

*Solstice™ CMIP 8.2
Administrator's Guide*



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Preface

Solstice™ CMIP provides a complete software platform for developing and running systems management applications in the OSI domain, based on the Common Management Information Services (CMIS). There are two variants of the Solstice CMIP product:

- **Solstice CMIP SDE** (Standard Development Environment), which provides libraries and include files used to develop network management applications.
- **Solstice CMIP RT** (Runtime), which provides a runtime process to support applications developed using Solstice CMIP SDE.

You must install and configure either the SunLink OSI Communication Platform or the RFC 1006 driver on each machine that uses Solstice CMIP RT to control and manage remote applications across an OSI network.

Who Should Use This Book

This book is intended for experienced system administrators who are configuring and using applications running over Solstice CMIP to manage and control their networks. It assumes that you are familiar with the Solaris™ windows environment and the SunOS™ operating system. It also assumes that you are familiar with the elements of the Common Management Information Protocol (CMIP) and with network addressing in the OSI domain.

How This Book Is Organized

Chapter 1, “Introducing Solstice CMIP,” provides an overview of Solstice CMIP and describes how to run applications over the network management platform.

Chapter 2, “Modifying the Default Configuration of Solstice CMIP,” describes the graphical user interface (GUI) to Solstice CMIP, and explains how to use it to access the user-configurable network parameters.

Chapter 3, “Troubleshooting Solstice CMIP,” provides information designed to help you diagnose and resolve problems with Solstice CMIP.

Standards Reference

Solstice CMIP conforms to the specifications defined in following documents:

- ISO-IS-9595 *Version 2 Common Management Information Service (CMIS)* (CCITT X.710)
- ISO-IS-9596 *Version 2 Common Management Information Protocol (CMIP)* (CCITT X.711)
- ISO 10040 *Systems Management Overview* (CCITT X.701)
- ISO 10165-1 *Structure of Management Information (SMI)* (CCITT X.720)
- ISO 10165-4 *Guidelines for the Definition of Managed Objects (GDMO)* (CCITT X.722)
- NMF 1.0 — *Network Management Forum*
- NMF 1.1 — *Network Management Forum*

The application programming interface to Solstice CMIP is defined by the following X/Open publications:

- X/Open CAE Specification:
Systems Management—Management Protocols (XMP) API dated March 1994.
- X/Open CAE Specification:
OSI-Abstract-Data Manipulation (XOM) API dated November 1991.

What Typographic Changes Mean

The following table describes the typographic changes used in this book.

Table P-1 Typographic Conventions

Typeface or Symbol	Meaning	Example
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. machine_name% You have mail.
AaBbCc123	What you type, contrasted with on-screen computer output	machine_name% su Password:
<i>AaBbCc123</i>	Command-line placeholder: replace with a real name or value	To delete a file, type <code>rm filename</code> .
<i>AaBbCc123</i>	Book titles, new words or terms, or words to be emphasized	Read Chapter 6 in <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be root to do this.

Shell Prompts in Command Examples

The following table shows the default system prompt and superuser prompt for the C shell, Bourne shell, and Korn shell.

Table P-2 Shell Prompts

Shell	Prompt
C shell prompt	machine_name%
C shell superuser prompt	machine_name#
Bourne shell and Korn shell prompt	\$
Bourne shell and Korn shell superuser prompt	#

Introducing Solstice CMIP

1 

<i>Product Architecture</i>	<i>page 1</i>
<i>Running Applications over Solstice CMIP</i>	<i>page 5</i>
<i>Running the Example Application</i>	<i>page 8</i>

This chapter provides an overview of Solstice CMIP Runtime (RT). It describes the product architecture and explains how applications running over Solstice CMIP can be used to manage networks in the OSI domain. This chapter also includes information about using Solstice CMIP in conjunction with other Solstice or SunLink network products.

For information on developing applications using the libraries provided by the Solstice CMIP Standard Development Environment (SDE), see the *Solstice CMIP 8.2 Programmer's Guide*.

Product Architecture

Solstice CMIP is an implementation of the Common Management Information Protocol (CMIP) and the Common Management Information Service (CMIS). CMIS defines a number of services used to control and manage networks in the OSI domain. Applications developed using the Solstice CMIP SDE (Standard Development Environment) can access these services to gather information and modify network parameters.

Figure 1-1 shows how the components of Solstice CMIP interact with network management applications and, via the transport layer interface (TLI), with the transport provider.

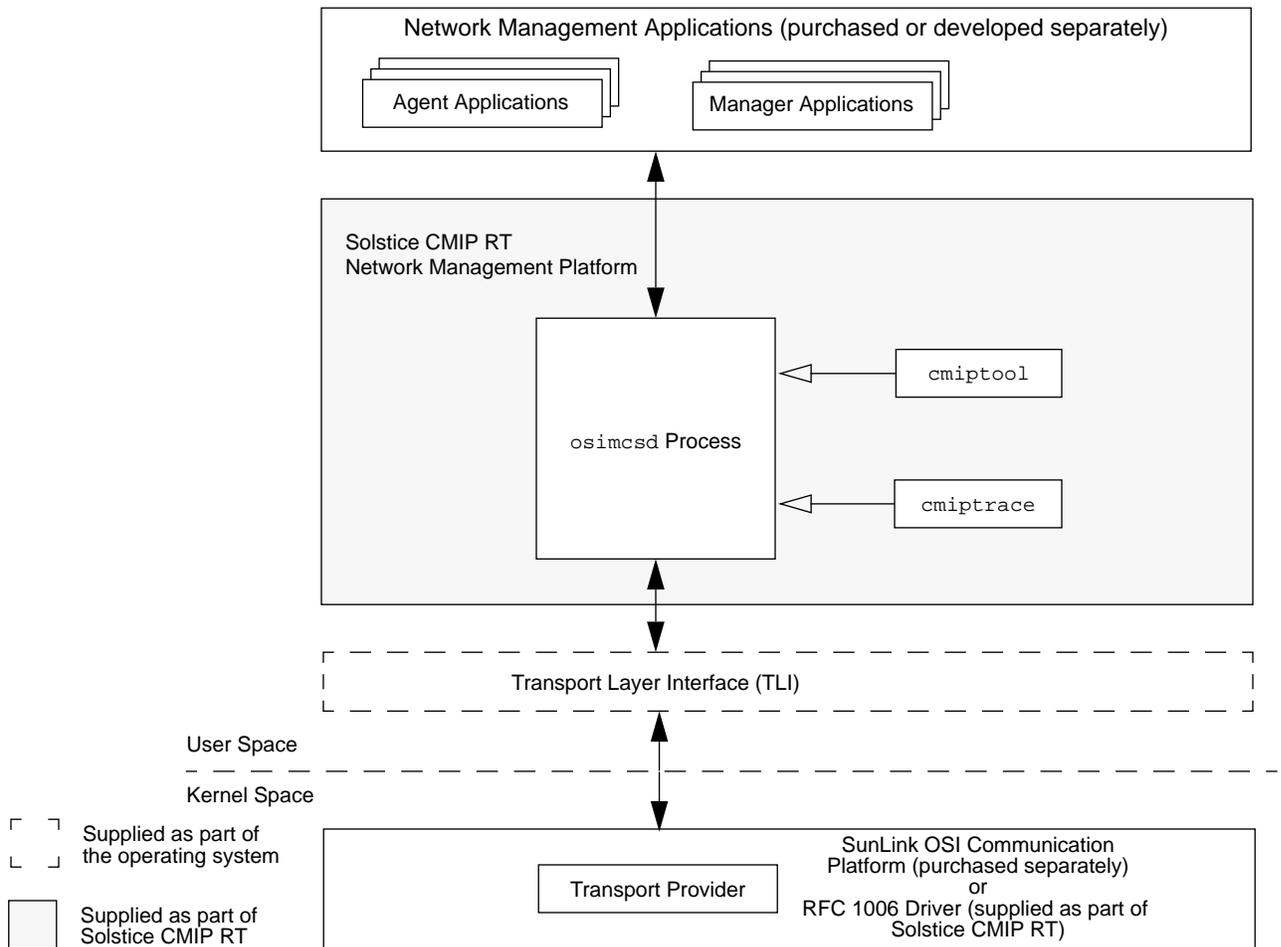


Figure 1-1 Solstice CMIP Product Architecture

Solstice CMIP

The following components are delivered as part of Solstice CMIP:

