Example Configuration Scenarios

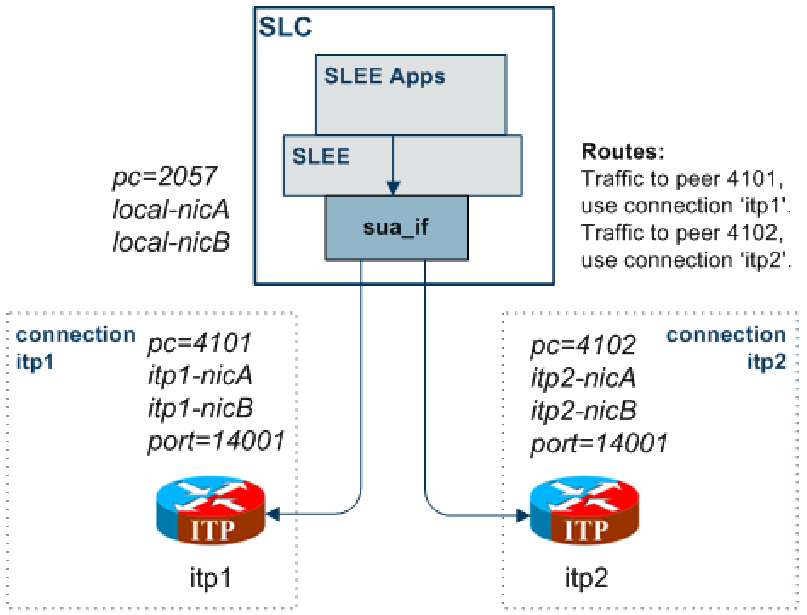
Example - route 2 PCs

This is a small and simple **eserv.config** for the SUA stack. This example routes to 2 PCs. However, because they are configured as STP PCs, traffic is re-directed to STPs. All end-points have two IP addresses, so SCTP multi-homing is used.

```
SUA = {
    # Local point code.
    opc = 2057
    # Failover list for failed traffic.
    stpPCs = [ 4101, 4102 ]

    connections = {
        itp1 = {
            # multi-home to both nics.
            remote_host = [ "itp1-nicA", "itp1-nicB" ]
            remote_port = 14001
            local_host = [ "local-nicA", "local-nicB" ]
            # specify routing context and loadshare for ITPs.
            routing_context = 666
            traffic_mode_type = "loadshare"
        }
        itp2 = {
            # multi-home to both nics.
            remote_host = [ "itp2-nicA", "itp2-nicB" ]
            remote_port = 14001
            local_host = [ "local-nicA", "local-nicB" ]
            # specify routing context and loadshare for ITPs.
            routing_context = 666
            traffic_mode_type = "loadshare"
        }
    }

    routes = [
        {
            peer = 4101       # Route all traffic to peer 4101 to
            use = "itp1"      # dest defined in connection 'itp1'.
        }
        {
            peer = 4102       # Route all traffic to peer 4102 to
            use = "itp2"      # dest defined in connection 'itp2'.
        }
    ]
}
```

Diagram - route 2 PCs

Here is a diagram which shows some of the features of the example.



Example - route all to balanced ITPs

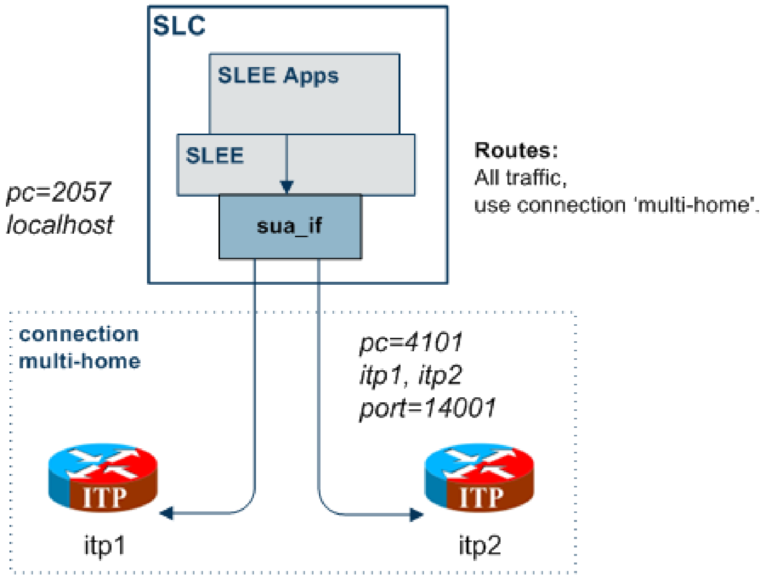
This example directly routes all PCs and all GTs to a pair of load-balanced ITPs (itp1 and itp2).

```
SUA = {
    opc = 2057
    connections = {
        multi-home = {
            # multi-home to both itps.
            remote_host = [ "itp1", "itp2" ]
            remote_port = 14001
            local_host = [ "localhost" ]
            routing_context = 666
            traffic_mode_type = "loadshare"
        }
    }
    routes = [
        {
            peer = "*"            # Route all traffic to
            use = "multi-home"    # destns in connection 'multi-home'.
        }
    ]
}
```

