Oracle® Communications Network Charging and Control

Installation Guide

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Contents

About This Document

Audience

This guide is for system administrators who install or uninstall Oracle Communications Network Charging and Control (NCC).

Prerequisites

Before installing or uninstalling NCC, you should have an understanding of UNIX, Oracle Solaris, and a familiarity with IN concepts as well as an understanding of Oracle databases, SQL, and PL/SQL.

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

Related Documents

See the following documents for related information about NCC:

- *Concepts*
- *System Administrator's Guide*
- *Configuration User's Guide*
- *Security Guide*

Document Conventions

Typographical Conventions

The following terms and typographical conventions are used in the Oracle Communications Network Charging and Control (NCC) 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

NCC Installation Overview

Overview

Introduction

This chapter describes the Oracle Communications Network Charging and Control (NCC) installed components and provides an overview of the NCC installation procedure.

In this chapter

This chapter contains the following topics.

NCC Installed Components Overview

About NCC Installed Components

During the NCC installation process, you install and configure the following components:

- Oracle Database
- BRM SDK if your NCC system will communicate with Oracle Communications Billing and Revenue Management (BRM) when using the BRM Portal Communications Protocol (PCP) interface
- NCC software packages

NCC Software

The following table describes the NCC software sub-components installed.

Component	Provides
SMS	Service Management System (SMS) support for all other components. For example: • Data replication. • Statistics and alarm collection. • Security (users and permissions). • Report generation.
SLEE	The Service Logic Execution Environment (SLEE) for the Voucher and Wallet Server (VWS) and Service Logic Controller (SLC) nodes.
ACS	Base call handling and processing capabilities, and the Control Plan Editor.
CCS	Rating, charging, subscriber and voucher capabilities.
SMCB	SMS rating and charging capabilities.
BE	Real-time charging, voucher redemption, and session control capabilities.

Component	Provides
DSY	Diameter Sy Interface
MM	All messaging capabilities.
MM Navigator	Routing information lookup capabilities for messaging services.
RAP	CAMEL roaming capabilities.
UIS and UPC	USSD capabilities.
DAP	Outbound XML capabilities.
OSD	Inbound XML capabilities.
LCP	Location based capabilities.
SCA	SIP capabilities.
VSSP	ISUP capabilities.
SIGTRAN	M3UA and SUA capabilities.
PI	Provisioning capabilities.
CAP3_GW	CAP3 capabilities.
DCA	Inbound Diameter capabilities.
DCD	Outbound Diameter capabilities.
ECA	Inbound EDR/CDR processing capabilities.
ENUM	ENUM capabilities.
IS41	Inbound IS41 (CDMA) capabilities.
LCA	Inbound LDAP capabilities.
MFW	MAP Firewall capabilities.
MOB_ROAM	Additional roaming capabilities.
NGW	Notification Gateway capabilities.
NP_SERVICE_PACK	Number portability capabilities.
RCA	RADIUS capabilities.
SES	Subscriber event capabilities.
SEI	SMS to email capabilities.
TFR	TCAP relay capabilities.
VPN	Virtual private networking capabilities.

Certification

This release has been certified on:

- Solaris 11.3
- Oracle Database 12.2.0.1.0
- Oracle Linux 7 Update 3

NCC Installation Procedure Overview

Overview of the Installation Procedure

You install NCC on each Service Management System (SMS), Voucher and Wallet Server (VWS), and Service Logic Controller (SLC) node. The installation procedure follows these steps:

Step	Action
1	Plan your installation. When planning your installation, you will need to: • Determine the scale of your implementation, for example, whether it is a small test system or a large production system. • Determine how many physical machines you need. • Plan the system topology, for example, which SMS, VWS, or SLC nodes will run on which machines.
2	Review the following system requirements: • Hardware requirements, such as disk space and memory size • Software requirements, such as operating system version, file system layout, and file sizes • Information requirements, such as IP addresses and host names
3	Perform pre-installation tasks: • Perform system preparation tasks such as disabling services and configuring the location of log files. • Install and configure the Oracle database on local or remote server. • Install and configure additional third-party software.
4	Install the NCC product software on all nodes and optionally install service templates. **Note:** If the database is on a remote server, ensure the required table spaces are added. See *Advanced Storage and Memory Sizing* (on page 23) for more details.
5	Perform mandatory post-installation configuration tasks.
6	Verify the installation.

Installation Options

You install NCC by using the NCC Oracle Universal Installer (the installer). Using the installer, you can perform either a GUI installation or a silent installation using response files, similar to Oracle database installation.

Service Templates

About Service Templates

You can install the following service templates when you install NCC using the NCC Installation Manager:

- Prepaid Charging Service Template (PCST)

Installing a service template automatically performs initial configuration and setup for the service. You will need to perform additional post installation configuration tasks to complete the service setup.

Prepaid Charging Service Template

The Prepaid Charging Service Template (PCST) includes example control plans and tariffing configuration. It provides a list of prepaid services that can be used to differentiate the operator from competitors in the market.

For more information on prepaid services and their configuration, see *Configuration User's Guide*.

Supporting Multi-Byte UTF-8 Character Sets

NCC uses the AL32UTF8 database character set that supports multi-byte UTF-8 and traditional character sets. The NCC Installation Manager automatically sets the character set to AL32UTF8 when you install NCC.

Ensuring a Successful Installation

Introduction

The NCC installation should be performed only by qualified personnel. You must be familiar with the Oracle Solaris and Linux operating systems, Oracle Database software. You should be experienced with installing Solaris and Linux packages. It is recommended that the installation and configuration of the Oracle database be performed by an experienced database administrator.

Installation Guidelines

Follow these guidelines:

- As you install each component (for example, Oracle Database), verify that the component is installed successfully before continuing the installation process.
- Pay close attention to the system requirements. Before you begin installing the software, make sure your system has the required base software. In addition, make sure that you know all of the required configuration values, such as host names and port numbers.
- As you create new configuration values, write them down. In some cases, you might need to re-enter configuration values later in the procedure.

Chapter 2

Planning Your NCC Installation

Overview

Introduction

This chapter explains how to plan an Oracle Communications Network Charging and Control (NCC) installation.

In this chapter

This chapter contains the following topics.

About Planning Your NCC Installation

Planning Your NCC Installation

When planning your NCC installation, you will need to decide:

- How many Service Management System (SMS), Voucher and Wallet Server (VWS), and Service Logic Controller (SLC) nodes to install
- Which node to install on which server
- If external storage is used, how to connect each server to the external storage
- If databases will be co-located at nodes or located remotely
- How to connect NCC servers together in your network
- How to connect NCC servers with the rest of your network
- How to integrate the NCC solution into the telco infrastructure

Before installing NCC, you should create an implementation plan that includes the following elements:

- A logical and physical overview of the solution, listing all nodes used in the solution and how they interact (for example: protocols used, and so on). If the solution is deployed geographically across multiple sites, then this should be reflected here.
- Hardware details for each node, including connected hardware such as external storage
- Rack mounting and cabling details
- Storage and database details
- IP network details
- Telco network integration details

For an overview of the NCC architecture, see the discussion about the NCC system architecture in *NCC Concepts*.

About Cohosting NCC Nodes

Cohosting multiple NCC nodes on a single physical server is only supported in combination with virtualization technologies, such as the following:

- Oracle VM Server for SPARC or Oracle VM for Linux
- Hardware partitioning such as dynamic domains

Each node should have its own operating system, database instance, and storage layout. You could also use an existing database available on a remote server. See *Installing the Oracle Database Software* (on page 53) for details.

Detailed Planning

Storage Planning

Document the storage configuration. For each SMS, VWS, and SLC node, include the following information:

- How the internal disks will be organized
- Whether disks will be managed by a volume manager or a RAID controller or both
- What data will be stored on each disk or disk group
- How the external storage will be organized; for example, what are the Logical Unit Numbers (LUN), RAID groups, and so on
- How the servers will be connected to the storage and how you will make this access redundant
- Details of any specific parameters that will be set in the external storage, volume manager, and file systems

Database Planning

Document all database parameters for each SMS, VWS, and SLC node, including the following:

- Where the different database elements (such as data files, redo logs, archive logs, and so on) will be stored
- The values defined for the oracle environment variables (such as ORACLE_SID, ORACLE_BASE, ORACLE_HOME, and so on)
- The System Global Area (SGA) parameters
- Any other specific instance parameters you will use

Network Planning

To plan the network implementation:

- Document the different internal and external IP networks that will be used and create a schematic overview of these networks. Use this overview to describe which nodes have access to which networks.
- Document the physical configuration of the network. For example, document which Network Interface Card (NIC) ports will be used for which networks.
- Document how redundancy will be achieved; for example, through IP network multipathing (IPMP).
- Document Network Time Protocol (NTP) configuration. Either list existing NTP servers or define which nodes will be configured as NTP servers.
- Create a host register containing details of all IP addresses and netmasks for all nodes and networks.

Integration Planning

Plan for integration with the telco environment by documenting at least the following items:

- How the SLC nodes will be integrated into the telco environment. Create a schematic overview and use this overview to describe the interaction between the SLC nodes and the telco infrastructure (for example: MSC Signaling Gateways, IPs, and so on).
- Which transport and application protocols will be used in which scenarios (for example: M3UA, SUA, INAP, Camel, MAP, and so on).
- How traffic will be routed to and from the SLC nodes. For example, record details of SCCP/SUA routing, including SCCP addressing parameters, global title addresses, subsystems, and so on.
- How traffic will be load-balanced across the SLC nodes.
- Any protocol specific details for each application protocol. For example, for INAP or Camel, record which subsystem numbers and service keys will be used and which type of service will be invoked for each protocol.
- A detailed call-flow for each call scenario, showing the signaling units and signaling unit parameters being received and returned by the SLC nodes.

OSD Configuration Planning

You configure Open Services Development (OSD) to enable SLC nodes to receive HTTP/SOAP requests. The requests trigger control plans on the SLC. When configuring OSD, you should determine:

- How many OSD interfaces will run on each SLC
- The IP address and TCP port that each interface will use to listen for incoming connections

The SMS and VWS nodes also send HTTP/SOAP requests to the SLC nodes in order to submit SMS notifications. This means that at a minimum, you must configure OSD interfaces as targets for the SMS and VWS nodes.

Tip: You should use an:

- Internal LAN (if available) for the HTTP/SOAP traffic sent from the VWS and SMS nodes to the SLC nodes.
- External LAN for the HTTP/SOAP traffic coming from external systems

You should document the OSD configuration in a table and keep this information available for reference during the installation and configuration process.

OSD Configuration Example

The following table lists example OSD configuration for SMS notification requests.

SLC nodes	OSD interface	Sample IP:port values	Source nodes	Scenario
SLC1	osdInterface	10.1.0.10:2222	SMS, VWS1, VWS2	SMS Notification request
SLC2	osdInterface	10.1.0.20:2222	SMS, VWS1, VWS2	SMS Notification request

Replication Planning

You should document all replication elements, node IDs, and IP addresses in a table. This information will be needed when you configure replication following the installation.

Replication Reference Table Example

The **Replication** column in the following table shows the typical values for a fully configured system.

Node		**Replication**		**UpdateRequester ID**			
Name	Type	Node ID	Internal IP Address	Alarms	AVD	Stats	Rep IF
test_SMS	SMS	1	10.0.0.10	-	-	-	-
test_SLC1	SLC	301	10.0.0.11	601	-	701	901
test_SLC2	SLC	302	10.0.0.12	602	-	702	902
test_VWS1	VWS	351	10.0.0.21	651	611	751	951
test_VWS2	VWS	352	10.0.0.22	652	612	752	952

The table headings map to the following configuration fields:

- *Name* is the **Description**
- *Node ID* is the **Node Number** - this must be unique across the system
- *UpdateRequester ID* - this must be unique across the system
- *Internal IP Address* is the **Primary Node IP Address**

See the chapter on replication in *Service Management System Technical Guide* for information on replication and node numbering standards.

Chapter 3

NCC System Requirements

Overview

Introduction

This chapter describes the hardware and software requirements for Oracle Communications Network Charging and Control (NCC).

In this chapter

This chapter contains the following topics.

Network Requirements

Introduction

All NCC nodes require IP network connectivity to communicate with each other, as well as with other network elements such as management clients, provisioning systems, or telephony signaling transfer points. A typical NCC implementation comprises the following logical networks:

- Management
- Billing
- Internal communication
- Signaling

IP Networks

The following table describes the logical IP networks and their NCC implementation.

Network	Type	Purpose
Management	External	Provides external component access to the NCC nodes; for example, to UIs for performing operations, to provisioning systems for creating subscriber accounts and recharging accounts, to a data warehouse for collecting event detail record (EDRs), and so on. It also allows the nodes to transmit data to peripheral systems, such as network management systems (as SNMP traps).
Billing	Internal	Use an internal network for billing communication between the NCC nodes, such as call reservation requests or wallet information requests. The billing network should not be accessible by external systems.

Network	Type	Purpose
Internal communication	Internal	Use for all internal communications between the NCC nodes, including data replication but excluding billing communication. The Internal network should not be accessible by external systems.
Signaling	External	Use two signaling networks for redundant signaling connectivity between the SLC nodes and the telephony network. For integration into: • A GSM or CDMA network, set up a multi-homed SCTP association between Signaling Gateways and the SLC nodes to carry M3UA or SUA (SIGTRAN) traffic. • An NGN network, use the signaling networks to set up two separate TCP/IP connections between the Media Gateway Controller (MGC or softswitch) and each SLC node. The connections between the SLC nodes and the Signaling Gateways or MGCs can be switched (systems on the same IP subnet) or routed (for systems on different IP subnets).

Connecting Networks

When setting up the NCC network connections, you should:

- Connect management, billing, and internal networks to all nodes.
- Connect signaling networks to SLC nodes only.
- Use a single physical network for each logical network to ensure optimal performance and stability in production implementations. However, logical networks can share a single or multiple physical networks, if required.
- Ensure full redundancy for each network by using two or more network ports connected to an independent ethernet network.
- Use IP network multipathing (IPMP) to implement IP address and network interface failover capabilities on the NCC nodes.

Logical Network Settings

The following table lists the settings you should use for bandwidth, latency, security, redundancy, and external routing for each type of logical network.

Logical Network	Bandwidth	Latency	Security	Redundancy	External Routing
Management	High	Medium	Yes	Yes	Yes
Billing	High	Low	No	Yes	No
Internal	High	Medium	No	Yes	No
Signaling	High	Low	No	Yes	Yes

Note: If you do not require routing for connectivity to peer signaling nodes, then you will not need external routing for the signaling network.

Logical Network Settings Table

This table explains the bandwidth, latency, security, redundancy, and external routing settings listed in *Logical Network Settings* (on page 10).

Setting	Description
Bandwidth	An indicator of the required bandwidth for this connection. Typical model IP connections have low bandwidth requirements, allowing them to be satisfied with shared infrastructure. Medium bandwidth requirements may require some quality of service. High bandwidth requirements may require a dedicated link, for example, over an E1/T1 bearer.
Latency	Latency requirements are relevant to performance and volume testing. The level of latency reflects how time critical the response is.
Security	The level of security required depends on whether or not the information being passed is sensitive or is financial information such as vouchers. You may need a dedicated connection for high levels of security.
Redundancy	Redundancy enables failover protection if a connection is lost.
External Routing	External routing is needed if the subnet will require routing beyond the NCC solution.

Memory Requirements

About Memory Requirements

You will require at least eight gigabytes of RAM per node to completely install NCC. You may require additional memory depending on the size and complexity of the deployment.

The exact amount of memory required on each SMS, VWS, and SLC node depends on memory requirements of:

- The operating system
- The NCC application processes running on the node
- The Oracle Database instance processes and System Global Area (SGA) settings

Note: For information about advanced memory sizing, see *Advanced Storage and Memory Sizing* (on page 23).

Database Memory

For more information on memory requirements for the NCC applications, including example settings for small, medium, and large production systems, see *Advanced Storage and Memory Sizing* (on page 23).

The following table lists the minimum NCC Oracle database SGA settings for each NCC node in your environment. You should review all settings for your specific deployment.

SGA Element	Recommended minimum setting (MB)		
	SMS	VWS	SLC
log_buffer	16	10	16
java_pool_size	160	0	160
shared_pool_size	512	512	512
pga_aggregate_target	256	64	256

SGA Element	Recommended minimum setting (MB)		
large_pool_size	160	32	160
db_cache_size	48	128	48
db_keep_cache_size	32	32	32
db_recycle_cache_size	32	32	32
db_32k_cache_size	128	0	128

Storage Requirements

Introduction

Each node in a NCC installation will consist of a number of logical sets of data. On some nodes, additional sets of data may be required, such as Oracle Archive logs, or data files may be divided to help optimize performance. For example, redo logs and data files could be separated in the Oracle Database Instance set.

You should follow these recommendations if possible:

- Dedicate the boot disk to OS and do not use it to store any other logical data groups.
- Maintain a mirror of the boot disk for redundancy.

General Storage Requirements

Each NCC node will consist of at least the minimum logical sets of data listed in the following table.

Data Set	Mount Point
Operating system with **/var** file system and swap space	Boot disk
NCC applications (binaries, libraries, log files, temporary files)	**/IN** (mandatory)
Oracle Database Server (binaries, $ORACLE_BASE, $ORACLE_HOME)	**/u01** (recommended)
Oracle Database instance (for example, data files, log files)	**/oracle/datafiles** (recommended)
Oracle redo log files	**/oracle/redologs** (recommended)

Swap sizing should be based on the following guidelines for each node.

For Oracle Enterprise Database 12*c*:

System RAM Size	Recommended Swap Size
1GB to 2GB	= 1.5x System RAM
>2GB to <16GB	= System RAM
>16GB	= 16GB

SMS Storage Requirements

The following table details the mount points and minimum storage requirements for the SMS node.