- **OSI Management Communication Service (`osimcsd`) daemon**
This daemon is the process that implements the network management protocol (CMIP). It provides network management services used to access the transport provider.
- **Graphical User Interface (GUI) for Solstice CMIP (`cmiptool`)**
The GUI for Solstice CMIP displays information about the `osimcsd` daemon and provides access to the user-configurable parameters. See Chapter 2, “Modifying the Default Configuration of Solstice CMIP” for detailed instructions on how to use `cmiptool` to configure Solstice CMIP.
- **Diagnostic Tool for Solstice CMIP (`cmiptrace`)**
This diagnostic tool displays the flow of data through the `osimcsd` daemon. It can be used to diagnose CMIP interoperability or configuration problems.
- **RFC 1006 driver**
The RFC 1006 driver implements the RFC 1006 protocol, which enables OSI applications to run over TCP/IP. The RFC 1006 driver can be used instead of the OSI Communication Platform (Stack) as the transport provider as shown in Figure 1-1 on page 2.

If you want to run CMIP applications over TCP/IP only, replace the OSI Stack with the RFC 1006 driver. This will free memory and disk resources.

The RFC 1006 package, `SUNWrk6`, includes these software components:

- The `rk6d(1M)` daemon controls the RFC 1006 driver. It is started automatically whenever you reboot your machine. You can fine-tune the configuration of the `rk6d` daemon by stopping it then restarting it manually with some command-line options.
- The `rk6stat(1M)` utility displays statistical information.
- The `rk6trace(1M)` utility traces incoming and outgoing Protocol Data Units (PDUs).

For more information on the RFC 1006 driver utilities, see their manpages.

Transport Provider

The transport provider is either of the following:

- **SunLink OSI Communication Platform**

The SunLink OSI Communication Platform must be purchased separately. It is required if the RFC 1006 driver is not used as the transport provider. The SunLink OSI Communication Platform is an implementation of the OSI reference model that enables transparent data transfer between peer applications over diverse networks. See the *SunLink OSI 8.1 Communication Platform Administrator's Guide*.

- **RFC 1006 driver**

The RFC 1006 driver is supplied with Solstice CMIP. It can be used instead of the OSI Communication Platform (Stack) if you want to run CMIP applications over TCP/IP only.

Network Management Applications

Any application that is developed using the Solstice CMIP SDE (Standard Development Environment) can use Solstice CMIP to access the transport provider. Applications are divided into two categories. Manager applications are used to modify and control the behavior of OSI networks through Solstice CMIP; agent applications modify and report information about managed resources. Network management applications must be purchased or developed separately.

Running Applications over Solstice CMIP

Once Solstice CMIP is configured and started it operates transparently to provide the network management services defined by the Common Management Information Service (CMIS). You can then start applications that use these services to control and manage networks in the OSI domain.

Starting Solstice CMIP

Solstice CMIP is installed with a set of default parameters, tailored to run over Ethernet LAN (LLC1), WAN (X.25), and TCP/IP (RFC 1006) connections. Under most circumstances you do not need to modify these default parameters.

Solstice CMIP is started automatically each time you reboot your machine. The startup script is `/etc/rc2.d/S97osimcs`.

To start Solstice CMIP manually:

1. **Log in as root or become superuser.**
2. **Make sure that the transport provider is running:**
 - a. **If your network management applications use an OSI transport provider, make sure that the SunLink OSI stack is configured and running.**

Use `ps(1)` to check for the processes associated with the SunLink OSI communication platform.

```
prompt# ps -ef | grep osi
root <pid> <timestamp> /usr/sbin/osinetd
```

If the stack is not running, start it manually by typing:

```
prompt# /etc/rc2.d/S90osinet start
```

Refer to *Installing and Licensing SunLink OSI* and *SunLink OSI 8.1 Communication Platform Administrator's Guide* for detailed instructions.

- b. If your network management applications use the RFC 1006 driver, make sure that the `rk6d` daemon is running.**

```
hostname# ps -ef | grep rk6d
root <pid> <timestamp> /usr/sbin/rk6d
```

If the daemon is not running, start it manually by typing:

```
hostname# /etc/rc2.d/S90rk6 start
```

Note – An error message is generated if you start Solstice CMIP without starting the transport provider; however, the process is started normally. You can use Solstice CMIP in loopback mode without starting the transport provider. See “Using Solstice CMIP in Loopback Mode” on page 7.

- 3. Start Solstice CMIP by launching the `osimcsd` daemon process.**

```
prompt# /etc/rc2.d/S97osimcs start
```

Stopping Solstice CMIP

You must stop all processes running over the transport provider before stopping the processes associated with the transport provider itself.

To stop the `osimcsd` daemon associated with Solstice CMIP:

- 1. Log in as `root` or become `superuser`.**
- 2. Ensure that all the applications running over Solstice CMIP are stopped.**
Exactly how you do this depends on the applications themselves.
- 3. Stop the `osimcsd` daemon process.**

```
prompt# /etc/rc2.d/S97osimcs stop
```

Using Solstice CMIP in Loopback Mode

When you run Solstice CMIP in loopback mode, the `osimcsd` daemon checks the destination address of the request passed by the application. If it matches the address of one of the local applications, it loops the request back to the matching application without accessing the transport provider as shown in Figure 1-2.

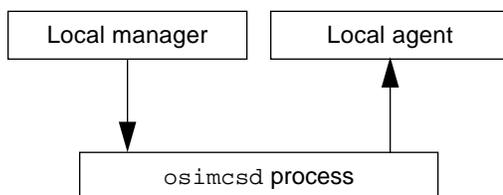


Figure 1-2 Sending a Request to a Local Application (Loopback Enabled)

Loopback mode is enabled by default. If you disable loopback mode, the `osimcsd` daemon always passes requests to the transport provider as shown in Figure 1-3, regardless of whether the destination address is local or not. See “Modifying the CMIP/MCS Parameters” on page 18 for instructions on how to disable loopback mode.

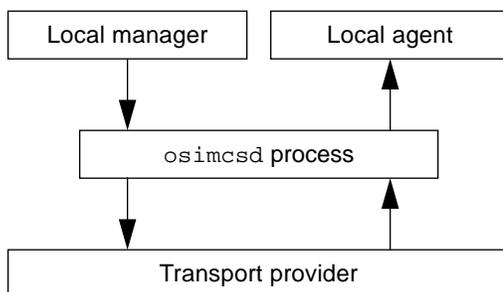


Figure 1-3 Sending a Request to a Local Application (Loopback Disabled)

Running the Example Application

The example program is divided in two parts—the manager and the agent. It returns and displays information about the machine on which the agent application is running. It is located in the `/opt/SUNWconn/bin` directory.