Note: The STP mechanism is not used, so the TCAP transactions are not tracked (as there is only one destination, that doesn't matter).

Diagram - route all to balanced ITPs

Here is a diagram which shows some of the features of the example.



Example - route on transmission type

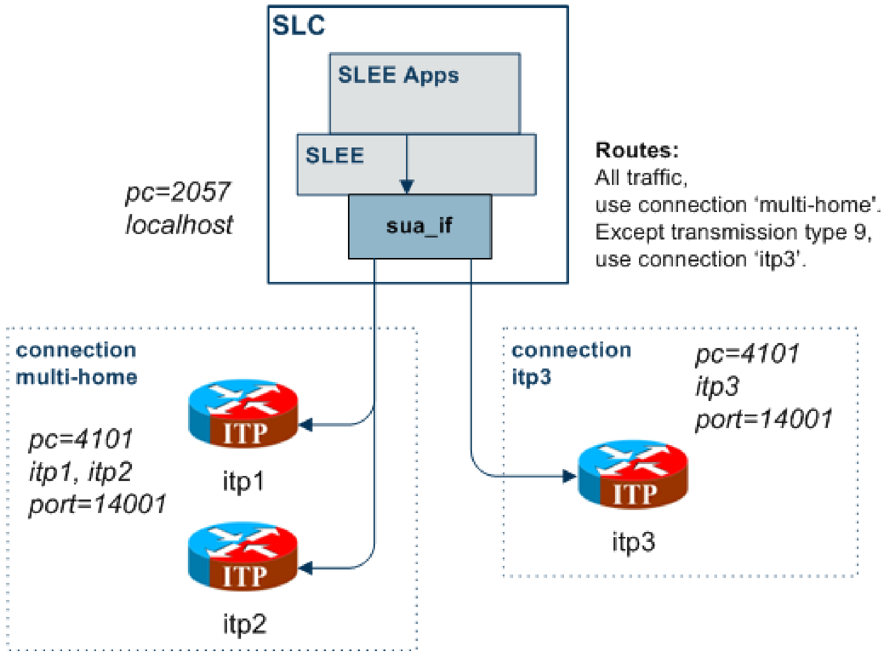
This example directly routes all PCs and all GTs to an ITP (itp1), except for traffic with transmission type 9 which goes to itp3.

```
SUA = {
    opc = 2057

    connections = {
        multi-home = {
            # multi-home to both itps.
            remote_host = [ "itp1", "itp2" ]
            remote_port = 14001
            local_host = [ "localhost" ]
            routing_context = 666
            traffic_mode_type = "loadshare"
        }
        itp3 = {
            remote_host = "itp3" # Send to itp3.
            use = "multi-home"   # Use main config to set defaults.
        }
    }

    routes = [
        {
            peer = "*"            # Route all traffic to
            use = "multi-home"    # destns in connection 'multi-home'.
        }
        {
            label = "tt9"         # Class 'tt9' will use
            use = "itp3"          # dest defined in connection 'itp3'.
        }
    ]

    classifiers = [
        {
            trans_type = 9        # Route all traffic with transmission type 9
```

```
                label = "tt9"          # to dest in route labelled 'tt9'
            }
        ]
}
```

Diagram - route on transmission type

Here is a diagram which shows some of the features of the example.



Chapter 3

Background Processes

Overview

Introduction

This chapter explains the processes that are started automatically by Service Logic Execution Environment (SLEE).

Note: This chapter also includes some plug-ins to background processes which do not run independently.