Data Set	Mount Point	Minimum Size
NCC applications	**/IN**	20 GB
Oracle Database server (12*c* R2 Enterprise Edition)	**/u01**	10 GB

Data Set	Mount Point	Minimum Size
Oracle Database instance	**/oracle/datafiles**	80 GB

VWS Storage Requirements

The following table details the mount points and minimum storage requirements for the VWS node.

Data Set	Mount Point	Minimum Size
NCC applications	**/IN**	20 GB
Oracle Database server	**/u01**	10 GB
Oracle Database instance	**/oracle/datafiles**	45 GB

SLC Storage Requirements

The following table details the mount points and minimum storage requirements for the SLC node.

Data Set	Mount Point	Minimum Size
NCC applications	**/IN**	20 GB
Oracle Database server	**/u01**	10 GB
Oracle Database instance	**/oracle/datafiles**	25 GB

SMS Tablespace Requirements

The following table lists the minimum tablespace sizing required for an installation on the SMS node.

Component	Tablespace Name	Datafile Size (MB)	Number of Files	Total Size
ACS	ACS_DATA	200	2	400
	ACS_INDEX	200	1	200
	ACS_SUBURB_DATA1	200	4	800
	ACS_SUBURB_INDEX 1	200	4	800
CCS	CCS_CDR	2001	1	2001
	CCS_CDR_I	2001	1	2001
	CCS_DATA	2001	1	2001
	CCS_EVENT	2001	1	2001
	CCS_EVENT_I	2001	1	2001
	CCS_INDEX	2001	1	2001
	CCS_SUBS	2001	1	2001
	CCS_SUBS_I	2001	1	2001
	CCS_VOUCHERS	2001	1	2001
	CCS_VOUCHERS_I	2001	1	2001

Component	Tablespace Name	Datafile Size (MB)	Number of Files	Total Size
	CCS_XDB	2001	1	2001
ENUM	EN_DATA	200	1	200
	EN_INDEX	200	1	200
	EN_SUBS	200	1	200
	EN_SUBS_I	200	1	200
LCP	LCP_DATA	200	1	200
	LCP_INDEX	200	1	200
MM	MMX_DATA	200	1	200
	MMX_INDEX	200	1	200
NP_SERVICE_PACK	NP_DATA	200	1	200
	NP_INDEX	200	1	200
	NP_SUBS	200	1	200
	NP_SUBS_I	200	2	400
OSD	OSD_DATA	200	1	200
	OSD_INDEX	200	1	200
PI	PI_DATA	200	1	200
	PI_INDEX	200	1	200
RCA	RCA_DATA	200	1	200
	RCA_INDEX	200	1	200
SES	SES_DATA	200	1	200
	SES_INDEX	200	1	200
SMS	REP_DATA	2001	1	2001
	SMF_ALARMS	2001	1	2001
	SMF_ALARMS_I	2001	1	2001
	SMF_AUD	2001	2	4002
	SMF_AUD_I	2001	1	2001
	SMF_DATA	200	2	400
	SMF_INDEX	200	1	200
	SMF_STATS	2001	1	2001
	SMF_STATS_I	2001	1	2001
	SYSAUX	2001	1	2001
	SYSTEM	512	1	512
	TOOLS	2001	1	2001
	UNDOTBS2	2001	5	10005

Component	Tablespace Name	Datafile Size (MB)	Number of Files	Total Size
	USERS	2001	1	2001
UIS	UIS_CDR	200	1	200
	UIS_CDR_I	200	1	200
	UIS_DATA	200	1	200
	UIS_INDEX	200	1	200
UPC	UPC_DATA	200	1	200
	UPC_INDEX	200	1	200
VPN	VPN_DATA	200	1	200
	VPN_INDEX	200	1	200

VWS Tablespace Requirements

The following table lists the minimum tablespace sizing required on the VWS node.

Component	Tablespace Name	Datafile Size (MB)	Number of Files	Total Size
ACS	ACS_DATA	200	2	400
	ACS_INDEX	200	1	200
BE	BE_DATA	200	1	200
	BE_EVENT	2001	1	2001
	BE_EVENT_I	2001	1	2001
	BE_SUBS	2001	1	2001
	BE_SUBS_I	2001	1	2001
	BE_VOUCHERS	2001	1	2001
	BE_VOUCHERS_I	2001	1	2001
	SYSAUX	500	1	500
	SYSTEM	450	1	450
	TEMP	2001	5	10005
	REDO	101	16	1616
	TOOLS	200	1	200
	UNDO	2001	5	10005
	USERS	200	1	200
CCS	CCS_DATA	200	1	200
	CCS_INDEX	200	1	200
	CCS_SUBS	2001	1	2001

Component	Tablespace Name	Datafile Size (MB)	Number of Files	Total Size
	CCS_SUBS_I	2001	1	2001
	CCS_VOUCHERS	2001	1	2001
	CCS_VOUCHERS_I	2001	1	2001
SMS	SMF_DATA	100	1	100
	SMF_INDEX	100	1	100

SLC Tablespace Requirements

The following table lists the minimum tablespace sizing required on the SLC node.

Component	Tablespace Name	Datafile Size (MB)	Number of Files	Total Size
ACS	ACS_DATA	200	2	400
	ACS_INDEX	200	1	200
	ACS_SUBURB_DATA1	200	4	800
	ACS_SUBURB_INDEX 1	200	4	800
CCS	CCS_SCP_DATA	200	1	200
	CCS_SCP_INDEX	200	1	200
	CCS_SUBS	2001	1	2001
	CCS_SUBS_I	2001	1	2001
ENUM	EN_DATA	200	1	200
	EN_INDEX	200	1	200
	EN_SUBS	200	1	200
	EN_SUBS_I	200	1	200
LCP	LCP_DATA	200	1	200
	LCP_INDEX	200	1	200
MM	MMX_DATA	200	1	200
	MMX_INDEX	200	1	200
NP_SERVICE_PAC K	NP_DATA	200	1	200
	NP_INDEX	200	1	200
	NP_SUBS	200	1	200
	NP_SUBS_I	200	1	20
OSD	OSD_DATA	200	1	200
	OSD_INDEX	200	1	200
RCA	RCA_DATA	200	1	200
	RCA_INDEX	200	1	200

Component	Tablespace Name	Datafile Size (MB)	Number of Files	Total Size
SES	SES_DATA	200	1	200
	SES_INDEX	200	1	200
SMS	SMF_DATA	100	1	100
	SMF_INDEX	100	1	100
	SYSAUX	2001	1	2001
	SYSTEM	2001	1	2001
	TOOLS	2001	1	2001
	UNDOTBS1	2001	2	4002
	USERS	2001	1	2001
UIP	UIS_CDR	200	1	200
	UIS_CDR_INDEX	200	1	200
	UIS_DATA	200	1	200
	UIS_INDEX	200	1	200
UPC	UPC_DATA	200	1	200
	UPC_INDEX	200	1	200
VPN	VPN_DATA	200	1	200
	VPN_INDEX	200	1	200

Software and Hardware Requirements

Introduction

This section details the hardware platforms and prerequisite software required to install NCC.

For details on installing the required system software, see the installation and setup documentation supplied with the software.

Hardware Platforms

The following table lists the minimum recommended and mandatory hardware platforms for the NCC applications.

Hardware	Mandatory / Recommended	Required for
64-bit SPARC CPU architecture or Linux x86	Mandatory	All nodes
Storage Array (RAID)	Recommended	SMS only
A PC with a screen resolution of 1024x768 pixels	Recommended	Installer and Clients

Prerequisite Software

The following table lists the additional Oracle and third-party software that you should install prior to installing NCC.

Software	Version	Where to install
Oracle Solaris or Linux operating system. This includes the packages listed below.	11.3 or later (Solaris) 7.3 or later (Linux)	All nodes **Note:** When installing the nodes, ensure that all the nodes are installed on the same operating system.
Oracle Database Server: 12*c* R2 Enterprise Edition	12.2.0.1.0	SMS nodes
Oracle Database Server: 12*c* R2 Standard Edition 2	12.2.0.1.0	SLC and VWS nodes
Oracle Java Runtime Environment (JRE)	8u181 or later	GUI clients hosts
Oracle Java Development Kit (JDK)	8u181	All nodes. **Note**: If an old version of JDK 8 is installed on Solaris, remove the older package first.
SCTP Libraries (Linux)		SLC nodes
Xinetd (Linux) / inetd (Solaris)		All nodes
Httpd		SMS nodes
Oracle Communications Billing and Revenue Management (BRM) SDK (on SLC nodes) See *Installing and Configuring BRM SDK* (on page 58) for more information.	BRM SDK 7.5.0.21.0 or later	SLC Node **Note**: Copy 64 bit libraries libnzsdk64.so, libpcmext64.so and libportal64.so into BRM SDK installed 'lib' directory with proper permissions.

Preparing the System

Introduction

Check the kernel parameters on the system to ensure the system is optimally configured.

Kernel Parameters

The following table shows the minimum and recommended values for kernel parameters on Solaris 11 for Oracle 12*c* databases, and lists the resource controls to use when modifying the parameter values with the **projadd** or **projmod** command**.**

Parameter	Replaced by Resource Control	Minimum Value	Recommended Value
semsys:seminfo_semmni	project.max-sem-ids	100	2048
semsys:seminfo_semmsl	process.max-sem-nsems	250	2048
shmsys:shminfo_shmmax	project.max-shm-memory	4294967295	4294967295
shmsys:shminfo_shmmni	project.max-shm-ids	100	2048
N/A	process.max-file-descriptor	65536	65536

For Oracle 12*c* database the minimum values are the same except for project.max-shm-memory, which depends on the amount of physical RAM in the system. If RAM is in the range 1 GB to 16 GB, you should set the minimum value for project.max-shm-memory to half the size of the physical memory. If RAM is greater than 16 GB, you should set project.max-shm-memory to a value of at least 8 GB.

For Linux:

1. Determine the sum of process parameters for all database instances on the system, the overhead for Oracle background processes, the system and other application requirements.
2. Set semmns (total semaphores system-wide) to the larger of the value in 1 or 32000.
3. Set semmsl (semaphores per set) to 250.
4. Set semmni (total semaphore sets) to semmns/semmsl rounded up to the nearest multiple of 1024.
5. For Linux and Oracle 10.2-12.2, set the maximum number of asynchronous I/O requests allowed in /etc/sysctl.conf as follows:

```
fs.aio-max-nr = 3145728
```

After changing the /etc/sysctl.conf, run the following command as root to set the values in the system:

```
# /sbin/sysctl -p /etc/sysctl.conf
```

Modifying Resource Control Values

Follow these steps to set resource controls for Solaris 11 and later.

Step	Action
1	Log in to the NCC node as root user.
2	Use the **projadd** command to set the value of **`process.max-file-descriptor`**: `projadd -U oracle -K "process.max-file-descriptor=(priv,65536,deny)" group.dba`
3	Use the **projmod** command to set the value of **`project.max-shm-memory`**: `projmod -sK "project.max-shm-memory=(priv,32G,deny)" group.dba`
4	Use the **projmod** command to set the value of **`project.max-sem-ids`**: `projmod -sK "project.max-sem-ids=(priv,2048,deny)" group.dba`
5	Use the **projmod** command to set the value of **`project.max-sem-nsems`**: `projmod -sK "process.max-sem-nsems=(priv,2048,deny)" group.dba`
6	Use the **projmod** command to set the value of **`project.max-shm-ids`**: `projmod -sK "project.max-shm-ids=(priv,2048,deny)" group.dba`

For Linux, set the values by editing /etc/sysctl.conf and then using the following /sbin/sysctl command:

```
# /sbin/syctl -p /etc/sysctl.conf
```

Tuning the System's ZFS Performance

Set the following parameters in your **/etc/system** file.

To tune the NCC system's performance:

Note: The following settings are recommended for a machine with 16 GB of memory.

Step	Action
1	Disable ZFS from forcing a flush of the the disk array write cache: `set zfs:zfs_nocacheflush=1`
2	Set the ZFS file system's maximum cache size. For example, to set the maximum cache size to 5 GB: `set zfs:zfs_arc_max=0x140000000`

Step	Action
3	Set the ZFS file system's minimum cache size. For example, to set the minimum cache size to 5 GB: `set zfs:zfs_arc_min=0x140000000`

4	If your file system cache is small, disable prefetching:
	`set zfs:zfs_prefetch_disable=1`
	`set zfs:zfs_immediate_write_sz=8000`

For more information on tuning parameters for ZFS, see *Solaris ZFS Administration Guide*.

Setting the Time Zone

Introduction

The same time zone must be used for all machines on which the NCC applications are installed. GMT is the recommended time zone for all machines; however, the local time zone may be configured for hosts on which the NCC GUI client runs.

Setting Time Zones to GMT

The NCC applications use the default time zone unless it is overridden in the user's profile.

Locale and time zone are configured through SMF service properties.

Note: Ensure all accounts default to the GMT time zone. If you set or change the default time zone, set it on each node, and then restart each node.

To set the time zone to GMT in Solaris:

Step	Action
1	Log in as the root user.
2	Run the following command: **`svccfg -s timezone:default setprop timezone/localtime= astring: GMT`** **`svcadm refresh timezone:default`**

To set the time zone to GMT in Linux:

Step	Action
1	Log in as the root user.
2	Run the following command: **`timedatectl set-timezone GMT`**
3	If the application is configured to read RTC time in local timezone, run the following command to set RTC in UTC: **`timedatectl set-local-rtc 0`**
4	Edit **`/etc/profile`** and alter the TZ line to: **`export TZ=GMT`**
5	Run the following command to check the time zone: **`-bash-4.2$ timedatectl`**

The result would appear as:

```
Warning: ignoring the TZ variable, reading the system's timezone
setting only.

Local time: Thu 2017-03-16 04:10:02 GMT
Universal time: Thu 2017-03-16 04:10:02 UTC
Timezone: GMT (GMT, +0000)
NTP enabled: no
NTP synchronized: yes
RTC in local TZ: no
DST active: n/a
```

You should synchronize the date and time for all nodes through Network Time Protocol (NTP). If no NTP server is available, then you should use the SMS nodes as NTP servers.

Important: It is critical that the date and time are synchronized across all NCC nodes.

Checking the Time Zone

Follow these steps to verify that a UNIX system has time zones configured correctly for GUI operations and time zone dependent discounts.

Step	Action
1	Log on to the machine for which you want to check the time zone.
2	Run the following command: **`env | grep TZ`** **Result:** `TZ = GMT` This indicates that the time zone directory is set to GMT.

Follow these steps to verify time zone on Linux machine.

Step	Action
1	Log in as a root user to the machine for which you want to check the time zone.

2	Run the following command to check the time zone:
	`-bash-4.2$ timedatectl`
	
	Result:
	`Warning: ignoring the TZ variable, reading the system's timezone setting only.`
	`Local time: Thu 2017-03-16 04:10:02 GMT`
	`Universal time: Thu 2017-03-16 04:10:02 UTC`
	`Timezone: GMT (GMT, +0000)`
	`NTP enabled: no`
	`NTP synchronized: yes`
	`RTC in local TZ: no`
	`DST active: n/a`
	This indicates that the time zone is set to GMT.

Chapter 4

Advanced Storage and Memory Sizing

Overview

Introduction

Precise storage and memory requirements depend on too many factors to be predicted accurately. This chapter provides estimate requirements for a number of example deployment scenarios of Oracle Communications Network Charging and Control (NCC).

In this chapter

This chapter contains the following topics.

Types of Implementations

Introduction

This section provides estimated storage and memory requirements for a number of example deployment scenarios.

Example Size Scenarios

The following table describes the different scenarios for which sizing information is provided.

Scenario	Description
Test system	This is the basic system installed as a minimum using the NCC Installer. It comprises: • One SMS node • One VWS pair (two nodes) • One SLC node This system corresponds to the minimum storage requirements detailed in *Storage Requirements* (on page 12).

Scenario	Description
Small production system	A production system covering: • Less than 1 million subscribers • Less than 24 million vouchers • Less than 1 million EDRs per day with 4 weeks retention Comprising: • One SMS node • One VWS pair (two nodes) • Two SLC nodes For details, see *Small Production System Example* (on page 24).
Medium production system	A production system covering: • Less than 1 million subscribers • Less than 120 million vouchers • Less than 10 million EDRs per day with 12 weeks retention Comprising: • One SMS node • Two VWS pairs (four nodes) • Four SLC nodes For details, see *Medium Production System Example* (on page 30).
Large production system	A production system covering: • Less than 10 million subscribers • Less than 240 million vouchers • Less than 20 million EDRs per day with 24 weeks retention Comprising: • One SMS node • Four VWS pairs (eight nodes) • Eight SLC nodes For details, see *Large Production System Example* (on page 34).

Small Production System Example

Introduction

This section provides examples of the estimated minimum storage and memory sizing requirements for deploying the NCC applications in a small production environment.

Disk Storage on the SMS

The following table describes the estimated minimum disk storage required on the SMS to deploy the NCC applications in a small production environment.

Mount Point	Contents	Required Space (MB)	Block Overhead	Allocated Space (MB)	Total Mount Point Space (GB)
/oracle/datafiles	Core Oracle database	17411	2%	17759	109
	NCC application data files	67732	2%	69087	

Mount Point	Contents	Required Space (MB)	Block Overhead	Allocated Space (MB)	Total Mount Point Space (GB)
	CCS BE EDRs stored in the database	24012	2%	24492	
/oracle/redologs	Oracle redo logs	1616	2%	1648	2
/oracle/tempfiles	Oracle TEMP tablespace	10005	2%	10205	10
/oracle/archivelogs	Oracle archive logs	102400	2%	104448	102
/u01	Oracle software	5120	2%	5222	6
/IN		23896	2%	24376	24
Grand Total				257238	253

Disk Storage on the VWS

The following table describes the estimated minimum disk storage required on the VWS to deploy the NCC applications in a small production environment.