The manager application performs the following tasks:

- 1. Gets the address of a remote agent to query**
- 2. Sends a `get` request to the agent to obtain information about the machine on which the agent application is running**
- 3. Waits for a response**
- 4. Displays the message received from the agent**
- 5. Shuts down the API and resets**

The agent application performs the following tasks:

- 1. Performs an `mp_bind()` to register itself**
- 2. Waits for an incoming request from a manager**
- 3. If the incoming request is a `get` request, returns a `linked-get` response**
- 4. Returns to wait state**

You must start the agent application before the manager application. By default, the manager and agent run locally in loopback mode over a TCP/IP (RFC 1006) connection. If the transport provider is not running, you must start the agent and the manager on the same machine.

Default Addresses for the Example Application

If you start the agent or the manager without specifying any command-line options, default addresses are used for binding. They are:

- **Manager** `PSEL=rfc1, SSEL=Prs, TSEL=CMIP, NSAP=IP address of host`
- **Agent** `PSEL=rfc0, SSEL=Prs, TSEL=CMIP, NSAP=IP address of host`

In addition, the manager addresses the agent using the default address of the agent.

To start the agent using the default address:

```
prompt% /opt/SUNWconn/bin/cmipagent
Performing mp_initialize()
Performing mp_bind()

Agent : iteration 1
Performing mp_wait()
```

To start the manager using the default address:

```
prompt% /opt/SUNWconn/bin/cmipmanager
```

On the agent side, you will see the following series of events:

```
Performing mp_initialize()
Performing mp_bind()

Agent : iteration 1
Performing mp_wait()
Performing mp_receive()
Performing mp_get_rsp()

Agent : iteration 2
Performing mp_wait()
```

On the manager side, you will see the following series of events:

```
Performing mp_initialize()
Performing mp_bind()
Performing mp_get_req()
Results of mp_get_req()

The remote system is called papyrus
The system was manufactured by Sun_Microsystems
Number of processors configured is 1
Number of processors currently online is 1
CPU info : Processor 0, a 40 MHz sparc CPU + sparc FPU, is online.
The size of physical memory (in Mbytes) is 48
System supports POSIX version 1

Performing mp_unbind()
Performing mp_shutdown()

cmipmanager: done at Fri Jul  8 18:16:43 1994
```

The manager application stops automatically when it has completed its request and received a response. You must stop the agent explicitly by typing `Ctrl-C`.

Changing the Default Addresses

You can alter the default address for the agent and the manager by entering the following command-line options:

Note - The session selector cannot be changed.

Address of Local Application

- `-N <addr>` : local network service access point
- `-T <tssel>` : local transport selector
- `-P <psel>` : local presentation selector

Address of Remote Application

- n <addr> : remote network service access point
- t <tset> : remote transport selector
- p <psel> : remote presentation selector

All addresses that are entered in hexadecimal must be preceded by 0x.

Running the Example Over the TCP/IP Subnetwork

To set up a connection over TCP/IP (RFC 1006) with loopback mode disabled, you must specify the agent address when you start the manager if the agent is running on a remote machine.

On the agent side, type:

```
prompt% cmipagent
```

On the manager side type:

```
prompt% cmipmanager -n 0x<tcp/ip address>
```

The TCP/IP address of the agent application is displayed in the `cmiptool` window on the machine on which the agent is started. It must be entered exactly as it appears in `cmiptool`, preceded by 0x. For example, if the TCP/IP address of the agent is 129.157.179.22, the components of the address in hexadecimal are obtained as follows:

- 129 is equivalent to 0x81
- 157 is equivalent to 0x9d
- 179 is equivalent to 0xb3
- 22 is equivalent to 0x16

These combined give 0x819db316 as the TCP/IP address.

Running the Example Over the CLNP Subnetwork

To set up a connection over CLNP, you must set the local address for the agent and both the local and remote addresses for the manager. For example, the following commands show how to set up a connection over CLNP where:

- The agent listens on PSEL=tp40.
- The manager listens on PSEL=tp45.
- The network service access point of the host on which the agent runs is 0x498077b29f01.
- The network service access point of the host on which the manager runs is 0x49723408601.

The command for starting the agent in this example is:

```
prompt% cmipagent -P tp40 -N 0x498077b29f01
```

The command for starting the manager in this example is:

```
prompt% cmipmanager -N 0x49723408601 -P tp45 -n 0x498077b29f01  
-p tp40
```

Modifying the Default Configuration of Solstice CMIP



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<i>Modifying the Default XMP Address</i>	<i>page 16</i>
<i>Modifying the CMIP/MCS Parameters</i>	<i>page 18</i>
<i>Modifying the Common Transport Selector</i>	<i>page 23</i>
<i>Configuration File Format</i>	<i>page 24</i>

Solstice CMIP configuration data are contained in the text file `/etc/opt/SUNWconn/cmip/cmip.conf`. You can modify the Solstice CMIP configuration data contained in this file in either of the following ways:

- Using `cmiptool` (the graphical user interface to Solstice CMIP)
- Editing by hand the file `/etc/opt/SUNWconn/cmip/cmip.conf`

Any changes you make to Solstice CMIP configuration data take effect when the `osimcsd` daemon is restarted. Under most circumstances, you should not need to alter the default configuration.

This chapter describes how to use `cmiptool` (the graphical user interface to Solstice CMIP) to display information about your network management platform and to modify the default configuration of the `osimcsd` daemon. This chapter also describes the format of the configuration data file.

Starting and Using `cmiptool`

The graphical user interface to Solstice CMIP is called `cmiptool`. All the features of `cmiptool` are accessible from the window shown in Figure 2-1 on page 15. To start `cmiptool`:

1. Run `xhost(1)` to enable root access to the Xserver:

```
prompt% $OPENWINHOME/xhost + root@<local_machine>
```

2. Log in as root or become superuser.

3. Start `cmiptool`, by typing:

```
prompt# /opt/SUNWconn/sbin/cmiptool
```

The `cmiptool` main window is shown in Figure 2-1 on page 15. The name of the local host is displayed at the bottom left of the main window. The TCP/IP address of the local host is displayed to the right of the name of the local host. It is given in two forms: decimal form, followed in parentheses by its hexadecimal equivalent. The transport provider used is indicated to the right of the TCP/IP address of the local host. It is either OSI or RFC 1006.

- Click OK to save your changes to the configuration data file. The `cmiptool` main window closes.
- Click Apply to save your changes to the configuration data file. The `cmiptool` main window remains open.
- Click Reset to display the settings for the last applied configuration.
- Click Defaults to display the settings for the default configuration. To save these settings to the configuration data file, click OK or Apply.
- Click Cancel to close the `cmiptool` main window without changing the configuration data file.

Whenever you click OK or Apply, you are asked if you want to restart the `osimcsd` daemon, thereby modifying its configuration.



Caution – When `osimcsd` is restarted, all open CMIS connections are closed.

Figure 2-1 cmiptool Main Window

To improve the appearance of the `cmiptool` windows under the OpenWindows™ window manager, specify the `-w` option when you start `cmiptool`. When `cmiptool` is started with the `-w` option, the X resources listed in Table 2-1 on page 16 are set.