In this chapter

This chapter contains the following topics.

sua_if

Purpose

sua_if is the main binary in the SIGTRAN TCAP Interface, for a SUA installation.

Startup

sua_if is an SLEE Interface and is started during SLEE initialization. The line in the **SLEE.cfg** which starts the sua_if is:

```
 INTERFACE=sua_if sua_if.sh /IN/service_packages/SLEE/bin EVENT
```

For instructions about starting and stopping sua_if, see *Service Logic Execution Environment Technical Guide*.

Configuration

sua_if is configured by the:

- File set by the ESERV_CONFIG_FILE environmental variable (usually this will be **sigtran.config**)
- Command line parameters that can also be set in **tcapif.def**

For more information about configuring this binary, see *Configuration Overview* (on page 9).

Output

The sua_if process writes error messages to the system messages file. It also writes additional output to the **/IN/service_packages/SLEE/tmp/sigtran.log** file.

m3ua_if

Purpose

m3ua_if is the main binary in the SIGTRAN TCAP Interface, for a M3UA installation.

Startup

m3ua_if is an SLEE Interface and is started during SLEE initialization. The line in the **SLEE.cfg** which starts the m3ua_if is:

```
 INTERFACE=m3ua_if m3ua_if.sh /IN/service_packages/SLEE/bin EVENT
```

For instructions about starting and stopping m3ua_if, see *Service Logic Execution Environment Technical Guide*.

Configuration

m3ua_if is configured by the:

- File set by the ESERV_CONFIG_FILE environmental variable (usually this will be **sigtran.config**)
- Command line parameters that can also be set in **tcapif.def**.

For more information about configuring this binary, see *Configuration Overview* (on page 9).

Output

The sua_if process writes error messages to the system messages file. It also writes additional output to the **/IN/service_packages/SLEE/tmp/sigtran.log** file.

Chapter 4

Troubleshooting

Overview

Introduction

This chapter explains the important processes on each of the server components in Convergent Charging Controller, and describes a number of example troubleshooting methods that can help aid the troubleshooting process before you raise a support ticket.

In this chapter

This chapter contains the following topics.

Common Troubleshooting Procedures

Introduction

Refer to *System Administrator's Guide* for troubleshooting procedures common to all Convergent Charging Controller components.

Debug

Introduction

sua_if/m3ua_if contains a logging capability that can be used to store messages received and sent by the stack.

Messages are recorded at SCCP-level for both SUA and M3UA.

Setup

To turn on the SCCP-level message logging, set the log parameter to true, and reload the configuration.

Note: You can reload the configuration by sending the interface a SIGHUP.

For more information about the log parameter, see *log* (on page 26).

Output

Once logging is switched on the interface will append to a binary log file in **/IN/service_packages/SLEE/tmp**.

Output is in the form of raw data which can be decoded with the tcread program.

Chapter 5

Statistics and Reports

Overview

Introduction

This chapter explains the statistics produced by the application, and the reports you can run on the statistics.

In this chapter

This chapter contains the following topics.

Statistics

Introduction

The SIGTRAN TCAP Interface logs an array of statistics counters for each socket. Statistics are kept for:

- Errors
- Packets sent and received (per packet type)

Statistics for all connections

This table describes the statistics which are kept for all connections:

Statistic	Description
RX_total	Total packets received.
TX_total	Total packets sent.
RX_error	Number of errors when attempting to read a packet from a connection.
TX_error	Number of errors when attempting to write a packet to a connection.
RX_corrupt	Number of packets received that contain incorrect data. This may be: • Incorrectly formatted packets • Correctly formatted packet that is not valid for the current state of the connection
TX_congest	Number of outbound packets dropped due to transmit buffers being full.
connection_failures	Number of times an error has resulted in the connection being disconnected.

SUA connections

For each packet type (for example, CLDT) two statistics are kept with the:

- RX_ prefix, for packets received (for example, RX_CLDT).
- TX_ prefix, for packets sent (for example, TX_CLDT).

M3UA connections

For each packet type (for example: DATA) two statistics are kept with the:

- RX_ prefix, for packets received (for example, RX_DATA).
- TX_ prefix, for packets sent (for example, TX_DATA).

SCCP over M3UA connections

In addition to the M3UA statistics, for each SCCP packet type (for example: UDT) two statistics are kept with the:

- RX_SCCP_ prefix, for packets received (for example, RX_SCCP_UDT).
- TX_SCCP_ prefix, for packets sent (for example, TX_SCCP_UDT).