Mount Point	Contents	Required Space (MB)	Block Overhead	Allocated Space (MB)	Total Mount Point Space (GB)
/oracle/datafiles	Core Oracle database	17408	2%	17756	40
	NCC application data files	22610	2%	23062	
/oracle/redologs	Oracle redo logs	1600	2%	1632	2
/oracle/tempfiles	Oracle TEMP tablespace	10005	2%	10205	10
/oracle/archivelogs	Oracle archive logs	20480	2%	20890	21
/u01	Oracle software	5120	2%	5222	6
/IN		20480	2%	20890	21
Grand Total				99657	100

Disk Storage on the SLC

The following table describes the estimated minimum disk storage required on the SLC to deploy the NCC applications in a small production environment.

Mount Point	Contents	Required Space (MB)	Block Overhead	Allocated Space (MB)	Total Mount Point Space (GB)
/oracle/datafiles	Core Oracle database	17408	2%	17756	26
	NCC application data files	7702	2%	7856	

Mount Point	Contents	Required Space (MB)	Block Overhead	Allocated Space (MB)	Total Mount Point Space (GB)
/oracle/datafiles	Core Oracle database	17408	2%	17756	26
/oracle/redologs	Oracle redo logs	1600	2%	1632	2
/oracle/tempfiles	Oracle TEMP tablespace	10005	2%	10205	10
/u01	Oracle software	5120	2%	5222	6
/IN		20480	2%	20890	21
Grand Total				63561	65

Oracle Datafiles on the SMS

Oracle redo logs should be sufficiently sized to ensure that, under production load, a log switch occurs every 15 to 20 minutes. If redo logs are sized too small, then they fill up more quickly necessitating a redo log switch, which is a relatively expensive operation. The redo log switch interval can be determined by looking at the timestamps of the log switch messages that appear in the Oracle alert log. After installation, redo log sizes can be changed if desired by following the instructions in the Oracle Database documentation.

The following table provides details of the Oracle data files on the SMS for which sizing should be reviewed for a small production system.

Component	Tablespace Name	Data File Size (MB)	Number of Files	Total Size (MB)
SYSAUX	SYSAUX	500	1	500
SYSTEM	SYSTEM	2001	1	2001
TEMP	TEMP	2001	5	10005
TOOLS	TOOLS	2001	1	2001
UNDOTBS1	UNDOTBS1	2001	5	10005
SMS	USERS	2001	1	2001
ACS	CONTROL FILES	300	3	900
SMS	REDO LOGS	100	16	1600
ACS	ACS_DATA	200	1	200
	ACS_INDEX	200	1	200
CCS	CCS_DATA	2001	1	2001
	CCS_EVENT	2001	1	2001
	CCS_EVENT_I	2001	1	2001
	CCS_INDEX	2001	1	2001
	CCS_SUBS	2001	2	4002
	CCS_SUBS_I	2001	1	2001
	CCS_VOUCHERS	2001	2	4002

Component	Tablespace Name	Data File Size (MB)	Number of Files	Total Size (MB)
	CCS_VOUCHERS_I	2001	2	4002
	CCS_XDB	2001	1	2001
LCP	LCP_DATA	200	1	200
	LCP_INDEX	200	1	200
MM	MMX_DATA	300	1	300
	MMX_INDEX	300	1	300
OSD	OSD_DATA	300	1	300
	OSD_INDEX	200	1	200
PI	PI_DATA	200	1	200
	PI_INDEX	200	1	200
SMS	REP_DATA	2001	1	2001
	SMF_ALARMS	2001	3	6003
	SMF_ALARMS_I	2001	2	4002
	SMF_AUD	2001	7	14007
	SMF_AUD_I	2001	1	2001
	SMF_DATA	2001	1	2001
	SMF_INDEX	200	2	400
	SMF_STATS	2001	1	2001
	SMF_STATS_I	2001	2	4002
UIP	UIS_CDR	2001	1	2001
	UIS_CDR_I	2001	1	2001
	UIS_DATA	200	1	200
	UIS_INDEX	200	1	200
UPC	UPC_DATA	200	1	200
	UPC_INDEX	200	1	200

Partitioned Files on the SMS

The following table provides the estimated storage (in MB) for the partitioned tablespaces on the SMS in a small production environment.

Partitioned Tablespace Name	File Size	Weekly Storage	Data Files Per Week	Weekly Partitions Allocated	Total Tablespace Size (MB)
CCS_CDR_Yyyyy_Www	2001	3800	2	5	24012

Oracle Datafiles on the VWS

The following table provides details of the Oracle data files on the VWS for which sizing should be reviewed.

Component	Tablespace Name	Data File Size (MB)	Number of Files	Total Size (MB)
SYSAUX	SYSAUX	500	1	500
SYSTEM	SYSTEM	2001	1	2001
TEMP	TEMP	2001	5	10005
TOOLS	TOOLS	2001	1	2001
UNDO	UNDO	2001	5	10005
SMS	USERS	2001	1	2001
ACS	CONTROL FILES	300	3	900
SMS	REDO LOGS	100	16	1600
ACS	ACS_DATA	200	1	200
	ACS_INDEX	200	1	200
BE	BE_DATA	200	1	200
	BE_SUBS	2001	2	4002
	BE_SUBS_I	2001	1	2001
	BE_VOUCHERS	2001	1	2001
	BE_VOUCHERS_I	2001	1	2001
CCS	CCS_DATA	200	7	1400
	CCS_INDEX	200	2	400
	CCS_SUBS	2001	1	2001
	CCS_SUBS_I	2001	1	2001
	CCS_VOUCHERS	2001	2	4002
	CCS_VOUCHERS_I	2001	1	2001
SMS	SMF_DATA	100	1	100
	SMF_INDEX	100	1	100
UIP	UIS_DATA	200	1	200
	UIS_INDEX	200	1	200

Oracle Datafiles on the SLC

The following table provides details of the Oracle data files on the SLC for which sizing values should be reviewed.

Component	Tablespace Name	Data File Size (MB)	Number of Files	Total Size (MB)
SYSAUX	SYSAUX	500	1	500

Component	Tablespace Name	Data File Size (MB)	Number of Files	Total Size (MB)
SYSTEM	SYSTEM	2001	1	2001
TEMP	TEMP	2001	5	10005
TOOLS	TOOLS	2001	1	2001
UNDOTBS1	UNDOTBS1	2001	5	10005
SMS	USERS	2001	1	2001
ACS	CONTROL FILES	300	3	900
SMS	REDO LOGS	100	16	1600
ACS	ACS_DATA	200	1	200
	ACS_INDEX	200	1	200
CCS	CCS_SCP_DATA	200	2	400
	CCS_SCP_INDEX	200	2	400
	CCS_SCP_SUBS	2001	1	2001
	CCS_SCP_SUBS_I	2001	1	2001
LCP	LCP_DATA	200	1	200
	LCP_INDEX	200	1	200
MM	MMX_DATA	300	1	300
	MMX_INDEX	300	1	300
OSD	OSD_DATA	300	1	300
	OSD_INDEX	200	1	200
SMS	SMF_DATA	100	1	100
	SMF_DATA	100	1	100
UIS	UIS_CDR	2001	0	0
	UIS_CDR_INDEX	2001	0	0
	UIS_DATA	200	1	200
	UIS_INDEX	200	1	200
UPC	UPC_DATA	200	1	200
	UPC_INDEX	200	1	200

Memory Sizing for a Small Production System

The following table provides the estimated minimum memory requirements (in MB) for the NCC applications deployed on a small production system.

SGA Element	SMS	VWS	SLC
log_buffer	16	16	16
java_pool_size	150	0	0

SGA Element	SMS	VWS	SLC
shared_pool_size	512	128	128
pga_aggregate_target	512	128	128
large_pool_size	256	32	0
db_cache_size	256	128	32
db_keep_cache_size	4096	5012	2048
db_recycle_cache_size	2048	2048	0
db_32k_cache_size	2048	0	0
NCC applications	4096	4096	4096

Medium Production System Example

Introduction

This section provides examples of the minimum storage and memory sizing requirements for deploying the NCC applications in a medium sized production environment.

Disk Storage on the SMS

The following table describes the estimated minimum disk storage required on the SMS to deploy the NCC applications in a medium sized production environment.

Mount Point	Contents	Required Space (MB)	Block Overhead	Allocated Space (MB)	Total Mount Point Space (GB)
/oracle/datafiles	Core Oracle database	37418	2%	38166	677
	NCC application data files	109753	2%	111948	
	CCS BE EDRs stored in database	532266	2%	542911	
/oracle/redologs	Oracle redo logs	1600	2%	1632	2
/oracle/tempfiles	Oracle TEMP tablespace	30015	2%	30615	30
/u01	Oracle software	120	2%	5222	6
/oracle/archivelogs	Oracle archive logs	102400	2%	104448	102
/IN	NCC application	20480	2%	20890	55
	Incoming & processed EDR flat files	34180	2%	34863	
Grand Total				890696	872

Disk Storage on the VWS

The following table describes the estimated minimum disk storage required on the VWS to deploy the NCC applications in a medium sized production environment.

Mount Point	Contents	Required Space (MB)	Block Overhead	Allocated Space (MB)	Total Mount Point Space (GB)
/oracle/datafiles	Core Oracle database	17408	2%	17756	56
	NCC application data files	38218	2%	38982	
/oracle/redologs	Oracle redo logs	1600	2%	1632	2
/oracle/tempfiles	Oracle TEMP tablespace	10005	2%	10205	10
/oracle/archivelogs	Oracle archive logs	20480	2%	20890	21
/u01	Oracle software	5120	2%	5222	6
/IN		20480	2%	20890	21
Grand Total				115577	116

Disk Storage on the SLC

The following table describes the estimated minimum disk storage required on the SLC to deploy the NCC applications in a medium sized production environment.

Mount Point	Contents	Required Space (MB)	Block Overhead	Allocated Space (MB)	Total Mount Point Space (GB)
/oracle/datafiles	Core Oracle database	17408	2%	17756	31
	NCC application data files	13705	2%	13979	
/oracle/redologs	Oracle redo logs	1600	2%	1632	2
/oracle/tempfiles	Oracle TEMP tablespace	10005	2%	10205	10
/u01	Oracle software	5120	2%	5222	6
/IN		20480	2%	20890	21
Grand Total				69684	70

Additional Oracle Datafiles on the SMS

The following table provides details of the additional Oracle data files that will be used on the SMS. These data files are in addition to the minimum created automatically by the installation process for a test system.

Component	Tablespace Name	Data File Size (MB)	Number of Files	Total Size (MB)

Component	Tablespace Name	Data File Size (MB)	Number of Files	Total Size (MB)
TEMP	TEMP	2001	15	30015
UNDOTBS	UNDOTBS1	2001	15	30015
	UNDOTBS2	2001	15	30015
CCS	CCS_EVENT	2001	3	6003
	CCS_EVENT_I	2001	1	2001
	CCS_SUBS	2001	6	12006
	CCS_SUBS_I	2001	2	4002
	CCS_VOUCHERS	2001	10	20010
	CCS_VOUCHERS_I	2001	8	16008
SMS	SMF_ALARMS	2001	3	6003
	SMF_ALARMS_I	2001	2	4002
	SMF_AUD	2001	7	14007
	SMF_AUD_I	2001	1	2001
	SMF_STATS	2001	1	2001
	SMF_STATS_I	2001	2	4002

Partitioned Files on the SMS

The following table provides the estimated storage (in MB) for the partitioned tablespaces on the SMS in a medium sized production environment.

Partitioned Tablespace Name	File Size	Weekly Storage	Data Files Per Week	Weekly Partitions Allocated	Total Tablespace Size (MB)
CCS_CDR_Yyyyy_Www	2001	37700	19	13	532266

Additional Oracle Datafiles on the VWS

The following table provides details of the additional Oracle data files that will be used on the VWS. These data files are in addition to the minimum created automatically by the installation process for a test system.

Component	Tablespace Name	Data File Size (MB)	Number of Files	Total Size (MB)
BE	BE_SUBS	2001	3	6003
	BE_SUBS_I	2001	2	4002
	BE_VOUCHERS	2001	1	2001
	BE_VOUCHERS_I	2001	1	2001
CCS	CCS_DATA	200	5	1000
	CCS_INDEX	200	2	400

Component	Tablespace Name	Data File Size (MB)	Number of Files	Total Size (MB)
	CCS_SUBS	2001	4	8004
	CCS_SUBS_I	2001	1	2001
	CCS_VOUCHERS	2001	4	8004
	CCS_VOUCHERS_I	2001	2	4002

Additional Oracle Datafiles on the SLC

The following table provides details of the additional Oracle data files that will be used on the SLC in a medium production environment. These data files are in addition to the minimum created automatically by the installation process for test system.

Component	Tablespace Name	Data File Size (MB)	Number of Files	Total Size (MB)
CCS	CCS_SCP_DATA	200	2	400
	CCS_SCP_INDEX	200	2	400
	CCS_SUBS	2001	4	8004
	CCS_SUBS_I	2001	1	2001

Memory Sizing for a Medium Production System

The following table provides the estimated minimum memory requirements (in MB) for the NCC applications deployed in a medium sized production environment.

SGA Element	SMS	VWS	SLC
log_buffer	16	16	16
java_pool_size	150	0	0
shared_pool_size	512	128	128
pga_aggregate_target	512	128	128
large_pool_size	512	32	0
db_cache_size	512	128	32
db_keep_cache_size	8192	12960	6464
db_recycle_cache_size	8192	2048	0
db_32k_cache_size	8192	0	0
NCC applications	8192	8192	8192

Large Production System Example

Introduction

This section provides examples of the minimum storage and memory sizing requirements for deploying the NCC applications in a large production environment.

Disk Storage on the SMS

The following table describes the estimated minimum disk storage required on the SMS to deploy the NCC applications in a large production environment.

Mount Point	Contents	Required Space (MB)	Block Overhead	Allocated Space (MB)	Total Mount Point Space (GB)
Data files (shared / global)					
ASM +DATA Diskgroup	Core Oracle database	107453	2%	109602	2240
	NCC application data files	163780	2%	167056	
	CCS BE EDRs stored in database	1976988	2%	2016528	
ASM +REDO Diskgroup	Oracle redo logs	1600	2%	1632	2
ASM +TEMP Diskgroup	Oracle TEMP tablespace	50025	2%	51026	50
Other (shared / global)					
ASM +CRS Diskgroup	Oracle OCR	512	2%	522	1
ASM +CRS Diskgroup	Oracle voting	512	2%	522	1
/global/oracle	Oracle shared	10240	2%	10445	11
/global/IN	IN application logs	51200	2%	52224	51
/global/CCS	Processed EDR flat files	68359	2%	69727	69
/global/CDR	Incoming EDR flat files for CDRLoader1	17090	2%	17432	18
Other (private / local)					
/IN	NCC applications	20480	2%	20890	21
/u01	Oracle software	5120	2%	5222	6
ASM +ARCH1 Diskgroup	Oracle archive logs	102400	2%	104448	102
ASM +ARCH2 Diskgroup	Oracle archive logs	102400	2%	104448	102
Total					
Shared/Global				2549009	2495
Private/Local				261120	258

Mount Point	Contents	Required Space (MB)	Block Overhead	Allocated Space (MB)	Total Mount Point Space (GB)
Grand Total				2810129	2753

Disk Storage on the VWS

The following table describes the estimated minimum disk storage required on the VWS to deploy the NCC applications in a large production environment.

Mount Point	Contents	Required Space (MB)	Block Overhead	Allocated Space (MB)	Total Mount Point Space (GB)
/oracle/datafiles	Core Oracle database	17408	2%	17756	59
	NCC application data files	41820	2%	42656	
/oracle/redologs	Oracle redo logs	1600	2%	1632	2
/oracle/tempfiles	Oracle TEMP tablespace	10005	2%	10205	10
/oracle/archivelogs	Oracle archive logs	20480	2%	20890	21
/u01	Oracle software	5120	2%	5222	6
/IN		20480	2%	20890	21
Grand Total				119251	119

Disk Storage on the SLC

The following table describes the estimated minimum disk storage required on the SLC to deploy the NCC applications in a large production environment.

Mount Point	Contents	Required Space (MB)	Block Overhead	Allocated Space (MB)	Total Mount Point Space (GB)
/oracle/datafiles	Core Oracle database	17408	2%	17756	37
	NCC application data files	19708	2%	20102	
/oracle/redologs	Oracle redo logs	1600	2%	1632	2
/oracle/tempfiles	Oracle TEMP tablespace	10005	2%	10205	10
/u01	Oracle software	5120	2%	5222	6
/IN		20480	2%	20890	21
Grand Total				75807	76

Additional Oracle Datafiles on the SMS

The following table provides details of the additional Oracle data files that will be used on the SMS in a large production environment. These data files are in addition to the minimum created automatically by the installation process for a test system.

Component	Tablespace Name	Datafile Size (MB)	Number of Files	Total Size (MB)
TEMP	TEMP	2001	25	50025
UNDOTBS	UNDOTBS1	2001	25	50025
	UNDOTBS2	2001	25	50025
CCS	CCS_EVENT	2001	6	12006
	CCS_EVENT_I	2001	1	2001
	CCS_SUBS	2001	12	24012
	CCS_SUBS_I	2001	3	6003
	CCS_VOUCHERS	2001	19	38019
	CCS_VOUCHERS_I	2001	16	32016
SMS	SMF_ALARMS	2001	3	6003
	SMF_ALARMS_I	2001	2	4002
	SMF_AUD	2001	7	14007
	SMF_AUD_I	2001	1	2001
	SMF_STATS	2001	1	2001
	SMF_STATS_I	2001	2	4002

Partitioned Files on the SMS

The following table provides the estimated storage (in MB) for the partitioned tablespaces on the SMS in a large production environment.

Partitioned Tablespace Name	File Size	Weekly Storage	Data Files Per Week	Weekly Partitions Allocated	Total Tablespace Size (MB)
CCS_CDR_Yyyyy_Www	2001	75350	38	25	1976988

Additional Oracle Datafiles on the VWS

The following table provides details of the additional Oracle data files that will be used on the VWS in a large production environment. These data files are in addition to the minimum created automatically by the installation process for a test system.