If you specify the `-w` option under the common desktop environment (CDE), only the colors are affected, not the fonts. Any changes to colors made using CDE style manager are not applied to `cmiptool` if it has been started using `-w` option.

Table 2-1 X Resources for cmiptool set With the -w Option

X Resource	Setting
Cmiptool*textFontList	lucidasans
Cmiptool*buttonFontList	lucidasans-bold
Cmiptool*labelFontList	lucidasans-bold
Cmiptool*foreground	black
Cmiptool*background	gray
Cmiptool*highlightColor	yellow
Cmiptool*selectColor	yellow
Cmiptool*XmTextField.background	white
Cmiptool*XmList.background	white
Cmiptool*XmList.highlightColor	black
Cmiptool*XmList.selectColor	black

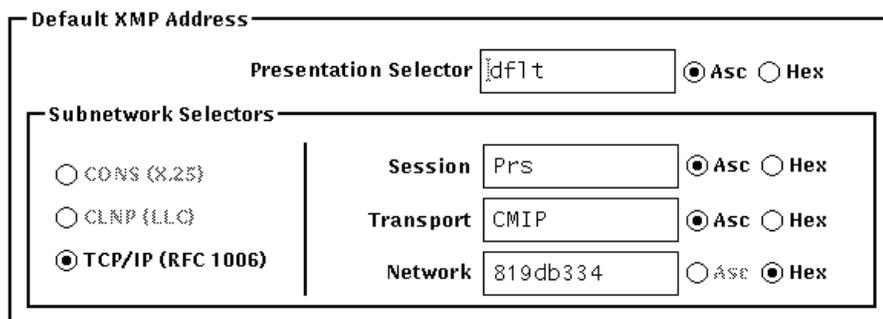
Modifying the Default XMP Address

The default XMP address is the address that is used when an address is not specified explicitly by the application. You can use `cmiptool` to change:

- The presentation selector (PSEL)
- The subnetwork type

The session selector (SSEL), transport selector (TSEL) and network address (NSAP) are determined by the subnetwork type. They cannot be changed using `cmiptool` and are displayed for information only.

Under most circumstances, you do not need to change the default XMP address in order to run applications over Solstice CMIP. An example default XMP Address for a TCP/IP (RFC 1006) connection is shown in Figure 2-2.



Default XMP Address	
Presentation Selector	df1t <input checked="" type="radio"/> Asc <input type="radio"/> Hex
Subnetwork Selectors	
<input type="radio"/> CONS (X.25)	Session Prs <input checked="" type="radio"/> Asc <input type="radio"/> Hex
<input type="radio"/> CLNP (LLC)	Transport CMIP <input checked="" type="radio"/> Asc <input type="radio"/> Hex
<input checked="" type="radio"/> TCP/IP (RFC 1006)	Network 819db334 <input type="radio"/> Asc <input checked="" type="radio"/> Hex

Figure 2-2 Default XMP Address (TCP/IP)

Subnetwork Type

This option is used to specify one of the three supported subnetwork types:

- CONS(X.25) for WAN connections
- CLNP(LLC1) for LAN connections
- TCP-IP(RFC 1006) for TCP/IP connections

By default, this option is set to CLNP(LLC1).

Presentation Selector (PSEL)

The presentation selector is used to select the entity above the presentation layer—in this case, the CMIP application (manager or agent). This parameter is specified in either hexadecimal or ASCII and can be any unique value of not more than 18 digits (hexadecimal) or nine characters (ASCII) in length. The default value is `df1t`.

Session Selector (SSEL)

The session selector is used to select the entity above the session layer—in this case, the presentation layer included in Solstice CMIP. It is specified by the `osimcsd` daemon and cannot be changed. The session selector for the default XMP address is read-only. It can be displayed in either hexadecimal or ASCII.

Transport Selector (TSEL)

The transport selector is used to select the entity above the transport layer—in this case, the session layer of Solstice CMIP. This parameter is read-only and can be displayed in either hexadecimal or ASCII. It is set by modifying the MCS common transport selector. See “Modifying the Common Transport Selector” on page 23 for more details.

Network Address (NSAP)

The network service access point (NSAP) is used to select the entity above the network layer—in this case, the transport provider. If the transport provider is the SunLink OSI communication platform, the NSAP specifies the transport layer of the SunLink OSI communication platform. This parameter is read-only and can be displayed in either hexadecimal or ASCII. It is set to one of the following:

- An X.25 address for CONS
- A LAN address for CLNP (by default 49<hostid>01 when the SunLink OSI communication platform is installed)
- An IP address for TCP/IP

See the *SunLink OSI 8.1 Communication Platform Administrator's Guide* for a detailed description of how to set the NSAP using `ositool`.

Modifying the CMIP/MCS Parameters

The `osimcsd` daemon processes both outgoing requests and incoming indications. It stores confirmed requests and indications until a corresponding response is received. Unconfirmed requests and indications are never stored. The flow of data through the daemon is illustrated in Figure 2-3 on page 19.

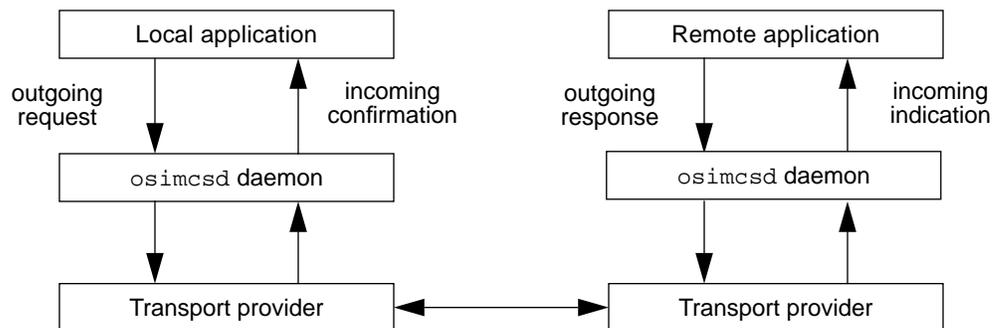


Figure 2-3 Confirmed Requests and Indications

The user-configurable CMIP/MCS parameters define how the local `osimcsd` daemon operates; they do not affect the protocol behavior. The default CMIP/MCS parameters are shown in Figure 2-4.