Note: A SCCP UDT packet contained in a M3UA DATA packet will be counted in both the relevant SCCP and M3UA counters.

Chapter 6

About Installation and Removal

Overview

Introduction

This chapter provides information about the installed components for the Oracle Communications Convergent Charging Controller application described in this guide. It also lists the files installed by the application that you can check for, to ensure that the application installed successfully.

In this Chapter

This chapter contains the following topics.

Installation and Removal Overview

Introduction

For information about the following requirements and tasks, see *Installation Guide*:

- Convergent Charging Controller system requirements
- Pre-installation tasks
- Installing and removing Convergent Charging Controller packages

SIGTRAN packages

An installation of SIGTRAN includes the following packages, on the:

- SMS:
  - sigtranSms
- SLC:
  - sigtranScp

Checking the Installation

Introduction

Refer to these checklists to ensure that SIGTRAN TCAP Interface has installed correctly.

Checklist - SMS

Follow the steps in this checklist to ensure SIGTRAN TCAP Interface has been installed on a SMS machine correctly.

Step	Action
1	Log into the system as acs_oper.
2	Enter `sqlplus /` **Note:** No password is required.
3	Ensure that the SMF_STATISTICS_DEFN table in the SMF database has been updated to include SIGTRAN TCAP Interface entries.

Checklist - non-SMS

Follow the steps in this checklist to ensure SIGTRAN TCAP Interface has been installed on a non-SMS machine correctly.

Step	Action
1	Log into the machine as the user which operates the SLEE running on this machine.
2	Check the **/IN/service_packages/SLEE** directory structure exists with subdirectories.
3	Check the **/IN/service_packages/SLEE/bin** directory contains the following files: • **sua_if** • **sua_if_.sh** • **m3ua_if** • **m3ua_if.sh**
4	Check the **/IN/service_packages/SLEE/etc** directory contains the following files: • **sigtran.conf.example** • **sigtran.conf.sample**

Process list

If the application is running correctly, the following processes should be running on each non-SMS machine:

- Started during SLEE startup, one of the following:
  - sua_if
  - m3ua_if

Glossary of Terms

AAA

Authentication, Authorization, and Accounting. Specified in Diameter RFC 3588.

ACS

Advanced Control Services configuration platform.

AS

Application Server. The logical entity serving a SUA routing key. An AS is equivalent to an SS7 end point (for example, HLR, MSC,…). An AS contains, at least, one ASP.

ASN.1

Abstract Syntax Notation One - a formal notation used for describing data transmitted by telecommunications protocols. ASN.1 is a joint ISO/IEC and ITU-T standard.

ASP

- Application Service Provider, or
- Application Server Process. An IP based instance of an AS. An ASP implements a SCTP connection between 2 platforms.

CAMEL

Customized Applications for Mobile network Enhanced Logic

This is a 3GPP (Third Generation Partnership Project) initiative to extend traditional IN services found in fixed networks into mobile networks. The architecture is similar to that of traditional IN, in that the control functions and switching functions are remote. Unlike the fixed IN environment, in mobile networks the subscriber may roam into another PLMN (Public Land Mobile Network), consequently the controlling function must interact with a switching function in a foreign network. CAMEL specifies the agreed information flows that may be passed between these networks.

CAP

CAMEL Application Part

Connection

Transport level link between two peers, providing for multiple sessions.

Convergent

Also “convergent billing”. Describes the scenario where post-paid and pre-paid calls are handed by the same service platform and the same billing system. Under strict converged billing, post-paid subscribers are essentially treated as “limited credit pre-paid”.

Diameter

A feature rich AAA protocol. Utilises SCTP and TCP transports.

DP

Detection Point

DTMF

Dual Tone Multi-Frequency - system used by touch tone telephones where one high and one low frequency, or tone, is assigned to each touch tone button on the phone.

GPRS

General Packet Radio Service - employed to connect mobile cellular users to PDN (Public Data Network- for example the Internet).

GSM

Global System for Mobile communication.

It is a second generation cellular telecommunication system. Unlike first generation systems, GSM is digital and thus introduced greater enhancements such as security, capacity, quality and the ability to support integrated services.

GT

Global Title.