Component	Tablespace Name	Data File Size (MB)	Number of Files	Total Size (MB)
BE	BE_SUBS	2001	3	6003
	BE_SUBS_I	2001	2	4002
	BE_VOUCHERS	2001	1	2001

Component	Tablespace Name	Data File Size (MB)	Number of Files	Total Size (MB)
	BE_VOUCHERS_I	2001	1	2001
CCS	CCS_DATA	200	4	800
	CCS_INDEX	200	1	200
	CCS_SUBS	2001	6	12006
	CCS_SUBS_I	2001	1	2001
	CCS_VOUCHERS	2001	4	8004
	CCS_VOUCHERS_I	2001	2	4002

Additional Oracle Datafiles on the SLC

The following table provides details of the additional Oracle data files that will be used on the SLC in a large production environment. These data files are in addition to the minimum created automatically by the installation process for a test system.

Component	Tablespace Name	Data File Size (MB)	Number of Files	Total Size (MB)
CCS	CCS_SCP_DATA	200	2	400
	CCS_SCP_INDEX	200	2	400
	CCS_SUBS	2001	6	12006
	CCS_SUBS_I	2001	2	4002

Memory Sizing for a Large Production System

The following table provides the estimated minimum memory requirements (in MB) for the NCC applications deployed in a large production environment.

SGA Element	SMS	VWS	SLC
log_buffer	16	16	16
java_pool_size	150	0	0
shared_pool_size	512	128	128
pga_aggregate_target	512	128	128
large_pool_size	512	32	0
db_cache_size	512	128	32
db_keep_cache_size	16384	17696	12368
db_recycle_cache_size	8192	2048	0
db_32k_cache_size	16384	0	0
NCC applications	8192	8192	8192

Node-Specific Users

Introduction

This section provides information on the node-specific users and the privileges they should have.

Users on SMS Database Instance

Ensure the SMS database instance contains a user called SMF with the following privileges:

GRANTEE	PRIVILEGE	ADMIN OPTION
SMF	ALTER ANY INDEX	YES
SMF	ALTER ANY PROCEDURE	YES
SMF	ALTER ANY ROLE	YES
SMF	ALTER ANY SEQUENCE	YES
SMF	ALTER ANY TABLE	YES
SMF	ALTER ANY TRIGGER	YES
SMF	ALTER TABLESPACE	NO
SMF	ALTER USER	NO
SMF	CREATE ANY DIRECTORY	NO
SMF	CREATE ANY PROCEDURE	NO
SMF	CREATE ANY SEQUENCE	NO
SMF	CREATE ANY SYNONYM	NO
SMF	CREATE ANY TABLE	NO
SMF	CREATE ANY TRIGGER	NO
SMF	CREATE ANY VIEW	NO
SMF	CREATE DATABASE LINK	NO
SMF	CREATE MATERIALIZED VIEW	NO
SMF	CREATE PROCEDURE	NO
SMF	CREATE PUBLIC SYNONYM	NO
SMF	CREATE ROLE	NO
SMF	CREATE SEQUENCE	NO
SMF	CREATE SESSION	YES
SMF	CREATE TABLE	NO
SMF	CREATE TABLESPACE	NO
SMF	CREATE TRIGGER	NO
SMF	CREATE TYPE	NO
SMF	CREATE USER	NO
SMF	CREATE VIEW	NO
SMF	DELETE ANY TABLE	YES
SMF	DROP ANY DIRECTORY	NO
SMF	DROP ANY INDEX	NO
SMF	DROP ANY PROCEDURE	NO
SMF	DROP ANY ROLE	NO
SMF	DROP ANY SEQUENCE	NO

GRANTEE	PRIVILEGE	ADMIN OPTION
SMF	DROP ANY TABLE	NO
SMF	DROP ANY VIEW	NO
SMF	DROP PUBLIC DATABASE LINK	NO
SMF	DROP PUBLIC SYNONYM	NO
SMF	DROP TABLESPACE	NO
SMF	DROP USER	NO
SMF	EXECUTE ANY PROCEDURE	NO
SMF	GRANT ANY PRIVILEGE	NO
SMF	GRANT ANY ROLE	NO
SMF	INSERT ANY TABLE	YES
SMF	SELECT ANY TABLE	YES
SMF	UNLIMITED TABLESPACE	NO
SMF	UPDATE ANY TABLE	YES

Users on SLC Database Instance

Ensure the SLC database instance contains a user called SCP with the following privileges:

GRANTEE	PRIVILEGE	ADMIN OPTION
SCP	ALTER ANY INDEX	YES
SCP	ALTER ANY PROCEDURE	YES
SCP	ALTER ANY ROLE	YES
SCP	ALTER ANY SEQUENCE	YES
SCP	ALTER ANY TABLE	YES
SCP	ALTER ANY TRIGGER	YES
SCP	ALTER TABLESPACE	NO
SCP	ALTER USER	NO
SCP	CREATE ANY DIRECTORY	NO
SCP	CREATE ANY PROCEDURE	NO
SCP	CREATE ANY SEQUENCE	NO
SCP	CREATE ANY SYNONYM	NO
SCP	CREATE ANY TABLE	NO
SCP	CREATE ANY TRIGGER	NO
SCP	CREATE ANY VIEW	NO
SCP	CREATE DATABASE LINK	NO
SCP	CREATE MATERIALIZED VIEW	NO
SCP	CREATE PROCEDURE	NO
SCP	CREATE PUBLIC SYNONYM	NO
SCP	CREATE ROLE	NO
SCP	CREATE SEQUENCE	NO
SCP	CREATE SESSION	YES

GRANTEE	PRIVILEGE	ADMIN OPTION
SCP	CREATE TABLE	NO
SCP	CREATE TABLESPACE	NO
SCP	CREATE TRIGGER	NO
SCP	CREATE USER	NO
SCP	CREATE VIEW	NO
SCP	DELETE ANY TABLE	YES
SCP	DROP ANY INDEX	NO
SCP	DROP ANY PROCEDURE	NO
SCP	DROP ANY ROLE	NO
SCP	DROP ANY SEQUENCE	NO
SCP	DROP ANY TABLE	NO
SCP	DROP PUBLIC DATABASE LINK	NO
SCP	DROP PUBLIC SYNONYM	NO
SCP	DROP TABLESPACE	NO
SCP	DROP USER	NO
SCP	EXECUTE ANY PROCEDURE	NO
SCP	GRANT ANY PRIVILEGE	NO
SCP	GRANT ANY ROLE	NO
SCP	INSERT ANY TABLE	YES
SCP	SELECT ANY TABLE	YES
SCP	UNLIMITED TABLESPACE	NO
SCP	UPDATE ANY TABLE	YES

Users on VWS Database Instance

Ensure the VWS database instance contains a user called E2BE_ADMIN with the following privileges:

GRANTEE	PRIVILEGE	ADMIN OPTION
E2BE_ADMIN	ALTER SESSION	YES
E2BE_ADMIN	CREATE ANY CONTEXT	NO
E2BE_ADMIN	CREATE ANY DIRECTORY	NO
E2BE_ADMIN	CREATE ANY TRIGGER	NO
E2BE_ADMIN	CREATE MATERIALIZED VIEW	NO
E2BE_ADMIN	CREATE PROCEDURE	NO
E2BE_ADMIN	CREATE PUBLIC SYNONYM	NO
E2BE_ADMIN	CREATE ROLE	NO
E2BE_ADMIN	CREATE SEQUENCE	NO
E2BE_ADMIN	CREATE SESSION	YES
E2BE_ADMIN	CREATE TABLE	NO
E2BE_ADMIN	CREATE TRIGGER	NO
E2BE_ADMIN	CREATE USER	NO
E2BE_ADMIN	CREATE VIEW	NO
E2BE_ADMIN	DROP ANY CONTEXT	NO

GRANTEE	PRIVILEGE	ADMIN OPTION
E2BE_ADMIN	DROP PUBLIC SYNONYM	NO
E2BE_ADMIN	DROP USER	NO
E2BE_ADMIN	GRANT ANY PRIVILEGE	NO
E2BE_ADMIN	GRANT ANY ROLE	NO
E2BE_ADMIN	UNLIMITED TABLESPACE	NO

Chapter 5

NCC Pre-Installation Tasks

Overview

Introduction

This chapter explains the tasks you should perform before installing Oracle Communications Network Charging and Control (NCC).

In this chapter

This chapter contains the following topics.

Preparing the System for Installation

About Preparing the System

To prepare the system before you install NCC, you log in to each node in turn as the root user, and perform the following tasks:

- (Optional) Disable automount for the top directory of the mount point for all entries in the **auto_home** map file. See *Disabling automount for the Home Directory* (on page 44).
- Enable remote login for the root user. See *Enabling Remote Login* (on page 44).
- Configure the log notice alarms. See *Configuring Where to Log Notice Alarms* (on page 45).
- Configure the directory to use for reporting core dumps and storing core files. See *Configuring Core Dump Reporting* (on page 45).
- Disable any unnecessary system services. See *Disabling System Services* (on page 46).
- Open ports to NCC in your Linux firewall. See *Opening Ports in Your Linux Firewall* (on page 47).
- Ensure machines automatically boot following a temporary power loss. See *Configuring Machines to Boot Automatically* (on page 48).
- Enable the SSH root login. See *Enabling SSH Root Login* (on page 48).
- Ensure Java 1.8 is installed. See the Oracle Java documentation.
- Configure the SSH SMF service. See *Configuring the SSH SMF Service* (on page 49).
- Configure the **/etc/system** file to make buffer-overflow attacks more difficult. See *Preventing Buffer Overflow Attacks* (on page 49).
- Disable the keyboard abort sequence. See *Disabling Keyboard Abort Sequence* (on page 49).
- Create the **/IN** Directory. See *Creating the /IN Directory* (on page 50).

NCC Installation Options

You can install NCC in the GUI mode (using Oracle Universal Installer) or in silent mode.

- **GUI mode:** Use the GUI mode when you want to interact with the Installer during installation. See *Installation Types*.
- **Silent mode:** Use the silent mode when you are installing NCC using the same configuration repeatedly. The silent mode does not use the GUI and it runs in the background. See *Installing NCC in Silent Mode* for more information.

Disabling automount for the Home Directory

(Optional) Disable `automount` for each node's *home* top directory, where *home* is the highest level directory used for installation. Disabling automount for this location allows you to create an Oracle user for the database administrator in the *home* directory.

Follow these steps to disable `automount` for the *home* directory.

Step	Action
1	Open the following file in a text editor: For Solaris: **`/etc/auto_master`** For Linux: **`/etc/auto.master`**
2	Comment out the line containing `auto_home` by inserting **#** at the beginning of the line. For example: **#** `/home  auto_home -nobrowse`
3	Save and close the file.
4	Restart autofs to remount the file system by running the command: For Solaris: /usr/sbin/svcadm restart autofs For Linux: systemctl restart autofs.service
5	Create a symbolic link **/export/home** to **/home** by running the command: **`ln -s /home /export/home`** **Result:** This allows you to write to both the **/export/home** and the **/home** directories. Note: If **/export** does not exist, create one before linking **/home** by running: **`mkdir /export`**

Enabling Remote Login

In Solaris, comment out the following line in the **/etc/default/login** file by inserting **#** at the beginning of the line:

`CONSOLE=/dev/console`

This enables you to log in remotely as the root user from every remote client.

Configuring Where to Log Notice Alarms

Configure where to log notice alarms, which contain informational messages that are generated during the installation process.

Follow these steps to log notice level alarms.

Step	Action
1	Open the following file in a text editor: For Solaris: **/etc/syslog.conf** For Linux: **/etc/rsyslog.conf**
2	Add the following line: For Solaris: **`*.notice;kern.debug;daemon.notice;mail.crit`** *logfile* where *logfile* is the log file name including the absolute path; for example, **/var/adm/messages**. For Linux: **`*.=notice;kern.=debug;daemon.=notice;mail.=crit`** *logfile* where *logfile* is the log file name including the absolute path; for example, **/var/log/messages**.
3	Save and close the file.
4	For Linux only, restart logging by running the command: systemctl restart rsyslog.service

Configuring Core Dump Reporting

On Linux

1. In /etc/profile, if there is a **`ulimit -S -c 0`** command, change it to or add the following command:

   `ulimit -S -c unlimited > /dev/null 2>&1`
   This will set the soft limit for core files to be unlimited.

2. In /etc/security/limits.conf, set:

   * soft core unlimited

3. In /etc/sysctl.conf, define the path of the core dump and the file name format for core files:

```
kernel.core_pattern = /var/crash/core-%h-%p-%e
where the format specifiers are
%h - system hostname
%p - PID of dumped process
%e - executable file name
```

4. In /etc/sysctl.conf, set **`fs.suid_dumpable`** to 2 to make core dumps readable by root only:

```
fs.suid_dumpable = 2
```
   Load the changed sysctl settings:

```
# sysctl -p
```

5. In /etc/abrt/abrt-action-save-package-data.conf, set the following:

   `OpenGPGCheck = no` (to collect core dumps from unsigned packages)

ProcessUnpackaged = yes (to collect core dumps from unpackaged software)

6. Restart the abrtd daemon.

   For Oracle Linux 7:

```
/bin/systemctl restart abrtd.service
/bin/systemctl restart abrt-ccpp.service
```

On Solaris

The following command sets the init core file pattern for core dump reporting.

```
coreadm -i core. %f.%p
```

Set up the coreadm to report core dumps and to store core files in a defined directory.

Use the following commands to report core dumps and store core files in the **/var/crash** directory:

```
/usr/bin/coreadm -g /var/crash/core-%n-%p-%f -e global
/usr/bin/coreadm -e global-setid
/usr/bin/coreadm -d proc-setid
/usr/bin/coreadm -d process
/usr/bin/coreadm -e log
/usr/bin/coreadm -u
```

Important: You should use a dedicated volume for storing core files to ensure that other system, or application directories, are not affected if this directory becomes full.

Disabling System Services

You can disable the following system services, if they are not needed:

- FTP
- Telnet
- Rlogin
- Sendmail

For Solaris, use the **svcadm** command to disable the system services.

Example commands:

```
svcadm disable ftp
svcadm disable telnet
svcadm disable rlogin
svcadm disable sendmail
```

For Linux, use the **systemct1** command to disable the system services.

Example commands:

systemctl stop ftp.service

systemctl stop telnet.service

systemctl stop rlogin.service

systemctl stop sendmail.service

systemctl disable -now ftp.service

Opening Ports in Your Linux Firewall

ollow these steps to open ports in your Linux firewall.

Step	Action
1	Log in as the root user.
2	Run the following command to configure the tables provided by the Linux kernel firewall: **`yum install iptables-services`**
3	Run the following command to view your firewall's current configuration: **`iptables -L`**
4	Run the following command for each NCC port through which the firewall should accept incoming traffic: **`iptables -A INPUT -p tcp --dport`** *`portNumber`* **`-j ACCEPT`** where *portNumber* is the NCC port through which the firewall accepts incoming traffic. For more information on ports, see *List of Ports Used by NCC* (on page 47). The new configuration rule is added to your firewall rules table.
5	Run the following command to save the configuration in the firewall rules table: **`/sbin/service iptables save`**
6	Run the following command to reinitialize the iptables service: **`service iptables restart`** The configuration changes take effect after you reinitialize the iptables service.
7	Run the following command to backup your firewall rules table to an external file: **`iptables-save >`** *`filename`* where *filename* is the path and name of the file in which to save your firewall rules table. You can use this file to distribute the firewall rules table to other nodes or to restore your firewall rules table after a system reboot.

Important: Your changes to the firewall rules table are lost after a system reboot. After a system reboot, you must re-open the ports in your Linux firewall by running the following command:

`iptables-restore <` *`filename`*

where *filename* is the path and name of the file you saved in step 7.

List of Ports Used by NCC

The following table lists the ports used by NCC.

Port Number	Description
25	Email client port
53	ENCA port
80	acsStatisticsDBInserter, acsStatsMaster, and acsStatsLocal port
161	smsAlarmRelay port
1490	Used by ACS
1495	ccsSSMMaster port
1500	ccsMFileCompiler and beServer port
1521	SQL*Net port
1812	radiusControlAgent core port
1813	radiusControlAgent accounting port

Port Number	Description
2003	SEI EMI report port
2027	ccsVWARSExpiry and ccsExpiryMessageGenerator port CCS GPG key import screens, cmnPushFiles/cmnReceiveFiles for CCS EDRs
2028	cmnPushFiles/cmnReceiveFiles for ACS EDRs
2031	cmnPushFiles/cmnReceiveFiles for UIS EDRs
2484	Oracle database secure listening port
2500	Email server port
2999	piClientIF port
3033	SMPP remote port
3072	smsTrigDaemon and xmlTcapInterface port
3615	SCA remote communication port
3799	radiusControlAgent dynamic authorization port
3868	diameterControlAgent and diameterBeClient listening port
4099	dapIF listening port
5060	SCA TCP and UDP port
5096	XMS TCP and UDP port
5556	ccsBeOrb naming server port
7654	sigtran_monitor_daemon listening port
7669	smsCompareResyncServer
8888	smsInterface port
9999	xmlInterface port
12343	smsMaster and updateLoader port
12344	smsCompareResyncClient port
12696	VWS node port
14875	m3uaCdmaGateway test interface port
14876	m3uaCdmaGateway soak test interface port

Configuring Machines to Boot Automatically

On Solaris, set the **`eeprom auto-boot`** parameter value to **true** using the following command. This will ensure that the machine will automatically boot following a temporary power loss, such as a power outage.

Example

```
eeprom "auto-boot?"=true
```

Enabling SSH Root Login

Follow these steps to enable SSH root login.

Step	Action
1	In the **/etc/ssh/sshd_config** file, set the `PermitRootLogin` parameter value to **`yes`**.
2	Save and close the file.