OSIMCS Parameters									
Loopback	<input checked="" type="radio"/> On <input type="radio"/> Off								
<table border="1"> <thead> <tr> <th colspan="2">Maximum Number Of</th> </tr> </thead> <tbody> <tr> <td>Outstanding Operations</td> <td><input type="text" value="20"/></td> </tr> <tr> <td>Confirmed Indications</td> <td><input type="text" value="20"/></td> </tr> <tr> <td>Confirmed Requests</td> <td><input type="text" value="20"/></td> </tr> </tbody> </table>		Maximum Number Of		Outstanding Operations	<input type="text" value="20"/>	Confirmed Indications	<input type="text" value="20"/>	Confirmed Requests	<input type="text" value="20"/>
Maximum Number Of									
Outstanding Operations	<input type="text" value="20"/>								
Confirmed Indications	<input type="text" value="20"/>								
Confirmed Requests	<input type="text" value="20"/>								
<table border="1"> <thead> <tr> <th colspan="2">Timers</th> </tr> </thead> <tbody> <tr> <td>Inactivity (x 10s)</td> <td><input type="text" value="12"/></td> </tr> <tr> <td>Request (x 10s)</td> <td><input type="text" value="5"/></td> </tr> </tbody> </table>		Timers		Inactivity (x 10s)	<input type="text" value="12"/>	Request (x 10s)	<input type="text" value="5"/>		
Timers									
Inactivity (x 10s)	<input type="text" value="12"/>								
Request (x 10s)	<input type="text" value="5"/>								
<table border="1"> <thead> <tr> <th colspan="2">Sizes</th> </tr> </thead> <tbody> <tr> <td>User Window</td> <td><input type="text" value="5"/></td> </tr> <tr> <td>Memory Pool</td> <td><input type="text" value="200"/></td> </tr> </tbody> </table>		Sizes		User Window	<input type="text" value="5"/>	Memory Pool	<input type="text" value="200"/>		
Sizes									
User Window	<input type="text" value="5"/>								
Memory Pool	<input type="text" value="200"/>								
Common Transport Selector	<input type="text" value="CMIP"/> <input checked="" type="radio"/> Asc <input type="radio"/> Hex								

Figure 2-4 Default CMIS/MCS Parameters

Maximum Number of Outstanding Operations

This parameter defines the maximum number of outstanding asynchronous operations that the XMP library can handle simultaneously. This parameter is used instead of the constant `MP_MAX_OUTSTANDING_OPERATIONS` defined in the file `xmp.h`, which is ignored.

This parameter can be set in the range 10 to 100. The default value is 20.

Maximum Number of Confirmed Requests

This parameter defines the maximum number of confirmed requests that the `osimcsd` daemon can handle simultaneously. Limiting the number of simultaneous confirmed requests limits the amount of memory required to store outstanding requests. However, if the `osimcsd` daemon is servicing a large number of applications, increasing the maximum number of confirmed requests reduces the amount of time for which requests are queued.

This parameter can be set in the range 1 to 100. The default value is 20.

Maximum Number of Confirmed Indications

This parameter defines the maximum number of confirmed indications that the `osimcsd` daemon can handle simultaneously. Limiting the number of simultaneous confirmed indications limits the amount of memory required to store outstanding indications. However, if the `osimcsd` daemon is servicing a large number of applications, increasing the maximum number of confirmed indications reduces the amount of time for which indications are queued.

This parameter can be set in the range 1 to 100. The default value is 20.

Inactivity Timer

This parameter defines how long, in multiples of 10 seconds, an association can remain idle before it is closed automatically by the `osimcsd` daemon. Once an association is closed, it can be used to connect to another agent or manager. If the inactivity timer is set to zero, the association remains open until it is closed explicitly.

This parameter can be set in the range 0 to 255. The default value is 12.

Request Timer

This parameter defines how long, in multiples of 10 seconds, the `osimcsd` daemon will wait for a response to a confirmed request. If a response is not received before the request timer expires, the `osimcsd` daemon issues a error response to the requestor and closes the association. If the response timer is set to zero, the `osimcsd` daemon will wait indefinitely for a response.

This parameter can be set in the range 0 to 127. The default value is 5.

User Window Size

This parameter defines the number of simultaneous interactions that the `osimcsd` daemon will handle for a single association, before that user is blocked. The `osimcsd` daemon maintains a record of all outstanding interactions and refuses any interactions requested by a user that exceeds its window size. This imposes a form of flow control, which prevents a single user from dominating the resources of the `osimcsd` daemon. The user window size should not exceed the maximum number of confirmed requests. If it does, a provider error occurs when the number of simultaneous interactions for a single association exceeds the maximum number of confirmed requests.

This parameter can be set in the range 1 to 10. The default value is 5.

Memory Pool Size

This parameter defines the amount of shared memory in KBytes allocated internally by the `osimcsd` daemon. The memory pool size limits the maximum number of associations allowed. Increasing the value of this parameter allows more associations to be created, but also increases the amount of memory used by Solstice CMIP. The default value of this parameter is chosen to maximize the number of associations allowed without incurring excessive memory usage.

This parameter can be set in the range 100 to 1024. The default value is 200.

Loopback

This option is used to enable and disable loopback mode. Loopback mode is enabled by default. You can disable loopback mode if, for example, you want to simulate a remote connection on a single machine for testing or debugging purposes.

When loopback mode is enabled, the `osimcsd` daemon compares the destination address of a request against the addresses of all the local applications. If the destination address matches one of these applications, the request is processed and looped back without accessing the transport provider.

When loopback mode is disabled, the `osimcsd` daemon processes all requests and passes them to the transport provider, irrespective of the destination address.

Figure 2-5 shows how the `osimcsd` daemon handles a request issued to a local application with loopback mode enabled and disabled.

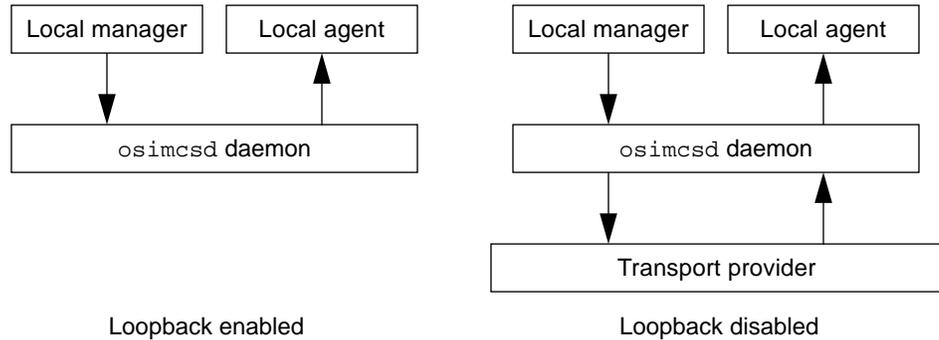


Figure 2-5 Loopback Mode Enabled and Disabled

Modifying the Common Transport Selector

The MCS common transport selector is used to select the entity above the transport layer—in this case, the session layer included in Solstice CMIP. This parameter is specified in either hexadecimal or ASCII and can be any unique value not more than eight digits (hexadecimal) or four characters (ASCII) long.

It is set to CMIP (ASCII) or 434d4950 (hexadecimal) by default. Changing the MCS common transport selector also modifies the transport selector that is displayed as part of the default XMP address.

There is also a session layer included in the 8.0, 8.0.1, 8.0.2 and 8.1 versions of the SunLink OSI communication platform. You must ensure that you choose different transport selectors for Solstice CMIP and the communication platform, avoiding the potential conflict shown in Figure 2-6.