The GT may be defined in any of the following formats:

- Type 1: String in the form "1,<noa>,<BCD address digits>"
- Type 2: String in the form "2,<trans type><BCD address digits>"
- Type 3: String in the form "3,<trans type>,<num plan>,<BCD address digits>"
- Type 4: String in the form "4,<trans type>,<num plan>,<noa>,<BCD address digits>"

The contents of the Global Title are defined in the Q713 specification, please refer to section 3.4.2.3 for further details on defining Global Title.

HLR

The Home Location Register is a database within the HPLMN (Home Public Land Mobile Network). It provides routing information for MT calls and SMS. It is also responsible for the maintenance of user subscription information. This is distributed to the relevant VLR, or SGSN (Serving GPRS Support Node) through the attach process and mobility management procedures such as Location Area and Routing Area updates.

HPLMN

Home PLMN

IDP

INAP message: Initial DP (Initial Detection Point)

IN

Intelligent Network

INAP

Intelligent Network Application Part - a protocol offering real time communication between IN elements.

Initial DP

Initial Detection Point - INAP Operation. This is the operation that is sent when the switch reaches a trigger detection point.

IP

1) Internet Protocol

2) Intelligent Peripheral - This is a node in an Intelligent Network containing a Specialized Resource Function (SRF).

IP address

Internet Protocol Address - network address of a card on a computer.

ISDN

Integrated Services Digital Network - set of protocols for connecting ISDN stations.

ISUP

ISDN User Part - part of the SS7 protocol layer and used in the setting up, management, and release of trunks that carry voice and data between calling and called parties.

ITU

International Telecommunication Union

M3UA

MTP3 User Adaptation. The equivalent of MTP in the SIGTRAN suite.

MAP

Mobile Application Part - a protocol which enables real time communication between nodes in a mobile cellular network. A typical usage of the protocol would be for the transfer of location information from the VLR to the HLR.

MS

Mobile Station

MSC

Mobile Switching Centre. Also known as a switch.

MT

Mobile Terminated

MTP

Message Transfer Part (part of the SS7 protocol stack).

MTP3

Message Transfer Part - Level 3.

NOA

Nature Of Address - a classification to determine in what realm (Local, National or International) a given phone number resides, for the purposes of routing and billing.

NP

Number Portability

PC

Point Code. The Point Code is the address of a switching point.

Peer

Remote machine, which for our purposes is capable of acting as a Diameter agent.

PLMN

Public Land Mobile Network

SCCP

Signalling Connection Control Part (part of the SS7 protocol stack).

SCTP

Stream Control Transmission Protocol. A transport-layer protocol analogous to the TCP or User Datagram Protocol (UDP). SCTP provides some similar services as TCP (reliable, in-sequence transport of messages with congestion control) but adds high availability.

SGP

Signalling Gateway Process.

SGSN

Serving GPRS Support Node

SLC

Service Logic Controller (formerly UAS).

SLEE

Service Logic Execution Environment

SMS

Depending on context, can be:

- Service Management System hardware platform
- Short Message Service
- Service Management System platform
- Convergent Charging Controller Service Management System application

SN

Service Number

SRF

Specialized Resource Function – This is a node on an IN which can connect to both the SSP and the SLC and delivers additional special resources into the call, mostly related to voice data, for example play voice announcements or collect DTMF tones from the user. Can be present on an SSP or an Intelligent Peripheral (IP).

SS7

A Common Channel Signalling system is used in many modern telecoms networks that provides a suite of protocols which enables circuit and non-circuit related information to be routed about and between networks. The main protocols include MTP, SCCP and ISUP.

SSN

Subsystem Number. An integer identifying applications on the SCCP layer.

For values, refer to *3GPP TS 23.003*.

SSP

Service Switching Point

STP

Signalling Transfer Point. Telecom equipment routing SS7 signalling messages.

SUA

Signalling Connection Control Part User Adaptation Layer

System Administrator

The person(s) responsible for the overall set-up and maintenance of the IN.

TCAP

Transaction Capabilities Application Part – layer in protocol stack, message protocol.

TCP

Transmission Control Protocol. This is a reliable octet streaming protocol used by the majority of applications on the Internet. It provides a connection-oriented, full-duplex, point to point service between hosts.

USSD

Unstructured Supplementary Service Data - a feature in the GSM MAP protocol that can be used to provide subscriber functions such as Balance Query.

VLR

Visitor Location Register - contains all subscriber data required for call handling and mobility management for mobile subscribers currently located in the area controlled by the VLR.

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