Step	Action
3	Run the following command: For Solaris: $ **svcadm -v restart svc:/network/ssh:default** For Linux: $ **systemctl restart ssh.service**

Configuring the SSH SMF Service

Run the following commands to configure the SSH SMF service to ensure the SSH daemon is running in **/milestone/multi-user** mode (run-level 2):

For Solaris:

```
svccfg -s network/ssh delprop dependents/ssh_multi-user-server
svccfg -s network/ssh setprop dependents/ssh_multi-user = fmri: /milestone/multi-
user
svccfg: Type required for new properties
svcadm refresh network/ssh
svcadm restart network/ssh
```

Installing HTTPD

Follow these steps to install HTTPD.

Step	Action
1	Login as root user.
2	Do one of the following: • For Solaris, run the following commands: **# pkg install web/server/apache-22** **# svcadm enable /network/http:apache22** • For Linux, do the following: a) Set SELinux to Permissive. b) Run the following commands: **# yum install httpd** **# service httpd start**

Preventing Buffer Overflow Attacks

For Solaris, ensure that the following line in the **/etc/system** file is set to **1**:

```
set noexec_user_stack = 1
```

This makes buffer-overflow attacks more difficult by marking the stack as non-executable.

For Linux, no settings are required.

Disabling Keyboard Abort Sequence

For Solaris, ensure that the following line in the **/etc/default/kbd** file is set to **disable**:

```
KEYBOARD_ABORT=disable
```

This permanently changes the software default effect of the keyboard abort sequence.

For Linux, no settings are required.

Creating Users

The following sections explain the procedures to create users and groups in each NCC node.

The NCC application requires a single user of any given name to operate. A default username of 'smf_oper' is provided, but can be changed at install time. The NCC_runtime_user can invoke the NCC installation, but this is not mandatory. If you select to use a different user, then it is mandatory to first create the NCC_runtime_user.

User profiles

If you plan to run the NCC application as a different NCC_runtime_user to the default, it is required to either set:

1. The home directory of the NCC_runtime_user to '/IN/service_packages/SMS'
2. Add the following line entry to the .profile of the NCC_runtime_user so the correct environment is configured automatically at login following the installation.

```
if [ -f /IN/service_packages/SMS/.profile-??* ]; then
. /IN/service_packages/SMS/.profile-??*;
fi
```

Creating esg group for Each Node

Follow these steps to create esg group for each NCC Node:

Step	Action
1	Login as root user.
2	Run the following command to create the esg group: **/usr/sbin/groupadd -g** *gid* **esg** where *gid* is a unique group id for the operating system

Creating the /IN Directory

Follow these steps to create the **/IN** directory. The directory must be accessed through the primary user account installing NCC.

Step	Action
1	Log in as the root user.
2	Run the following command: $ **mkdir /IN**
3	Run the following command to set the permissions for the **/IN** directory: **chmod 775 /IN** **chown** *NCC_installation_user*:**esg /IN**

About Checking Prerequisite Requirements

Verify that your system meets prerequisite requirements before you install NCC. The installer includes a prerequisite check mode that performs the following tests:

- The system meets minimum software and hardware requirements
- The esg group exists

- The Oracle user, NCC_runtime_user and NCC_installation_user exists and belongs to the esg group and the group that owns the Oracle database (for example 'dba').
- The **/IN** directory exists and has readable, writable, and executable (775) file permissions
- JAVA_HOME and JAVA_HOME/bin should be set in PATH variable, so that java executable can be accessed from any location

Perform a prerequisite check by running the following command on each NCC node:

touch *oraInvFile*

java -jar ./nccInstaller_*platform*.**jar -invPtrLoc** *oraInvFile* **-prereqchecker -silent -entryPoint** *nodeType*

where:

- *platform* is **Linux** or **SunOS**.
- *oraInvFile* is the name and location of the Oracle Inventory file (**/IN/oraInst.loc**). You can point to the default file created by the Oracle Database installer. If the NCC installation user account cannot read the default file, create an **oraInst.loc** file in a writeable location.
- *nodeType* is the type of test to perform. Valid values are shown in the following table:

nodeType Value	Tests Performed
minimum	• Checks that all users and groups have been created. • Checks that the **/IN** directory exists.
sms	• Checks that all users and groups required by the SMS have been created. • Checks that the **/IN** directory exists.
slc	• Checks that all users and groups required by the SLC have been created. • Checks that the **/IN** directory exists. • Check SLC software dependencies.
vws	• Checks that the users and groups required by the VWS have been created. • Checks that the **/IN** directory exists. • Check VWS software dependencies.

During the prerequisite check process, the installer informs you whether your system passes each test by using one of the following settings:

Setting	Description
Passed	Your node passed the specified test.
Failed	Your node did not pass the specified test. This setting is for informational purposes only. It does not prevent you from installing NCC.
Not executed	The installer could not perform the specified test. This output includes additional information about how to perform the test manually.

The following shows sample output from the **nccInstaller**_*platform*.**jar** script when *nodeType* is set to **slc**:

```
Preparing to launch the Oracle Universal Installer from /var/tmp/OraInstall2019-10-
16_12-08-34PM
Oracle Prerequisite Checker Version 13.9.4.0.0 Production
Copyright (C) 1999, 2019, Oracle. All rights reserved.

Starting execution of prerequisite checks
Total No of checks: 9
```

```
Performing check for CheckEsgGroupExists
Checking OS group esg exists.
Check complete. The overall result of this check is: Passed


Check complete: Passed
=============================================================
Performing check for CheckUserBelongsToEsgGroup
Checking you belong to the OS esg group.
Check complete. The overall result of this check is: Passed


Check complete: Passed
=============================================================
Performing check for CheckOracleBelongsToEsgGroup
Checking oracle user belongs to the OS esg group.
Check complete. The overall result of this check is: Passed


Check complete: Passed
=============================================================
Performing check for checkUserBelongsToDbaGroup
Checking you belong to the OS database group.
Check complete. The overall result of this check is: Passed


Check complete: Passed
=============================================================
Performing check for CheckDirectoryExists
Checking /IN directory exists and has 775 permisions.
Check complete. The overall result of this check is: Passed


Check complete: Passed
=============================================================
Performing check for CheckPortalDirectoryExists
Checking the BRM SDK is installed (PortalDevKit 7.5).
Check complete. The overall result of this check is: Passed


Check complete: Passed
=============================================================
Performing check for CheckXinetdExists
Checking xinetd (linux) or inetd (solaris) are installed.
Check complete. The overall result of this check is: Passed


Check complete: Passed
=============================================================
Performing check for CheckLksctpExists
Checking lksctp-tools exists (linux only)
Check complete. The overall result of this check is: Passed


Check complete: Passed
=============================================================
Performing check for CheckMemory
Checking system memory:must be greater than or equal to 8GB.
Check complete. The overall result of this check is: Passed


Check complete: Passed
=============================================================
```

```
PrereqChecks complete

The log(s) can be found here: /var/tmp/OraInstall2019-10-16_12-08-34PM.
```

Installing a Browser

Browser and Java for NCC UI

To enable you to access the NCC UI, ensure that the required Java version and the browser listed in the following table are installed on your client system.

Note: NCC supports client systems that use Windows XP or higher.

Browser/Java	Description
Java	Java 8u181 or later
Browser	Any browser supporting the required Java version, such as IE 8 or higher

Installing and Configuring Oracle Database

About Installing and Configuring Oracle Database

You need to install Oracle Database Server on all nodes:

- Enterprise Edition for SMS or Standard Edition for non-partitioned deployments
- Standard Edition for all other nodes (SLC, VWS1, VWS2)

Installing the Oracle Database Software

You can install Oracle database for NCC in the following ways:

- Install Oracle database on remote host.
- Install Oracle database on local host.

Install Oracle Enterprise Database Server 12c Release 2

For detailed installation instructions, see *Database Installation Guide for Oracle Solaris*.

Oracle Database Software Installation Guidelines

Follow these guidelines when installing Oracle Enterprise Database software.

Installation Entity	Guideline Value
Oracle Software Owner User	Username: **oracle** Home directory: **/home/oracle**
OSDBA Group	**dba**
Oracle Base Directory (ORACLE_BASE)	**/u01/app/oracle**
(Oracle 12*c* database only*)* Oracle 12*c* Home Directory (ORACLE_HOME)	**/u01/app/oracle/product/12.2.0**

Installation Entity	Guideline Value
Oracle database datafile directory	**/oracle/datafiles**

Oracle user **.profile** (**/home/oracle/.profile**)	Configure the **oracle** user's **.profile** file with the following variables consistent with your environment.
	
	`# Set up terminal, non-interactive, default vt100`
	`TERM=vt100`
	`export TERM`
	
	`if [ -t 0 ] ; then`
	`  # Set some options`
	`  set -o vi`
	`  stty erase "^H" kill "^U" intr "^C" eof "^D"`
	`  stty hupcl ixon ixoff`
	`  set -o vi`
	`fi`
	
	`umask 022`
	
	`MAIL=/usr/mail/${LOGNAME:?}`
	`export MAIL`
	
	`ORACLE_BASE=/u01/app/oracle`
	`export ORACLE_BASE`
	
	`ORACLE_HOME=$ORACLE_BASE/product/`*`release_version`*
	`export ORACLE_HOME`
	
	`LD_LIBRARY_PATH_64=$ORACLE_HOME/lib`
	`export LD_LIBRARY_PATH_64`
	
	`LD_LIBRARY_PATH=$ORACLE_HOME/lib`
	`export LD_LIBRARY_PATH`
	
	`PATH=$PATH:$ORACLE_HOME/bin:/usr/bin:/etc:/usr/ccs/bin:/usr/openwin/bin:/usr/local/bin:/usr/sbin`
	`EDITOR=vi`
	`export EDITOR`
	
	`ORACLE_SID=[SMF|SCP|E2BE]`
	
	where *`release_version`* is 12.2.0
	
	Note: ORACLE_SID must be set to one of:
	• **SMF** for SMS node
	• **SCP** for SLC nodes
	• **E2BE** for VWS nodes
	
	`export ORACLE_SID`
	`(Solaris only)ulimit -s unlimited`
	`ulimit -n 4096`
	`export PATH`

Installation Entity	Guideline Value

Global profile (**/etc/profile**)	Configure your system's global profile as required for your environment. For example,
	`PS1='${LOGNAME}@$(/usr/bin/hostname):$([[ "${LOGNAME}" == "root" ]] && printf "%s" "${PWD}# " \|\| printf "%s" "${PWD}$ ")'`
	`ORACLE_BASE=/u01/app/oracle`
	`export ORACLE_BASE`
	`ORACLE_HOME=$ORACLE_BASE/product/`*`release_version`*
	`export ORACLE_HOME`
	`ORACLE_CLIENT_HOME=$ORACLE_HOME`
	`export ORACLE_CLIENT_HOME`
	`LD_LIBRARY_PATH=$ORACLE_CLIENT_HOME/lib:$LD_LIBRARY_PATH`
	`export LD_LIBRARY_PATH`
	`PATH=$PATH:$ORACLE_HOME/bin`
	`export PATH`
	`ORACLE_SID=[SMF|SCP|E2BE]`
	Where *release_version* is 12.2.0
	Note: ORACLE_SID must be set to one of:
	• **SMF** for SMS node
	• **SCP** for SLC nodes
	• **E2BE** for VWS nodes
	`export ORACLE_SID`

System resources for Oracle (Solaris only)	Set the following parameters and create a project for the **oracle** user on your system:
	`max-shm-memory = 16G`
	`max-sem-ids = 100`
	`max-sem-nsems = 256`
	`max-shm-ids = 100`
	Create a project for this as follows:
	`# projadd -U oracle -K "project.max-shm-memory=(priv,16G,deny)" group.dba`
	`# projmod -sK "project.max-sem-ids=(priv,100,deny)" group.dba`
	`# projmod -sK "process.max-sem-nsems=(priv,256,deny)" group.dba`
	`# projmod -sK "project.max-shm-ids=(priv,100,deny)" group.dba`

Installation Entity	Guideline Value

System resources for Oracle (Linux only)	**1** Determine the sum of process parameters for all database instances on the system, the overhead for Oracle background processes, the system and other application requirements.
	2 Set semmns (total semaphores system-wide) to the larger of the value in 1 or 32000.
	3 Set semmsl (semaphores per set) to 250.
	4 Set semmni (total semaphore sets) to semmns/semmsl rounded up to the nearest multiple of 1024.
	5 For Linux and Oracle 10.2-12.2, set the maximum number of asynchronous I/O requests allowed in /etc/sysctl.conf as follows:
	`fs.aio-max-nr = 3145728`
	After changing the /etc/sysctl.conf, run the following command as root to set the values in the system:
	`# /sbin/sysctl -p /etc/sysctl.conf`

Oracle Server Installation Guidelines

Follow these guidelines when using Oracle Universal Installer to install Oracle 12*c* on all nodes.

Installation Option	Guideline Values
Installation Method	Basic
Installation Type	Enterprise edition for partitioned SMS nodes Standard editions for VWS, SLC, and non-partitioned SMS nodes
Create Starter Database	No
Configuration Option	Install database software only

Oracle 12c Client Installation Guidelines

Follow these guidelines when using Oracle Universal Installer to install the Oracle 12*c* Release 2 client.

Installation Option	Guideline Values
Installation Type	Custom
Download Software	Skip software updates
Available Product Components	Oracle Database Utilities, Oracle Net Listener
Oracle Net Configuration Assistant	Oracle Net configuration is not needed. When prompted by the Oracle Net Configuration Assistant, cancel the assistant by clicking **Cancel** and confirming you want to cancel the assistant.

Configuring the Oracle Database to Start Automatically

You should implement startup scripts to automatically start the local database instance on system startup.

You can use the **/etc/init.d/oracleDB.sh** example Oracle startup and shutdown scripts to configure the system to start the Oracle database automatically on startup (and shut down automatically on system shutdown).

You should configure automatic startup for the Oracle database at system run level 2 instead of the default run level 3. Automatic shutdown can be configured for run levels 0 and 1 as well. You create symbolic links in the appropriate run level directories to the example startup and shutdown scripts.

To configure automatic startup and shutdown for using the example scripts, log in as the root user, and run the following commands:

For Solaris, see the discussion about automating shutdown and startup in *Oracle Database Administrator's Reference for Linux and UNIX-Based Operating System*.

For Linux:

```
chmod 700 /etc/init.d/dbora.sh
ln -s /etc/init.d/dbora.sh /etc/rc0.d/K10oracle
ln -s /etc/init.d/dbora.sh /etc/rc1.d/K10oracle
rm -f /etc/rc2.d/K10oracle
ln -s /etc/init.d/dbora.sh /etc/rc2.d/S99oracle
rm -f /etc/rc3.d/S99oracle
```

Note: After entering these commands, the symbolic link between **/etc/init.d/oracleDB.sh** and **K10oracle** in the **/etc/rc0.d** and the **/etc/rc1.d** directories mean that the Oracle instance will be stopped when the system is set to an init level below 2.

Oracle Database Instances

You can opt to automatically create Oracle database instances during the installation of the NCC software packages. A single database instance is created on each NCC node.

The following table shows the mapping between each node type and the named database instance on the node.

Node Type	Database Instance
SMS	SMF
VWS	E2BE
SLC	SCP

Setting Database Parameters for SMS Databases

Oracle recommends setting the following database parameters in the underlying databases used by Service Management System (SMS) nodes.

Database Parameter	Guideline Value
JOB_QUEUE_PROCESSES	**20**

To set the database parameters for SMS databases:

Step	Action
1	Ensure that you have SYSDBA privileges.
2	Go to the computer on which the Oracle database is installed.
3	Start SQL*Plus: `C:\> sqlplus /NOLOG`
4	Connect to the database as SYSDBA: `SQL> CONNECT / AS SYSDBA`

Step	Action
5	Set the **JOB_QUEUE_PROCESSES** initialization parameter to: `ALTER SYSTEM SET JOB_QUEUE_PROCESSES=20 SCOPE=BOTH`
6	Shut down Oracle database: `SQL> SHUTDOWN`
7	Restart Oracle database: `SQL> STARTUP`
8	Exit SQL*Plus: `SQL> EXIT`

Installing and Configuring BRM SDK

The Oracle Communications Billing and Revenue Management (BRM) SDK must be installed before installing NCC. This is not delivered with NCC and must be installed separately. See *NCC BRM Charging Driver Technical Guide* for details.

BRM SDK 7.5.0.21.0 must be installed for NCC 12.0.3 release. Further copy 64 bit libraries libnzsdk64.so, libpcmext64.so and libportal64.so into BRM SDK installed 'lib' directory with proper permissions.

Chapter 6

Installing NCC

Overview

Introduction

This chapter describes how to install Oracle Communications Network Charging and Control (NCC). Before you install NCC, read the following chapters:

- NCC Installation Overview
- Planning Your NCC Installation
- NCC System Requirements
- Advanced Storage and Memory Sizing
- NCC Pre-Installation Tasks

In this chapter

This chapter contains the following topics.

NCC Installation Types

When installing NCC in the GUI mode, you can select the type of installation:

SMS Node: Service Management System (SMS) installs the NCC SMS application and the SMS database. See *Installing NCC on the SMS Node Using the GUI* (on page 59).

SLC Node: Service Logic Controller (SLC) installs the NCC SLC application and the SLC database. See *Installing NCC on the SLC Node Using the GUI* (on page 63).

SLC With Test Tools: Service Logic Controller (SLC) installs the NCC SLC application, the SLC Test Tools, and the SLC database. See *Installing NCC on the SLC with Testing Tools Node Using the GUI* (on page 65).

VWS Node: Voucher and Wallet Server (VWS) installs the NCC application, the VWS database, and the VWS application. See *Installing NCC on the VWS Node Using the GUI* (on page 68).

Installing NCC on the SMS Node Using the GUI

Install NCC on either an Oracle Solaris 11.3 (64-bit) server or an Oracle Linux 7.3 server.