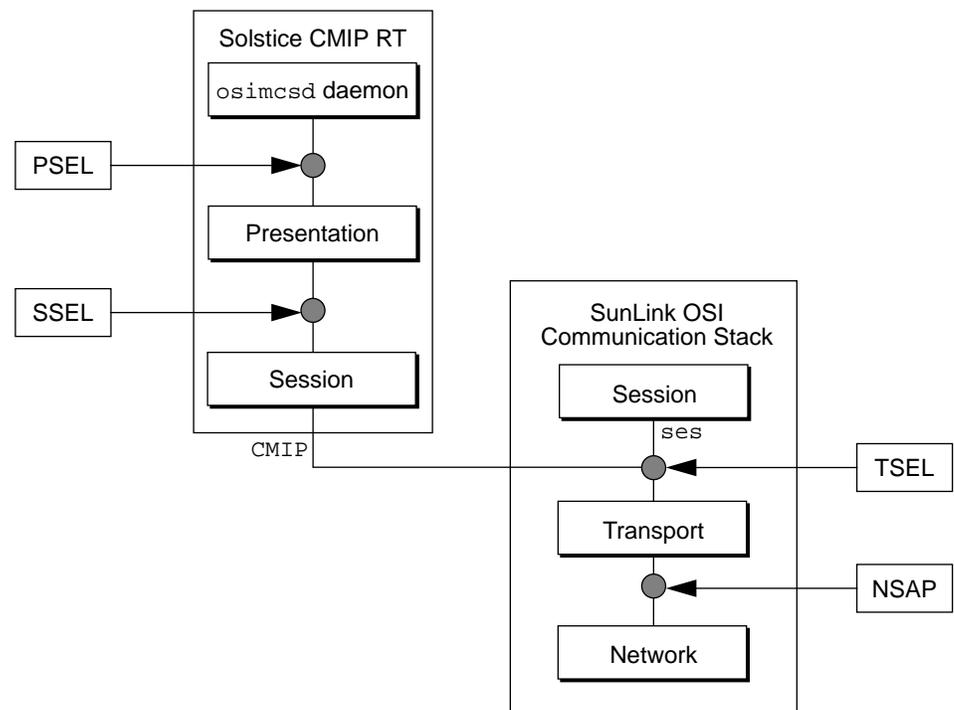


Figure 2-6 MCS Common Transport Selector

Configuration File Format

You can modify the Solstice CMIP configuration data by editing the file `/etc/opt/SUNWconn/cmip/cmip.conf`. Any changes you make to Solstice CMIP configuration data take effect when the `osimcsd` daemon is restarted.

The configuration file `/etc/opt/SUNWconn/cmip/cmip.conf` is divided into four sections that contain one or more keyword-value pairs. Each section is delimited by a `SECTION` keyword. Values can be integers, strings, and quoted-strings (strings that include blank spaces, enclosed in quotation marks).

Keywords can be entered in any order within the appropriate section. Optional keywords that are not specified are assigned their default values.

Identification Section

This section identifies the file and should also indicate when it was last modified and by whom.

`PRODUCT_NAME` *<string>*

Mandatory parameter. It identifies the product and is always set to `CMIP`.

`PRODUCT_VERSION` *<string>*

Mandatory parameter. It identifies the product revision and is always set to the current revision of Solstice CMIP.

`FILE_TYPE` *<string>*

Mandatory parameter. It identifies the type of file and is always set to `ASCII`.

`CHANGED_DATE` " *<quoted-string>* "

Optional parameter. It shows the date on which the file was last modified.

`CHANGED_BY` " *<quoted-string>* "

This is an optional parameter. It shows the name of the person who last modified the file.

CMIP_MCS_PARAMS *Section*

This section is used to set the parameters contained in the CMIP/MCS parameters section of `cmiptool` described in “Modifying the CMIP/MCS Parameters” on page 18.

`MAX_CONFIRMED_REQS` *<integer>*

Optional parameter. It defines the maximum number of confirmed requests that the `osimcsd` daemon can handle simultaneously. This parameter can be set in the range 1 to 100. The default value is 20.

`MAX_CONFIRMED_INDS` *<integer>*

Optional parameter. It defines the maximum number of confirmed indications that the `osimcsd` daemon can handle simultaneously. This parameter can be set in the range 1 to 100. The default value is 20.

`MAX_OUTSTANDING_OPS` *<integer>*

Optional parameter. It defines the maximum number of outstanding operations that the XMP library can handle simultaneously. This parameter can be set in the range 10 to 100. The default value is 20.

`INACTIVITY_TIMER` *<integer>*

Optional parameter. It defines how long, in multiples of 10 seconds, an association can remain idle before it is closed automatically by the `osimcsd` daemon. If the inactivity timer is set to zero, the association remains open until it is closed explicitly. This parameter can be set in the range 0 to 255. The default value is 12.

`REQUEST_TIMER` *<integer>*

Optional parameter. It defines how long, in multiples of 10 seconds, the `osimcsd` daemon will wait for a response to a confirmed request. If a response is not received before the request timer expires, the `osimcsd` daemon issues an error response to the requestor and closes the association. If the response timer is set to zero, the `osimcsd` daemon will wait indefinitely for a response. This parameter can be set in the range 0 to 127. The default value is 5.

`USER_WND_SIZE` *<integer>*

Optional parameter. It defines the user window size that controls the number of simultaneous interactions that the `osimcsd` daemon will handle for a single association, before that user is blocked. This parameter can be set in the range 1 to 10. The default value is 5.

MEMORY_POOL_SIZE <integer>

Optional parameter. It defines the amount of shared memory in KBytes allocated internally by the `osimcsd` daemon. The memory pool size limits the maximum number of associations allowed. This parameter can be set in the range 100 to 1024. The default value is 200.

LOOPBACK ON|OFF

Optional parameter. It is used to enable (ON) and disable (OFF) loopback mode. Loopback mode is enabled by default.

Default XMP Address Section

This section is used to define the XMP address that is used if an address is not specified explicitly by the application. The session selector (SSEL) is specified by the `osimcsd` daemon and cannot be changed. The network service access point (NSAP) for the SunLink OSI communication platform is defined using `ositool`. You can set the presentation selector (PSEL) and subnetwork type.

SUBNET CONS|CLNP|TCP-IP

Optional parameter. It defines one of the three supported subnetwork types:

- CONS(X.25) for WAN connections
- CLNP(LLC1) for LAN connections
- TCP-IP(RFC 1006) for TCP/IP connections

By default, this option is set to CLNP(LLC1).

PRESENTATION_SEL <string>

Optional parameter. It selects the entity above the presentation layer—in this case, the CMIP application (manager or agent). This parameter is specified in either hexadecimal or ASCII and can be any unique value of not more than 18 digits (hexadecimal) or nine characters (ASCII) in length. The default value is `dflt`. Hexadecimal values must be preceded with `0x`.

MCS_APPL_TRANSPORT_SEL *Section*

The MCS common transport selector is used to select the entity above the transport layer—in this case, the session layer included in Solstice CMIP. Note that there is also a session layer included in the 8.0, 8.0.1, 8.0.2 and 8.1 versions of the SunLink OSI communication platform. You must ensure that you choose different transport selectors for Solstice CMIP and the communication platform, as shown in Figure 2-6 on page 23.

TRANSPORT_SEL *<string>*

Optional parameter. This parameter is specified in either hexadecimal or ASCII and can be any unique value of not more than eight digits (hexadecimal) or four characters (ASCII) in length. Hexadecimal values must be preceded with 0x. It is set to CMIP (ASCII) or 434d4950 (hexadecimal) by default. Changing the MCS common transport selector also modifies the transport selector that is displayed by `cmiptool` as part of the default XMP address.

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<i>Problems Installing Solstice CMIP</i>	<i>page 31</i>
<i>Problems Licensing Solstice CMIP</i>	<i>page 31</i>
<i>Problems Using Solstice CMIP</i>	<i>page 34</i>
<i>Using cmiptrace</i>	<i>page 35</i>
<i>Using shmmgr</i>	<i>page 36</i>
<i>Errors Returned by the RFC 1006 Driver Utilities</i>	<i>page 38</i>

This chapter contains information designed to help you detect and resolve problems with Solstice CMIP as quickly as possible. It includes troubleshooting instructions for installing, licensing, and using Solstice CMIP.

Frequently Asked Questions

1. Do I need to remove my existing version of SunLink CMIP before I upgrade to Solstice CMIP 8.2?

Yes. You must remove the existing version of the software (using `pkgrm` to remove the product packages) *before* upgrading.

See *Getting Started with Solstice CMIP* for detailed instructions on how to remove SunLink CMIP.

- 2. Can I use the same license password that I installed for my existing version of SunLink CMIP to enable an upgrade to Solstice CMIP 8.2?**
Yes. Your old license password is still valid.
- 3. Do I need to install the `lit` package (`SUNWlit`) that comes with Solstice CMIP if I have already installed the version that came with another product?**
Yes. Although these packages have the same name, they are specific to the product with which they are delivered. You must install this package for each new product. If you have not installed the license password for a previous product, save the file `/etc/opt/licenses/LIC_CONFIG_FILE.combined` to safeguard the product-specific license information it contains.
- 4. Can I use Solstice CMIP with applications that are not developed using Solstice CMIP SDE?**
No. Applications that comply to the XMP and XOM specifications must be re-linked using the Solstice CMIP SDE before they will run over Solstice CMIP.
- 5. Do I have to start the transport provider before I use Solstice CMIP to manage local applications?**
No. Although a warning is generated when you launch Solstice CMIP, the `osimcsd` daemon is started normally and can be used in loopback mode to manage local applications.
- 6. Do I have to install the SunLink OSI communication platform before I use Solstice CMIP to manage remote applications?**
If the transport provider you are using is the SunLink OSI communication platform, you *must* install and start the SunLink OSI communication platform in order to manage remote applications. If you are installing the SunLink OSI communication platform, you must install it *before* installing Solstice CMIP.
- 7. Can I use a transport provider from a different vendor with Solstice CMIP?**
No. Solstice CMIP is designed to enable applications that manage networks using only the SunLink OSI communication platform or the RFC 1006 driver.

Problems Installing Solstice CMIP

This section includes troubleshooting information to help you resolve problems that you might encounter when installing Solstice CMIP.

Problem: Cannot locate the mounted directory containing the Solstice CMIP packages.

Action: Use `ps(1)` to check that the Volume Manager (`vold`) is running on your machine.

```
prompt% ps -ef | grep vold
root <pid> <datestamp> /usr/sbin/vold
```

If `vold` is running, check that you entered the path name correctly. By default, `vold` mounts the current release of Solstice CMIP RT under `/cdrom/cmip_8_2_rt`.

If `vold` is not running, you must mount the CD-ROM manually before you can access the directory.

Problem: Insufficient disk space in default destination directory.

Action: By default, the executable binaries for Solstice CMIP are installed under `/opt`. These files can be relocated to another partition on the same machine, or located on a server and shared between multiple client machines. System files and product-specific configuration files must be installed on every client machine.

Problems Licensing Solstice CMIP

This section includes troubleshooting information to help you resolve problems that you might encounter when installing the license password for Solstice CMIP.

Problem: Cannot start the `lit`. Command fails with error message:
permission denied.

Action: You must log in as `root` or become `superuser` before you can start the `lit`.

Problem: Cannot start the `lit`. Command fails with error message:
Cannot open connection to window server.

Action: You must enable `root` access to your Xserver.

```
prompt% $OPENWINHOME/xhost + root@<local_host>
```

Problem: The Select Product pull-down menu only shows the last product installed.

Action: Each time you install the `lit` package (`SUNWlit`) associated with a product, it overwrites any previously installed version. If you are installing several licensed products you should either ensure that you install each license before installing the next product, or you should backup the license file `LIC_CONFIG_FILE.combined` to safeguard the product-specific information it contains.

Problem: Cannot start Solstice CMIP. Command fails with error:
Cannot find license file

Action: You must install a license server and run the license installation script (`LIC_CONFIG_SCRIPT`) on each machine running Solstice CMIP.

Problem: Cannot start Solstice CMIP. Command fails with error:
Feature has expired

Action: Indicates that the license for Solstice CMIP has expired. If the license obtained was for a demonstration copy, it is no longer valid. You must purchase a new license and obtain a new license password from the license distribution center.

Problem: Cannot start Solstice CMIP. Command fails with error:
Encryption code in license file is inconsistent

Action: Any incorrect or missing license information (for example, number of RTUs, license password, expiration date) will disable your license when Solstice CMIP attempts to establish a session. Restart the `lit` and re-enter the license information correctly.

Problem: Cannot start Solstice CMIP. Command fails with error:
Cannot connect to licence server

Action: This indicates a severe problem with the license server. Check that the licence server machine is up and that the license daemon `lmgrd.ste` is running.

Try restarting the license daemon:

```
prompt# /etc/rc2.d/S85lmgrd
```

Problem: Cannot start Solstice CMIP following a system crash. Right to Use license is reported to be in use.

Action: If the system crashes while a licensed product is in use, the license may not be released correctly.

To check the current status of a license server:

```
prompt# cd /etc/opt/licenses
prompt# ./lmstat -c licenses_combined
lmstat - Copyright (C) 1993 Globetrotter Software Inc
Flexible License Manager status on <datestamp>

License server status:

    <hostname>: license server UP (MASTER)

Vendor daemon status:

    lic.SUNW (<version>): UP

Feature usage info:

    Users of CMIP: (Total of <rtu> licenses available)
```

To recover a lost license for Solstice CMIP:

```
prompt# cd /etc/opt/licenses
prompt# ./lmremove -c licenses_combined -v CMIP
```

Problems Using Solstice CMIP

This section includes troubleshooting information to help you resolve problems that you might encounter when starting and using Solstice CMIP.

Problem: CMIP application cannot be restarted after terminating abnormally, and fails with the error message:

`Communication error: Communication Problem`

Action: This indicates that the abnormal termination left the `osimcsd` daemon in a state where it appears that the application is still bound. Restarting the application attempts to bind the application with the same address. Stop and restart the `osimcsd` daemon to clear.

Problem: When using `cmiptool` under the OpenWindows window manager, strange characters are displayed in secondary windows.

Action: This indicates a problem with the Solaris operating environment. Install patch 102226-16 for the Solaris 2.4 operating environment.

Using cmiptrace

The `cmiptrace` utility displays the flow of data through the `osimcsd` daemon. You can use `cmiptrace` to identify and diagnose interoperability and configuration problems.