To install NCC on an SMS node:

Step	Action
1	Log in as the root user.
2	Create a **NCC** sub-directory in the **/var/spool/pkg** directory: **cd /var/spool/pkg** **mkdir NCC** **Note:** The amount of space available in this directory must be at least three times the size of the archive. For example, if the archive is 500 MB, the temporary directory should be at least 1500 MB.
3	Go to the Oracle software delivery Web site: http://edelivery.oracle.com/ and download the **NCC_v12_0_3_*platform*.zip** software pack to the **/var/spool/pkg/NCC** directory, where *platform* is **Linux** or **SunOS**.
4	Go to the **/var/spool/pkg/NCC** directory and unzip the **NCC_v12_0_3_*platform*.zip** file: **unzip NCC_v12_0_3_*platform*.zip**
5	Log in as the user (non-root) installing NCC. **Note:** Ensure that the non-root user installing NCC has access to the esg and Oracle database group (e.g. dba).
6	Run the following commands: **export DISPLAY=*IP_address*:0** **export JAVA_HOME=*Java_home*** where: • *IP_address* is the IP address of the computer on which you run the SMS GUI. • *Java_home* is the directory in which JDK 1.8 is installed.
7	Ensure that the SMS node meets all prerequisites by running the following commands: **touch /IN/oraInst.loc** **java -jar ./nccInstaller_*platform*.jar -invPtrLoc /IN/oraInst.loc -prereqchecker -silent -entryPoint sms**
8	Do one of the following: • To start the Installer: **java -jar ./nccInstaller_*platform*.jar -invPtrLoc /IN/oraInst.loc** • To start the Installer and create a silent installer response file during the installation: **java -jar ./nccInstaller_*platform*.jar -logLevel finest -record -destinationFile** *path* where *path* is the response file location. The installer screen appears.
9	Click **Next**. The Installation Location screen appears.
10	In the **Name** field, enter **/IN**.

Step	Action
11	Click **Next**. The Installation Type screen appears. **Note:** The NCC installer creates an **oraInventory** directory if it does not detect any installed Oracle products on the system. The **oraInventory** directory contains information about all Oracle products installed on your system. You can find the default location of the **oraInventory** directory by opening the **/etc/oraInst.loc** (Linux) file or the **/var/opt/oracle/oraInst.loc** (Solaris) file.
12	Select **SMS**.
13	Click **Next**. The Oracle User screen appears.
14	In the **Oracle DB Owner** field, retain the default **oracle**, which is the user name with permissions to create the Oracle database instance. Verify the **Oracle DB Group** field. Specify the NCC runtime user in the **Application Owner** field. Click **Next**. The Database Server Paths screen appears.
15	Confirm one of the following: **The database, schema, and application will be installed.** Select this option to install all items on the same node. **The database already exists and both the schema and application will be installed.** Select this option if you have already created the database including datafiles on this or a remote node but not the database schema or application. **The database and schema already exists and only the application will be installed**. Select this option if the database and schema already exists on this or a remote node and you want to only install the application.
16	If you are installing all items on the same node: In the **Base directory** field, retain the default, **/u01/app/oracle.** In the **Oracle home directory** field, enter **/u01/app/oracle/product/12.2.0**. In the **Datafile directory** field, enter the path to the **datafiles** directory in which to create NCC database instance data files. In the **Redolog directory** field, enter the path to the **redolog** directory in which to create NCC database redo log files. Click **Next**. In the **Oracle database password** field, enter the password for the Oracle database administrative accounts. In the **Confirm password** field, enter the password again to confirm. **Note**: If the password is less than 8 characters, a warning appears. You can click **OK** to proceed.
17	If items already exist on the same or remote node: In the **Oracle client home directory** field, enter **/u01/app/oracle/product/12.2.0**. In the **Oracle SID** field, enter **SMF.** In the **Database hostname** enter the host where the database is located. In the **Oracle database password** field, enter the password for the Oracle database administrative accounts on associated with the **Database hostname**.

Step	Action
18	In the **Screen superuser password** field, enter the password for the SMS GUI administrator account.
	Note: The password must match the password for the Oracle database installed on the SMS node.
19	In the **Confirm password** field, enter the password again to confirm.
20	Click **Next**.
	The PI Admin screen appears.
21	In the **PI admin password** field, enter the password for the PI administrator user account.
22	In the **Confirm password** field, enter the password again to confirm.
23	Click **Next.**
	The SMS EDR Paths screen appears.
24	In the **CDR Loader Input directory** field, retain the default path to the directory of a single system to store CDR input files.
25	In the **CDR Loader Output directory** field, retain the default path to the directory of a single system to store CDR output files.
26	Click **Next**.
	The Default Template Screen appears.
	If you want the default templates to be installed, check the Install PCST checkbox, else uncheck the Install PCST checkbox.
27	Click **Next**.
	The System Currency Details screen appears.
28	Set the following fields:
	Base Value - default is 100
	Big Symbol - default is $
	Little Symbol - default is c
	Separator - default is .
29	Click **Next**.
	Prerequisite check screen appears.
30	Based on the OS, few prerequisite checks are performed on clicking **Next**.
	The Installation Summary screen appears.
31	Review the selections you have made in the preceding screens, and click **Install.**
	The Installation Progress screen appears.
32	Click **Next**.
	The Installation Complete screen appears.
33	Click **Finish**.
34	Log onto the SMS as the root user.
	`cd /IN/bin`
	`./postinstallRoot.sh [-n]`
	where -n is an optional flag. It is used to indicate if NCC will be installed without a VWS node.
	Note: You can reuse the script at any time to complete or retry failures occurring on previous invocations.

Step	Action
35	Log onto the SMS as the NCC_runtime user (the user that was given in step 15 for application owner field). **cd /IN/bin** **./postinstallUser.sh** The script will prompt for information to be used as part of the runtime configuration. **Note**: You can reuse the script at any time to complete or retry failures occurring on previous invocations.

Installing NCC on the SLC Node Using the GUI

Install NCC on either an Oracle Solaris 11.3 (64-bit) server or Oracle Linux 7.3 server.

Note: Ensure that SMS is installed before installing SLC.

To install NCC on the SLC node:

Step	Action
1	Log in as the root user.
2	Create a **NCC** sub-directory in the **/var/spool/pkg** directory: **cd /var/spool/pkg** **mkdir NCC** **Note:** The amount of space available in this directory must be at least three times the size of the archive. For example, if the archive is 500 MB, the temporary directory should be at least 1500 MB.
3	Go to the Oracle software delivery Web site: http://edelivery.oracle.com/ and download the **NCC_v12_0_3_0_0_*platform*.zip** software pack to the **/var/spool/pkg/NCC** directory, where *platform* is **Linux** or **SunOS**.
4	Go to the **/var/spool/pkg/NCC** directory and unzip the **NCC_v12_0_3_0_0_*platform*.zip** file: **unzip NCC_v12_0_3_0_0_*platform*.zip**
5	Log in as the user (non-root) installing NCC, and go to the **/var/spool/pkg/NCC** directory. **Note:** Ensure that the non-root user installing NCC has access to the esg and Oracle database group (e.g. dba).
6	Run the following commands: **export DISPLAY=*IP_address*:0** **export JAVA_HOME=*Java_home*** where: • *IP_address* is the IP address of the computer on which the NCC GUI installer appears. • *Java_home* is the directory in which JDK 1.8 is installed.
7	Ensure that the SLC node meets all prerequisites by running the following command: **touch /IN/oraInst.loc** **java -jar ./nccInstaller_*platform*.jar -invPtrLoc /IN/oraInst.loc -prereqchecker -silent -entryPoint slc**

Step	Action
8	Do one of the following: • To access the Installer: **java -jar ./nccInstaller_***platform***.jar -invPtrLoc /IN/oraInst.loc** • To start the Installer and create a silent installer response file during the installation: **java -jar ./nccInstaller_***platform***.jar -logLevel finest -record -destinationFile** *path* where *path* is the response file location. The Installer screen appears.
9	Click **Next.** The Installation Location screen appears.
10	In the **Name** field, enter **/IN**.
11	Click **Next**. The Installation Type screen appears. **Note:** The NCC installer creates an **oraInventory** directory if it does not detect any installed Oracle products on the system. The **oraInventory** directory contains information about all Oracle products installed on your system. You can find the default location of the **oraInventory** directory by opening the **/etc/oraInst.loc** (Linux) file or the **/var/opt/oracle/oraInst.loc** (Solaris) file.
12	Select **SLC**.
13	Click **Next.** The Oracle User screen appears.
14	In the **Oracle DB Owner** field, retain the default **oracle**, which is the user name with permissions to create the Oracle database instance. Verify the **Oracle DB Group** field. Specify the NCC runtime user in the **Application Owner** field. Click **Next**. The Database Server Paths screen appears.
15	Confirm one of the following: **The database, schema, and application will be installed**. Select this option to install all items on the same node. **The database already exists and both the schema and application will be installed.** Select this option if you have already created the database including datafiles on this or a remote node but not the database schema or application. **The database and schema already exists and only the application will be installed**. Select this option if the database and schema already exists on this or a remote node and you want to only install the application.

Step	Action
16	If you are installing all items on the same node: In the **Base directory** field, retain the default, **/u01/app/oracle**. In the **Oracle home directory** field, retain the default, **/u01/app/oracle/product/12.2.0**. In the **Datafile directory** field, enter the path to the **datafiles** directory in which to create NCC database instance data files. In the **Redolog directory** field, enter the path to the **redolog** directory in which to create NCC database redo log files. Click **Next**. In the **Oracle database password** field, enter the password for the Oracle database administrative accounts. In the **Confirm password** field, enter the password again to confirm. **Note**: If the password is less than 8 characters, a warning appears. You can click **OK** to proceed.
17	If items already exist on the same or remote node: In the **Oracle client home directory** field, enter **/u01/app/oracle/product/12.2.0**. In the **Oracle SID** field enter **SCP**. In the **Database hostname** enter the host where the database is located. In the **Oracle database password** field, enter the password for the Oracle database administrative accounts on associated with the **Database hostname**.
18	In the **SMS Host name** field, enter the qualified hostname for the SMS server used to configure the clients that will connect to the SMS server.
19	Click **Next.** The Installation Summary screen appears.
20	Review the selections you have made in the preceding screens, and click **Install.** The Installation Progress screen appears.
21	Click **Next**. The Installation Complete screen appears.
22	Click **Finish**.

23	Log onto the SLC as the root user.
	`cd /IN/bin`
	`./postinstallRoot.sh`
	Note: You can reuse the script at any time to complete or retry failures occurring on previous invocations.

Installing NCC on the SLC with Testing Tools Node Using the GUI

Install NCC on either an Oracle Solaris 11.3 (64-bit) server or an Oracle Linux 7.3 server.

Note: Ensure that SMS is installed before installing SLC with Test Tools.

To install NCC on the SLC with Testing Tools node:

Step	Action
1	Log in as the root user.

Step	Action
2	Create a **NCC** sub-directory in the **/var/spool/pkg** directory: **cd /var/spool/pkg** **mkdir NCC** **Note:** The amount of space available in this directory must be at least three times the size of the archive. For example, if the archive is 500 MB, the temporary directory should be at least 1500 MB.
3	Go to the Oracle software delivery Web site: http://edelivery.oracle.com/ and download the **NCC_v12_0_3_0_0_***platform***.zip** software pack to the **/var/spool/pkg/NCC** directory, where *platform* is **Linux** or **SunOS**.
4	Go to the **/var/spool/pkg/NCC** directory and unzip the **NCC_v12_0_3_0_0_***platform***.zip** file: **unzip NCC_v12_0_3_0_0_***platform***.zip**
5	Log in as the user (non-root) installing NCC, and go to the **/var/spool/pkg/NCC** directory. **Note:** Ensure that the non-root user installing NCC has access to the esg and Oracle database group (e.g. dba).
6	Run the following commands: **export DISPLAY=***IP_address***:0** **export JAVA_HOME=***Java_home* where: • *IP_address* is the IP address of the computer on which the NCC GUI Installer appears. • *Java_home* is the directory in which JDK 1.8 is installed.
7	Ensure that the SLC node meets all prerequisites by running the following command: **touch /IN/oraInst.loc** **java -jar ./nccInstaller_***platform***.jar -invPtrLoc /IN/oraInst.loc -prereqchecker -silent -entryPoint slc**
8	Do one of the following: • To access the Installer: **java -jar ./nccInstaller_***platform***.jar -invPtrLoc /IN/oraInst.loc** • To start the Installer and create a silent installer response file during the installation: **java -jar ./nccInstaller_***platform***.jar -logLevel finest -record -destinationFile** *path* where *path* is the response file location. The Installer screen appears.
9	Click **Next**. The Installation Location screen appears.
10	In the **Name** field, enter **/IN**.
11	Click **Next**. The Installation Type screen appears. **Note:** The NCC installer creates an **oraInventory** directory if it does not detect any installed Oracle products on the system. The **oraInventory** directory contains information about all Oracle products installed on your system. You can find the default location of the **oraInventory** directory by opening the **/etc/oraInst.loc** (Linux) file or the **/var/opt/oracle/oraInst.loc** (Solaris) file.

Step	Action
12	Select **SLC With Test Tools** to install the SLC application, the SLC WIth Testing Tools, and the SLC database.
13	Click **Next**. The Oracle User screen appears.
14	In the **Oracle DB Owner** field, retain the default **oracle**, which is the user name with permissions to create the Oracle database instance. Verify the **Oracle DB Group** field. Specify the NCC runtime user in the **Application Owner** field. Click **Next**. The Database Server Paths screen appears.
15	Confirm one of the following: **The database, schema, and application will be installed.** Select this option to install all items on the same node. **The database already exists and both the schema and application will be installed.** Select this option if you have already created the database including datafiles on this or a remote node but not the database schema or application. **The database and schema already exists and only the application will be installed**. Select this option if the database and schema already exists on this or a remote node and you want to only install the application.
16	If you are installing all items on the same node: In the **Base directory** field, retain the default, **/u01/app/oracle**. In the **Oracle home directory** field, enter **/u01/app/oracle/product/12.2.0**. In the **Datafile directory** field, enter the path to the **datafiles** directory in which to create NCC database instance data files. In the **Redolog directory** field, enter the path to the **redolog** directory in which to create NCC database redo log files. Click **Next**. In the **Oracle database password** field, enter the password for the Oracle database administrative accounts. In the **Confirm password** field, enter the password again to confirm. **Note**: If the password is less than 8 characters, a warning appears. You can click **OK** to proceed.
17	If items already exist on the same or remote node: In the **Oracle client home directory** field, enter **/u01/app/oracle/product/12.2.0**. In the **Oracle SID** field enter **SCP**. In the **Database hostname**, enter the host where the database is located. In the **Oracle database password** field, enter the password for the Oracle database administrative accounts on associated with the **Database hostname**.
18	In the **SMS Host name** field, enter the qualified hostname for the SMS server used to configure the clients that will connect to the SMS server.
19	Click **Next.** The Installation Summary screen appears.
20	Review the selections you have made in the preceding screens, and click **Install.** The Installation Progress screen appears.

Step	Action
21	Click **Next**. The Installation Complete screen appears.
22	Click **Finish**.
23	Log onto the SLC as the root user. **cd /IN/bin** **./postinstallRoot.sh** **Note**: You can reuse the script at any time to complete or retry failures occurring on previous invocations.

Installing NCC on the VWS Node Using the GUI

Install NCC on either an Oracle Solaris 11.3 (64-bit) server or an Oracle Linux 7.3 server.

Note: Ensure that SMS is installed before installing VWS.

To install NCC on a VWS node:

Step	Action
1	Log in as the root user.
2	Create a **NCC** sub-directory in the **/var/spool/pkg** directory: **cd /var/spool/pkg** **mkdir NCC** **Note:** The amount of space available in this directory must be at least three times the size of the archive. For example, if the archive is 500 MB, the temporary directory should be at least 1500 MB.
3	Go to the Oracle software delivery Web site: http://edelivery.oracle.com/ and download the **NCC_v12_0_3_0_0**_*platform*.**zip** software pack to the **/var/spool/pkg/NCC** directory, where *platform* is **Linux** or **SunOS**.
4	Go to the **/var/spool/pkg/NCC** directory and unzip the **NCC_v12_0_3_0_0**_*platform*.**zip** file: **unzip NCC_v12_0_3_0_0**_*platform*.**zip**
5	Log in as the user (non-root) installing NCC, and go to the **/var/spool/pkg/NCC** directory. **Note:** Ensure that the non-root user installing NCC has access to the esg and Oracle database group (e.g. dba).
6	Run the following commands: **export DISPLAY=***IP_address***:0** **export JAVA_HOME=***Java_home* where: • *IP_address* is the IP address of the computer on which the NCC GUI appears. • *Java_home* is the directory in which JDK 1.8 is installed.
7	Ensure that the VWS node meets all prerequisites by running the following command: **touch /IN/oraInst.loc** **java -jar ./nccInstaller**_*platform*.**jar -invPtrLoc /IN/oraInst.loc -prereqchecker -silent -entryPoint vws**

Step	Action
8	Do one of the following: • To access the Installer: **java -jar ./nccInstaller_***platform***.jar -invPtrLoc /IN/oraInst.loc** • To start the Installer and create a silent installer response file during the installation: **java -jar ./nccInstaller_***platform***.jar -logLevel finest -record -destinationFile** *path* where *path* is the response file location. The Installer screen appears.
9	Click **Next**. The Installation Location screen appears.
10	In the **Name** field, enter **/IN**.
11	Click **Next**. The Installation Type screen appears. **Note:** The NCC installer creates an **oraInventory** directory if it does not detect any installed Oracle products on the system. The **oraInventory** directory contains information about all Oracle products installed on your system. You can find the default location of the **oraInventory** directory by opening the **/etc/oraInst.loc** (Linux) file or the **/var/opt/oracle/oraInst.loc** (Solaris) file.
12	Select **VWS**.
13	Click **Next.** The Oracle User screen appears.
14	In the **Oracle DB Owner** field, retain the default **oracle**, which is the user name with permissions to create the Oracle database instance. Verify the **Oracle DB Group** field. Specify the NCC runtime user in the **Application Owner** field. Click **Next**. The Database Server Paths screen appears.
15	Confirm one of the following: **The database, schema, and application will be installed**. Select this option to install all items on the same node. **The database already exists and both the schema and application will be installed**. Select this option if you have already created the database including datafiles on this or a remote node but not the database schema or application. **The database and schema already exists and only the application will be installed**. Select this option if the database and schema already exists on this or a remote node and you want to only install the application.