To start `cmiptrace`:

1. **Log in as root or become superuser.**
2. **Start `cmiptrace` by typing:**

```
prompt# /opt/SUNWconn/sbin/cmiptrace
```

The following trace example is a typical sequence of events that shows a successful bind and release:

```
<time> MCS-BIND-Rq, TRYING ADDRESS: MSEL=ZAAA CSEL=YAAA PSEL=dflt
SSEL=Prs TSEL=CMIP NSAP=80
<time> Cloned path: *2 *3 *4
<time> Downgoing Sap=4 Channel=1 Context=0
<time> MCS-BIND-Rq
<time>     Sap=4
<time>     Bind State=1
<time>     Connect State=1
<time>     Ivk Id=0
<time>     Dflt Req Timeout=240
<time>     Dflt Inac Timeout=600
<time>     Local Role=Manager Agent
<time>     Functional Units=Mult-Obj-Select Filter Mult-Reply
Cancel-Get-Svc
<time>     Quality Of Service=0
<time> Upgoing Sap=4 Channel=1 Context=2
<time> MCS-BIND-Cf
<time> Downgoing Sap=4 Channel=1 Context=1
<time> MCS-CANCEL-REGISTER-Rq
<time> Umounting 4
<time> SapFree: 4 3 2
```

The following trace shows an attempt to bind with an invalid address:

```

<time> MCS-BIND-Rq, TRYING ADDRESS: MSEL=ZAA@ CSEL=YAA@ PSEL=rfc0
SSEL=Prs TSEL=CMIP NSAP=0x498077b29f01
<time>      FAILED ON : SSEL=Prs TSEL=CMIP NSAP=0x819dd016
<time>      FAILED ON : SSEL=Prs TSEL=CMIP NSAP=
<time>      FAILED ON : SSEL=Prs TSEL=CMIP NSAP=RFC1006
<time>      FAILED ON : SSEL=Prs TSEL=CMIP NSAP=70
<time>      FAILED ON : SSEL=Prs TSEL=CMIP NSAP=0x497234086c01
<time>      FAILED ON : SSEL=Prs TSEL=CMIP NSAP=CLNS
<time>      FAILED ON : SSEL=Prs TSEL=CMIP NSAP=80
<time>      FAILED ON : SSEL=Prs TSEL=CMIP NSAP=0x00
<time>      FAILED ON : SSEL=Prs TSEL=CMIP NSAP=X25
<time>      FAILED ON : SSEL=Prs TSEL=CMIP NSAP=90
  
```

The following line of output indicates that an attempt was made to bind an application with an address that is already bound. Note that this may indicate that the `osimcsd` daemon failed to unbind the address when an application terminated abnormally. Stop `osimcsd` and restart to clear.

```

<time> OSIMCSD User already registered or bound
  
```

Using `shmmgr`

An application that runs over Solstice CMIP must free all of the memory that the XMP library gives to it in the form of return values for XMP functions (service-generated private objects). If an application fails to do so, the pool of memory available for service-generated private objects will be depleted over time until the `osimcsd` daemon cannot handle any more requests. When this occurs, the application will see all further XMP function calls fail with the message: `Communication error: Communication Problem`.

This problem can be diagnosed using the `shmmgr` utility delivered with Solstice CMIP, which displays the current state of the shared memory pool from which the `osimcsd` daemon is allocated memory.

To use `shmmgr`:

1. **Log in as root or become superuser.**
2. **Start `shmmgr` by typing:**

```
prompt# /opt/SUNWconn/cmip/sbin/shmmgr -s
```

When the `osimcsd` daemon is first started, `shmmgr` will display the following output:

```
buffer free : 1 out of total : 1
Largest free : 25589, Smallest free : 25589
free size : 25589
```

This shows that the shared memory pool has a total of 25589 bytes available and has not been fragmented.

If an application fails to release all of the shared memory that it receives, `shmmgr` could display something similar to the following:

```
buffer free : 2 out of total : 430
Largest free : 15309, Smallest free : 178
free size : 15487
```

This shows that the shared memory pool has been fragmented 430 times and that the total available memory is decreasing. Stopping and restarting the application should return the available memory to its original value.

If restarting the application still fails to release all of the memory, you can use `shmmgr` to deallocate memory that belongs to the shared memory pool.

1. **Log in as root or become superuser.**
2. **Stop all applications running over `osimcsd`.**
3. **Stop the `osimcsd` daemon.**

```
prompt# /etc/rc2.d/S97osimcs stop
```

4. Deallocate the shared memory using `shmmgr`.

```
prompt# /opt/SUNWconn/cmip/sbin/shmmgr -d
```

5. Restart the `osimcsd` daemon.

```
prompt# /etc/rc2.d/S97osimcs start
```

6. Check that all shared memory has been deallocated using `shmmgr`.

```
prompt# /opt/SUNWconn/cmip/sbin/shmmgr -s
buffer free : 1 out of total : 1
Largest free : 25589, Smallest free : 25589
free size : 25589
```

7. Restart the applications.

Errors Returned by the RFC 1006 Driver Utilities

rk6d Daemon Errors

rk6d: Could not find muxid <n> in list

The identifier of a TCP stream to be closed does not correspond to the identifier of an open TCP stream. Restart the `rk6d` daemon.

rk6d: Could not unlink

The `rk6d` daemon cannot unlink a TCP stream. Reboot your system.

rk6d: Error on poll

An error occurred while `rk6d` daemon was waiting for information from the kernel module. Restart the `rk6d` daemon.

rk6d: Fatal error in admin

An error occurred when sending administration messages to the kernel module. Restart the `rk6d` daemon.

rk6d: Fatal error plumbing listen stream

The `rk6d` daemon could not open a stream to the kernel module. Reinstall the `SUNWrk6d` package and try again.

rk6d: Fatal error plumbing streams

An error occurred when opening a TCP stream. Restart the `rk6d` daemon.

rk6d: Fatal error starting daemon

An error occurred when starting the `rk6d` daemon. There may be too many processes running on your system. Stop some processes then try again.

rk6d: Fatal error while waiting

An error occurred while `rk6d` daemon was waiting for information from the kernel module. Restart the `rk6d` daemon.

rk6d: Initial number of ctx exceeds maximum

When you start the `rk6d` daemon manually, the initial number of TCP streams (set using the `-i` option) must be less than the maximum TCP streams value (set using the `-m` option).

rk6d: Initial number of ctx should exceed min free ctx

When you start the `rk6d` daemon manually, the initial number of TCP streams (set using the `-i` option) must be more than the TCP streams “low-water” mark (set using the `-l` option).

rk6d: Min free ctx exceeds max free ctx

When you start the `rk6d` daemon manually, the TCP streams “low-water” mark (set using the `-l` option) must be less than the TCP streams “high-water” mark (set using the `-h` option).

`rkstat` *Errors*

rk6stat: Could not open device

The `rk6stat` utility could not communicate with the kernel module. Reinstall the `SUNWrk6d` package and try again.

rk6stat: Error reading statistics: <syserror>

Stop then restart the `rk6stat` utility. If this error is returned frequently, contact your authorized service provider.

rk6stat: Error resetting statistics: <syserror>

Stop then restart the `rk6stat` utility. If this error is returned frequently, contact your authorized service provider.

rk6trace *Errors*

rk6trace: Cannot start tracing

Stop then restart the `rk6trace` utility. If this error is returned frequently, contact your authorized service provider.

rk6trace: Could not open trace device <syserror>

The `rk6trace` utility could not open a device. Reinstall the `SUNWrk6d` package and try again.

rk6trace: Error in reading trace stream

Stop then restart the `rk6trace` utility. If this error is returned frequently, contact your authorized service provider.

rk6trace: Error on trace stream

Stop then restart the `rk6trace` utility. If this error is returned frequently, contact your authorized service provider.

rk6trace: Getmsg error <syserror>

Stop then restart the `rk6trace` utility. If this error is returned frequently, contact your authorized service provider.

rk6trace: I_SRDOPT call <syserror>

Stop then restart the `rk6trace` utility. If this error is returned frequently, contact your authorized service provider.

rk6trace: Poll error <syserror>

Stop then restart the `rk6trace` utility. If this error is returned frequently, contact your authorized service provider.

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