Step	Action
16	If you are installing all items on the same node: In the **Base directory** field, retain the default, **/u01/app/oracle**. In the **Oracle home directory** field, enter **/u01/app/oracle/product/12.2.0**. In the **Datafile directory** field, enter the path to the **datafiles** directory in which to create NCC database instance data files. In the **Redolog directory** field, enter the path to the **redolog** directory in which to create NCC database redo log files. Click **Next**. In the **Oracle database password** field, enter the password for the Oracle database administrative accounts. In the **Confirm password** field, enter the password again to confirm. **Note**: If the password is less than 8 characters, a warning appears. You can click **OK** to proceed.
17	If items already exist on the same or remote node: In the **Oracle client home directory** field, enter **/u01/app/oracle/product/12.2.0**. In the **Oracle SID** field enter **E2BE**. In the **Database hostname**, enter the host where the database is located. In the **Oracle database password** field, enter the password for the Oracle database administrative accounts on associated with the **Database hostname.**
18	In the **SMS Host name** field, enter the qualified hostname for the SMS server used to configure the clients that will connect to the SMS server.
19	Click **Next.** The VWS Config screen appears.
20	Enter the information for VWS configuration.
21	In the **SMS EDR Input directory** field, enter the full name and path to the directory to store SMS EDR input files.
22	Select the **Primary VWS node** check box to install the primary node of a VWS pair.
23	Click **Next.** The Installation Summary screen appears.
24	Review the selections you have made in the preceding screens, and click **Install**. The Installation Progress screen appears.
25	Click **Next**. The Installation Complete screen appears.
26	Click **Finish**.

27	Log onto the VWS as the root user.
	`cd /IN/bin`
	`./postinstallRoot.sh`
	Note: You can reuse the script at any time to complete or retry failures occurring on previous invocations.

Step	Action
28	Log onto the VWS as the NCC_runtime user. **cd /IN/bin** **./postinstallUser.sh** The script will prompt for information to be used as part of the runtime configuration. **Not:** You can reuse the script at any time to complete or retry failures occurring on previous invocations.

Installing NCC in Silent Mode

Use silent install mode when you are installing NCC using the same configuration repeatedly. Silent install mode does not use the GUI, and it runs in the background.

About the Response File

A response file contains answers to installation questions that you would otherwise provide in an interactive installation session. Each answer is stored as a value for a variable identified in the response file.

You can generate a response file that contains the parameters and values during the NCC GUI installation.

To generate a complete response file, run the following command to launch the Installer in the GUI mode:

java -jar ./nccInstaller_*platform***.jar -logLevel finest -record -***destinationFilePath*

where *destinationFilePath* is the response file location.

Note: The generated response file does not have a user password for security reasons. You must add the following parameters manually to the response file:

ORACLE_DATABASE_*PASSWORD*
ORACLE_DATABASE_*PASSWORD_CONFIRM*

NCC_SCREENS_SU_*PASSWORD*
NCC_SCREENS_SU_*PASSWORD_CONFIRM*

PI_ADMIN_*PASSWORD*
PI_ADMIN_*PASSWORD_CONFIRM*

where:

- *password* is the password for the Oracle database, NCC screens, and PI Admin.
- *password_confirm* is the same password entered for the Oracle database, NCC screens, and PI Admin.

Installing NCC in Silent Mode

To install NCC in silent mode:

Step	Action
1	Create a copy of the *response* file that was generated during the GUI installation and open it in a text editor.

Step	Action
2	Enter the values in the parameters to reflect the NCC installation requirements. **Note:** In silent install mode, the NCC installer treats incorrect context, format, or type values within a response file as if no value were specified.
3	Save and close the file.
4	Go to the **/IN** directory and run the following command: **java -jar ./nccInstaller_***Platform***.jar -logLevel finest -silent -responseFile** *path* where *path* is the NCC response file name and location. For example: `${JAVA_HOME}/bin/java -jar./nccInstaller_SunOS.jar -logLevel finest -silent -responseFile /tmp/smsinstallresponse.rsp` The installation runs silently in the background.

Following install on the SMS

Step	Action
1	Log onto the SMS as the root user. **cd /IN/bin** **./postinstallRoot.sh [-n]** where -n is an optional flag. It is used to indicate if NCC will be installed without a VWS node. **Note**: You can reuse the script at any time to complete or retry failures occurring on previous invocations.
2	Log onto the SMS as the NCC_runtime user. **cd /IN/bin** **./postinstallUser.sh** The script will prompt for information to be used as part of the runtime configuration. **Note**: You can reuse the script at any time to complete or retry failures occurring on previous invocations.

Following install on the SLC

Step	Action
1	Log onto the SLC as the root user. **cd /IN/bin** **./postinstallRoot.sh** **Note**: You can reuse the script at any time to complete or retry failures occurring on previous invocations.

Following install on the VWS

Follow these steps to

Step	Action
1	Log onto the VWS as the root user. **`cd /IN/bin`** **`./postinstallRoot.sh`** **Note**: You can reuse the script at any time to complete or retry failures occurring on previous invocations.
2	Log onto the VWS as the NCC_runtime user. **`cd /IN/bin`** **`./postinstallUser.sh`** The script will prompt for information to be used as part of the runtime configuration. **Note**: You can reuse the script at any time to complete or retry failures occurring on previous invocations.

About Installation Logs

You can check the log files in the **oraInventory/logs** directory. The default location of the **oraInventory** directory is in the **/IN/oraInst.loc** file.

Use the following log files to monitor installation and post-installations:

- **installAction***TimeStamp***.log**
- **oraInstall***TimeStamp***.err**
- **oraInstall***TimeStamp***.out**
- **silentInstall***TimeStamp***.log** (for the silent mode installation)

where *TimeStamp* is the date and time the log file was created.

The database schema installation log files for NCC are available in /IN/logs directory.

Removing Files After a Failed Installation

If **nccInstaller***_platform***.jar** fails during the installation process, some NCC files may remain on your system.

Follow these steps to remove any NCC files that remain on your system after a failed installation.

Step	Action
1	As root remove any remaining NCC files by running the following command: Go to the /IN/bin directory. **`./removeDatabase.sh`** **`./removeApplication.sh`**

Chapter 7

Post-Installation Tasks

Overview

Introduction

This chapter describes the post-installation tasks you must perform after installing Oracle Communications Network Charging and Control (NCC).

In this chapter

This chapter contains the following topics.

About Post-Installation Tasks

Post Installation Initial Configuration Tasks

The post-installation configuration tasks set the initial configuration for each NCC node. You should perform these tasks after completing the NCC installation on all nodes.

See *Post-Installation Initial Configuration* (on page 76) for more information.

About CDR Storage Configuration Tasks

The call data records (CDRs) generated by the system will be stored in the database. On production deployments, you should configure table partitioning for the CCS_BE_CDR table to define the following:

- The number of files needed each week to store CDR data
- The number of weeks to hold CDR data before it is purged from the database
- The location for the CDR data files

For details on CDR table partitioning configuration, see *Setting Up CDR Storage* (on page 81).

Note: For more information on CDR and EDR records, and how they are generated, see *Event Detail Record Reference Guide*.

About SSL Configuration Tasks

NCC supports secure network logins through Secure Socket Layer (SSL) connections from the NCC UI to the database. You specify whether SSL connections to the database are enabled on your system by setting the `jnlp.sms.EncryptedSSLConnection` Java application property in JNLP files. At installation, this property is set to true, and SSL connections to the database are enabled by default. To disable SSL connections to the database, set `jnlp.sms.EncryptedSSLConnection` to false. See *Disabling SSL Connections to the SMS Database* (on page 76) for more information.

If you plan to use SSL connections to the database, you must perform a number of additional configuration tasks. See *Enabling SSL Connections to the Database* (on page 82) for more information.

Disabling SSL Connections to the SMS Database

Follow these steps to disable SSL connections to the database.

Step	Action
1	Open the **sms.jnlp**, **acs.jnlp**, **vpn.jnlp**, and **ccp.jnlp** files on the SMS node. The **sms.jnlp**, **acs.jnlp**, and **vpn.jnlp** files are located in the **/IN/html** directory. The **ccp.jnlp** file is located in the **/IN/html/ccp** directory.
2	Set the `jnlp.sms.EncryptedSSLConnection` property to false by adding the following entry: **`<property name="jnlp.sms.EncryptedSSLConnection" value="false" />`**
3	Save and close the file.

To test without configuring secure login, turn off the security checking in the screen JNLP files.

For example, set the following in the **sms.jnlp** file:

`<property name="jnlp.sms.EncryptedSSLConnection" value="false" />`

Post-Installation Initial Configuration

About Initial Configuration Tasks

Perform the following initial configuration tasks after completing the NCC installation on all nodes:

- Set up IP addresses and hostnames to servers. See *Setting IP Addresses and Hostnames* (on page 76).
- Update the tablespace storage allocation on each node in accordance with system implementation type. For example, a large production system will require greater storage allocation than a small production system. See *Update Oracle Tablespace Storage* (on page 77).
- Update Oracle SGA parameters on each node. See *Update Oracle SGA Parameters* (on page 77).
- Update the Oracle **`cpu_count`** parameter. See *Update Oracle cpu_count Parameter* (on page 77).
- Update the Oracle Database default profile password for life time. See *Update Oracle Database Default Profile Password Life Time* (on page 78).
- Set shared memory limits for the NCC system. See *Setting Shared Memory Limits* (on page 78).
- Set the number of database connections. See *Setting the Number of Connections to the Database* (on page 79).
- If you want to use Internet Protocol verison 6 (IPv6) addresses, update the **eserv.config** file with the configuration for CORBA services. See *About CORBA Services Configuration for IPv6* (on page 80).

Setting IP Addresses and Hostnames

Ensure that the **/etc/hosts** file on all nodes includes entries for all hosts and their aliases. Some host aliases are automatically defined when you install NCC. Therefore, you should include at least the following predefined host entries in the **/etc/hosts** file.

- *sms_host* sms usms usms.CdrPush
- *be_host_1* be1
- *scp_host* scp uas1 acsStatsMaster uas.ccsSSMMaster
- *be_host_2* be2

where:

- *sms_host* is the IP address for the SMS node
- *be_host_1* is the IP address for the primary VWS node
- *scp_host* is the IP address for the SLC node
- *be_host_2* is the IP address for the secondary VWS node

Perform these steps on each node to set up IP addresses and hostnames for the servers.

Step	Action
1	Log in to the node.

2	Configure all network interfaces in the **/etc/hosts** file. Refer to your network plan for configuration values. See *Network Planning* (on page 6) for more information.
	Example /etc/hosts file
	`localhost`
	`127.0.0.1 localhost`
	`192.68.44.136 be1`
	`192.68.44.130 sms usms usms.CdrPush`
	`192.68.44.133 scp uas1 acsStatsMaster uas.ccsSSMMaster`
	`192.68.44.139 be2`

3	For platforms that are built on a zone server, modify the loop-back interface (lo0) and localhost entries to remove any association with the server hostname.
	For example, change the following entry from:
	`::1 pte69-zone1 localhost`
	`127.0.0.1 pte69-zone1 localhost loghost`
	to this:
	`::1 localhost`
	`127.0.0.1 localhost loghost`

4	On the SMS node, restart the smsMaster process.

Update Oracle Tablespace Storage

On each node in turn, update the tablespace storage allocation on the database instance on the node, to suit your deployment. Add or resize data files as required. See your Oracle Database administrator for information on resizing your tablespaces.

Update Oracle SGA Parameters

On each node in turn, update the Oracle SGA parameters for the database instance on the node to suit your deployment.

Update Oracle cpu_count Parameter
cpu_count specifies the number of CPUs available for Oracle Database to use. This parameter greatly affects the size of **Startup Overhead In Shared Pool** and is therefore set to **4** in the default **init.ora** files installed by NCC.

The **cpu_count** parameter may either be unset allowing Oracle Database to use all CPUs be tuned for a specific target system. Because this may increase the size of **Startup Overhead In Shared Pool**, the **shared_pool_size** parameter must be updated accordingly. The recommended initial value for **shared_pool_size** is **Startup Overhead In Shared Pool** + 256M.

The current size of the **Startup Overhead In Shared Pool** can be retrieved with the following SQL query:

```
select * from v$sgainfo where name = 'Startup overhead in Shared Pool';
```

See the chapter on configuring memory manually in *Oracle Database Administrator's Guide* for more information about specifying the shared pool size for your database.

Review Oracle lock_sga Parameter

On some hardware and operating system combinations, the lock_sga parameter may be set to TRUE to prevent System Global Area (SGA) memory swapping and paging, and so improving database performance.

Notes:

- If setting lock_sga to TRUE is not supported by the hardware and operating system combination, the database may fail to start if lock_sga is TRUE. Therefore lock_sga is set to FALSE in the default init.ora files installed by NCC.
- If lock_sga is set to TRUE on systems with insufficient memory, other processes may reduce in performance due to non-SGA memory swapping.

Please see the chapter on tuning the System Global Area in Oracle Database Administrator's Guide for more information on the lock_sga parameter.

Update Oracle Database Default Profile Password Life Time

An Oracle database user is created for each NCC user based on the default user profile in the database. The default profile includes a password expiration duration of 180 DAYS for Oracle 12*c* databases.

When using Oracle 12*c* databases, set the default profile **PASSWORD_LIFE_TIME** parameter to **UNLIMITED** before creating NCC users to avoid login errors due to expired passwords. If your security policy requires user password changes at regular intervals you must implement a procedure allowing users to change their passwords before expiration to prevent access failure. See *Oracle Database Security Guide* for the version of Oracle database you are using for a detailed description of how to use password management and protection.

Setting Shared Memory Limits

On Solaris, follow these steps on each node to set shared memory limits for the NCC system.

Step	Action
1	Log in as the root user.
2	Add the `esg` project group and set the shared memory limits for it by running the following commands: **`projadd -G esg -c "esg group project" -K "project.max-shm-memory=(priv,4G,deny)" group.esg`** **`projmod -sK "project.max-sem-ids=(priv,2048,deny)" group.esg`** **`projmod -sK "process.max-sem-nsems=(priv,2048,deny)" group.esg`** **`projmod -sK "project.max-shm-ids=(priv,2048,deny)" group.esg`**

On Linux, follow these steps on each node to set shared memory limits for the NCC system.

1. Determine the sum of process parameters for all database instances on the system, the overhead for Oracle background processes, the system and other application requirements.
2. Set semmns (total semaphores system-wide) to the larger of the value in 1 or 32000.
3. Set semmsl (semaphores per set) to 250.
4. Set semmni (total semaphore sets) to semmns/semmsl rounded up to the nearest multiple of 1024.

5 For Linux and Oracle 10.2-12.1, set the maximum number of asynchronous I/O requests allowed in /etc/sysctl.conf as follows:

```
fs.aio-max-nr = 3145728
```

After changing the /etc/sysctl.conf, run the following command as root to set the values in the system:

```
# /sbin/sysctl -p /etc/sysctl.conf
```

Setting the Number of Connections to the Database

Oracle database static parameters are defined in the **initSMF.ora** file located in the **$ORACLE_HOME/dbs** directory.

The **processes** parameter in the Static Parameters section of **initSMF.ora** defines the maximum number of connections allowed to the Oracle database. For a NCC installation, set this parameter to 400 or a higher.

Example configuration in initSMF.ora

```
# Static Parameters
####################
....
processes = 400
...
```

Setting the beServiceTrigger User and Password

If you configured the `beServiceTrigger` as part of the SMS postInstallUser.sh script, then you can skip this section.

`beServiceTrigger` sends BPL requests to the NCC Open Services Development (OSD) application for event processing. The `beServiceTrigger` user allows `beServiceTrigger` to access external systems, such as a client ASP that is accessed through OSD during event processing. `beServiceTrigger` retrieves the user credentials (username and password) from a secure credentials vault on the SMS node. The credentials vault is used for storing user names and passwords securely and for authorizing users. For more information about `beServiceTrigger`, see *Voucher and Wallet Server Technical Guide*.

If you want to use `beServiceTrigger` for sending real time wallet notifications to OSD, set the `beServiceTrigger` user credentials by using the `beServiceTriggerUser` utility. To enable `beServiceTrigger` to connect to the OSD interface on the SLC, set the user and password for `beServiceTrigger` and the OSD client ASP to be the same.

Follow these steps to set the `beServiceTrigger` username and password.

Step	Action
1	Log in to the SMS as `smf_oper` user.
2	Go to the following directory, where the `beServiceTriggerUser` utility is located: `/IN/service_packages/E2BE/bin`
3	Run the following command to set the username and password for `beServiceTrigger`: `beServiceTriggerUser -d/@SMF`
4	Restart the SLEE on the VWS by running the following command as `ebe_oper` user: `/IN/service_packages/SLEE/bin/slee-ctrl restart`

About CORBA Services Configuration for IPv6

The **/IN/service_packages/eserv.config** file on the SMS defines configuration for NCC.

/IN/service_packages/eserv.config

If you are using IP version 6 addresses, you must include the CorbaServices section in the **eserv.config** file. If you are using only IP version 4 addresses, the procedure in this section is optional.

The CorbaServices section in the **eserv.config** configuration file on the SMS node defines common connection parameters for CORBA services. The CorbaServices configuration overrides the default and command-line values specified for CORBA listen ports and addresses. You configure the CorbaServices section of the **eserv.config** file on the SMS by using the following syntax:

```
CorbaServices = {
    AddressInIOR = "hostname"
    smsTaskAgentOrbListenPort = port
    smsReportDaemonOrbListenPort = port
    smsTrigDaemonOrbListenPort = port
    ccsBeOrbListenPort = port
    OrbListenAddresses = [
        "ip_address1",
        "ip_address2",
]
}
```

where:

- *hostname* is the hostname or IP address to place in the IOR (Interoperable Object Reference) for the CORBA service.
- *port* is the number of the port on which the CORBA service will listen.
- *ip_address1,ip_address2* list the IP addresses on which CORBA services listen for incoming requests. The list of IP addresses in the `OrbListenAddresses` parameter can include both IP version 6 and IP version 4 addresses.

  If the `OrbListenAddresses` parameter is not set, or you do not specify any IP addresses, the CORBA service listens on all the IP addresses available on the host. Loopback IP addresses and special IP addresses, as defined in RFC 5156, are excluded.

For more information about configuring CORBA services, see *NCC Service Management System Technical Guide*.

Example CORBA Services Configuration on the SMS

The following example shows the CorbaServices configuration section in the **eserv.config** file for CORBA services on the SMS node.

```
CorbaServices = {
    AddressInIOR = "sms_machine.oracle.com"
    OrbListenAddresses = [
        "2001:db8:0:1050:0005:ffff:ffff:326b"
        "192.0.2.0"
    smsTaskAgentOrbListenPort = 6332
    smsReportDaemonListenPort = 6333
    smsTrigDaemonOrbListenPort = 6334
    ccsBeOrbListenPort = 6335
}
```

Setting Up CDR Storage

About CDR Storage Configuration

If you installed NCC in a production environment, configure CDR table (CCS_BE_CDR) partitioning to define how CDRs will be stored.

Note: We cannot partition CDR table if the SMS node is on remote database because partitioning requires DBA privilege.

Setting Up CDR Table Partitioning

Follow these steps to set up CDR table partitioning for CDR storage.

Step	Action
1	As the root user on the SMS node, edit the **/IN/service_packages/CCSPART/etc/ccspart.cfg** file.
2	Specify appropriate values for these parameters: • **WEEKLY_DATAFILE_COUNT**: Specify the number of 200 MB data files required per week to hold CDR data. Note: CDR data files may contain multiple CDR records, potentially of different types. • **WEEKS_TO_KEEP_PARTITION**: Specify the number of weeks CDR data should remain available on the SMS node before being purged from the database. • **DATAFILE_PATH**: Specify the location on the disk where CDR data files will be created.

Setting Up Voucher Storage

About Voucher Storage Configuration

If you installed NCC in a production environment, configure voucher table (CCS_VOUCHER_REFERENCE) partitioning to define how vouchers will be stored.

Note: You cannot partition voucher table if the SMS node is on remote database because partitioning requires DBA privilege.

Setting Up Voucher Table Partitioning

Follow these steps to set up voucher table partitioning for voucher storage.

Step	Action
1	As the root user on the SMS node, edit the **/IN/service_packages/CCSVCHRPART/etc/ccs_voucher_reference_part.cfg** file.
2	Specify appropriate values for these parameters: • **WEEKLY_DATAFILE_COUNT**: Specify the number of 200 MB data files required per week to hold voucher data. Note: Voucher data files may contain multiple voucher records, potentially of different types. • **WEEKS_TO_KEEP_PARTITION**: Specify the number of weeks voucher data should remain available on the SMS node before being purged from the database. • **DATAFILE_PATH**: Specify the location on the disk where voucher data files will be created.

Enabling SSL Connections to the Database

About SSL Connections to the Database

NCC supports secure network logins through Secure Socket Layer (SSL) connections from the NCC UI to the database.

To configure SSL connections to the database, perform the following steps on the SMS node:

Step	Action
1	Create the Oracle wallet that identifies the database server. See About Creating the Oracle Wallet.
2	Update the **listener.ora** file to define the location of the Oracle wallet and the listen port for SSL connections to the database. See *Updating the listener.ora file* (on page 85).
3	Update the **sqlnet.ora** file to define the location of the Oracle wallet. See *Updating the sqlnet.ora file* (on page 87).
4	The NCC installation automatically sets the Java application properties to enable SSL connections to the database. Check the configuration in your JNLP files to ensure that configuration has been set correctly. See *About Java Applet Configuration* (on page 90).
5	Clear the temporary Internet files from the Java cache.

Setting Up the Oracle Wallet to Use Self-Signed Certificates

Follow these steps to set up the Oracle server wallet to use self-signed certificates by using **setupOracleWallet.sh**.

Step	Action
1	Log in to the SMS as oracle user.
2	Run the following command: **`/IN/service_packages/SMS/bin/setupOracleWallet.sh`**
3	Answer *y* to the following prompt: `Do you wish to proceed with the configuration (y/n):`
4	When requested, enter the following information: • The base directory for the Oracle wallet • The two-letter international country (ISO) code for your country • The wallet password to use for the root CA wallet and the server wallet. You will be prompted for the password each time the wallet is accessed. **Note:** Wallet passwords have length and content validity checks applied to them. Generally, passwords should have a minimum length of eight characters and contain alphabetic characters combined with numbers and special characters.

Step	Action
5	Answer *y* to the following prompt: `Would you like to use a self-signed root certificate to sign the SMS server certificate?` When processing completes, the self-signed root certificate is exported to the following file: **./root/b64certificate.txt** **./root** is a sub-directory of the base directory for the Oracle wallet. You must import this certificate into the Java **lib\security\cacerts** file on each client PC.

Adding Trusted Certificates to the Keystore on Client PCs

If you are using self-signed certificates, update the keystore on client PCs to trust certificates from the SMS server that have been signed by the root CA.

Note: Certificates signed by a commercial CA are already trusted by definition, therefore update the keystore on client PCs only if you are using self-signed certificates.

Follow these steps to add a trusted certificate for the SMS server to the Java keystore on a client PC.

Step	Action
1	Copy the root CA certificate **./root/b64certificate.txt** to the client PC.
2	As an Administrator user on the client PC, open the command tool window and run the following command: **`keytool -importcert -keystore "\`***`cacerts_path`***`\java\lib\security\cacerts" -alias SMS -file "\`***`path`***`\\b64certificate.txt"`** where *cacerts_path* is the path to the **java\lib\security\cacerts** file and *path* is the location of the certificate file on the client PC.
3	When prompted, enter the password for the keystore. **Note:** The Java installation sets the keystore password to **`changeit`** by default.
4	Answer yes to the following prompt: `Trust this certificate? [no]:` Oracle keytool updates the keystore on the client PC to trust certificates from the SMS server that have been signed with the root CA.

Setting Up the Oracle Wallet to Use CA-Signed Certificates

Note: This procedure assumes that the commercial CA's own root certificate is available in the following file:

./root/b64certificate.txt

./root is a sub-directory of the base directory for the Oracle wallet.

Follow these steps to set up the Oracle server wallet to use certificates signed by a commercial CA by using **setupOracleWallet.sh**.

Step	Action
1	Log in to SMS as the oracle user.

Step	Action
2	Run the following command: **/IN/service_packages/SMS/bin/setupOracleWallet.sh**
3	Answer `y` to the following prompt: `Do you wish to proceed with the configuration (y/n):`
4	When requested, enter the following information: • The base directory for the Oracle wallet • The two-letter international country (ISO) code for your country • The password to use for the server wallet. You will be prompted for the password each time the wallet is accessed. **Note:** Wallet passwords have length and content validity checks applied to them. Generally, passwords should have a minimum length of eight characters and contain alphabetic characters combined with numbers and special characters.
5	Answer `n` to the following prompt: `Would you like to use a self-signed root certificate to sign the SMS server certificate?` The script creates the server auto login wallet and exports the certificate-signing request to the following file: **./server/creq.txt** **./server** is a sub-directory of the base directory for the Oracle wallet.
6	Send the certificate-signing request to the commercial CA for signing.
7	When the commercial CA returns the signed certificate, place the signed certificate in the following file: **./server/cert.txt**
8	Place the root certificate from the commercial CA in the following file: **./root/b64certificate.txt**
9	Log in as the oracle user on the SMS and run the following command: **/IN/service_packages/SMS/bin/setupOracleWallet.sh** `-s` **./server/cert.txt** `-t` **./root/b64certificate.txt** `-w` *wallet_base_directory* • **./server/cert.txt** specifies the location of the signed server certificate • **./root/b64certificate.txt** specifies the location of the root certificate from the commercial CA • *wallet_base_directory* specifies the Oracle wallet base directory The **setupOracleWallet.sh** script completes by adding the trusted CA certificate and the CA-signed certificate to the server wallet.

Updating the listener.ora file

Follow these steps to configure the Oracle listener.

Step	Action
1	Log in to SMS as the `oracle` user, or run the following command from a root login to become the user `oracle`: `su - oracle` **Note:** Logging in as the `oracle` user ensures that the path to all of the Oracle binaries is correct and that file ownership for Oracle files is preserved.
2	Go to the directory containing the **listener.ora** file. The location of the **listener.ora** file depends on the version of Oracle Database installed and the options selected at installation. It is located in one of the following directories by default: *ORACLE_HOME*`/network/admin` `/var/opt/oracle/` where *ORACLE_HOME* is the directory in which your Oracle Database is installed.
3	Edit the **listener.ora** file by using a text editor such as vi; for example: `vi listener.ora`

4	Add a new description to the listener description list that specifies the protocol and port to use for secure SSL connections to the database. You must set `PROTOCOL` to **TCPS** and `PORT` to **2484** for secure SSL connections.
	Use the following syntax:
	`LISTENER=`
	`  (DESCRIPTION_LIST =`
	`  (DESCRIPTION=(ADDRESS_LIST=`
	`  (ADDRESS=`
	`  (PROTOCOL=TCPS)`
	`  (HOST=`*hostname*`)`
	`  (PORT=2484)`
	`  )))`
	`)`
	where *hostname* is the hostname of the SMS node.
	Note: The standard Oracle listener TCP port is 1521. However, SSL connections use the standard port for the TCPS protocol, port 2484, instead. The TCPS protocol entry in the **listener.ora** file must appear *after* the TCP protocol entry.
	Note: If there is a firewall between screen clients and the SMS, you must open port 2484 in the firewall.

Step	Action

Example:

The following example shows DESCRIPTION_LIST configuration for an SMS node called “hostSMP”:

```
LISTENER=
  (DESCRIPTION_LIST =
  (DESCRIPTION=(ADDRESS_LIST=
     (ADDRESS=
         (PROTOCOL=IPC)
         (KEY=SMF)
         )))
  (DESCRIPTION=(ADDRESS_LIST=
     (ADDRESS=
         (PROTOCOL=TCP)
         (HOST=hostSMP)
         (PORT=1521)
         )))
  (DESCRIPTION=(ADDRESS_LIST=
     (ADDRESS=
         (PROTOCOL=TCPS)
         (HOST=hostSMP)
         (PORT=2484)
         )))
     )
)
```

Note: For the SMF database, ORACLE_SID has been set to SMF. The listener can be made aware of this by adding an ADDRESS entry to ADDRESS_LIST.

5 Add a new `WALLET_LOCATION` entry that specifies the directory that contains the server wallet that was created by **setupOracleWallet.sh**.

Use the following syntax:

```
WALLET_LOCATION =
     (SOURCE =
         (METHOD = FILE)
         (METHOD_DATA = (DIRECTORY = directory_name))
)
```

where *directory_name* is the Oracle server directory.

Example

The following example shows a `WALLET_LOCATION` configuration for the Oracle server wallet created in the directory named **/u01/app/wallets/oracle/server**

```
WALLET_LOCATION =
     (SOURCE =
         (METHOD = FILE)
         (METHOD_DATA = (DIRECTORY =/u01/app/wallets/oracle/server))
)
```

Step	Action

6	Add the following entries:
	`SSL_CLIENT_AUTHENTICATION=FALSE`
	`SSL_CIPHER_SUITES=(TLS_RSA_WITH_AES_128_CBC_SHA)`
	Notes: You must also:
	• Configure the same entries for `WALLET_LOCATION`, `SSL_CLIENT_AUTHENTICATION`, and `SSL_CIPHER_SUITES` in the **sqlnet.ora** file.
	• Set the `jnlp.sms.sslCipherSuites` Java application property in your JNLP files and the `SSL_CIPHER_SUITES` parameter to the same value.

7	Save and close the file.

8	Stop and restart the listener using the updated configuration by running the following commands:
	`lsnrctl stop`
	`lsnrctl start`

Updating the sqlnet.ora file

Follow these steps to configure the Oracle **sqlnet.ora** file for SSL connections to the database.

Note: You must configure new entries for WALLET_LOCATION, SSL_CLIENT_AUTHENTICATION, and SSL_CIPHER_SUITES in the **sqlnet.ora** file that are the same as those configured in the **listener.ora** file.

Step	Action
1	Log in to the SMS as the `oracle` user, or run the following command from a root login to become the `oracle` user: `su - oracle` **Note:** Logging in as the `oracle` user ensures that the path to all Oracle binaries is correct and that file ownership for Oracle files is preserved.
2	Go to the directory containing the **sqlnet.ora** file. The location of the **sqlnet.ora** file depends on the version of Oracle database installed and the options selected at installation. It is located in one of the following directories by default: *ORACLE_HOME*/**network/admin** **/var/opt/oracle/** where *ORACLE_HOME* is the directory in which the Oracle database is installed.
3	Edit the **sqlnet.ora** file by using a text editor such as vi; for example: `vi sqlnet.ora`

4	Add a new WALLET_LOCATION entry that specifies the directory of the server wallet that was created by **setupOracleWallet.sh**.
	Use the following syntax:
	`WALLET_LOCATION =`
	`  (SOURCE =`
	`  (METHOD = FILE)`
	`  (METHOD_DATA = (DIRECTORY = directory_name))`
	`)`
	where *directory_name* is the Oracle server directory.

Step	Action

	Example
	The following example shows a WALLET_LOCATION configuration for the Oracle server wallet created in the directory named **/u01/app/wallets/oracle/server**
	`WALLET_LOCATION =`
	`(SOURCE =`
	`(METHOD = FILE)`
	`(METHOD_DATA = (DIRECTORY =/u01/app/wallets/oracle/server))`
	`)`

5	Add the following new entries:
	`SSL_CLIENT_AUTHENTICATION=FALSE`
	`SSL_CIPHER_SUITES=(TLS_RSA_WITH_AES_128_CBC_SHA)`

6	Save and close the file.

Updating the eserv.config file

The default /IN/service_packages/eserv.config file on the VWS contains placeholder variables that need to be changed to actual values before the application can startup.

Parameter	Usage
${OUI_BE_SERVER_ID}	The VWS billing engine domain number this node belongs to. **Note**: Creating a domain is a manual activity following the NCC installation.
${OUI_SLC_HOST}	The SLC hostname of the node running OSD services. This enables notifications to be generated from the VWS to be sent by the SLC to the external network.

Note: All affected parameters can be auto populated by the /IN/bin/postiInstallUser.sh script on the VWS. If you select to use this procedure, then you are required to have

- A fully installed SMS node.
- Each VWS node is already defined in the replication configuration on the SMS.
- The VWS billing engine domain is defined in the CCS configuration on the SMS.

Configure SEI in the SLC Node

(Optional) Configure SEI in the SLC node. See the discussion about SEI configuration in *SMS Email Interface Technical Guide.*

Configuring Replication and Table Nodes

One way to configure replication is through the SMS screens.

To configure replication nodes and tables, see the discussion about replication nodes in *Service Management System User Guide*.

Note: Replicate the smf_normalization, smf_denormalization, and smf_seed tables on the SLC and VWS nodes for the slee processes to load Credential Vault data.

The NCC installer also provides a command line utiilty script to create a replication node on a fully operational SMS node. This avoids using the SMS screens. Run the script as the NCC_runtime_user:

/IN/bin/addReplicationNode.sh -n <node_number> -h <host_name> [-p <primary ip address>] [-s <secondary ip address>] [-d <description>]

-n <node_number>	Mandatory	Unique replication node id of the slave. Must be between 301 and 399. 301 - 349 defines SLC node. 350 - 399 defines VWS node.
-h <host_name>	Mandatory	Unqualified hostname of the replication slave.
-p <primary ip address>	Optional	Either IP address or hostname of the slave node. If not supplied, will use the -h parameter.
-s <secondary ip address>	Optional	Secondary IP address or hostname of slave node. No default value. This can be null.
-d <description>	Optional	Node description.

Note:

- The script does not validate either the hostname or ip address.
- When configuring SLC nodes an attempt to initiate a full replication resync will occur. The resync will fail if the SLC node is not installed or the updateLoader is not running on the SLC. The configuration will persist and a resync can be attempted at a later date by the user.
- If you require spaces in the description then use quotes round the entire string.

A replication node can be removed using a further utility script. Run the script as the NCC_runtime_user.

/IN/bin/removeReplicationNode.sh -n <node_number>

-n <node_number> mandatory. Node number.

Creating an ACS Customer

To create an ACS customer, see the discussion about creating an ACS customer in *Advanced Control Services User Guide*.

Creating a Domain

One way to configure the domain is through the SMS screens.

To create a domain, see the discussion about domain in *Charging Control Services User Guide.* After creating a new domain, restart the SMS screen and create **`replication.config`** file. To create **`replication.config`** file, see the discussion about Table Replication in *Charging and Control Service Management System User's Guide*.

The NCC installer also provides a command line utiilty script to create a domain on a fully operational SMS node. This avoids using the SMS screens. Run the script as the NCC_runtime_user:

/IN/bin/addUbeDomain.sh -n <name> -m <max_accounts> [-c] [-v] [-t] [-a]

-n <name> mandatory. Domain name.

-m <max_accounts> mandatory. Maximum number of accounts allowed.

-c optional. Defines a charging domain.

-v optional. Defines a voucher domain.

-t optional. Defines a tracking domain.

-a optional. Sets all the -c -v -t parameters.

Note: The domain is not fully created at this point.

Each VWS node configured is required to be assigned to the billing domain. Run the script as the NCC_runtime_user:

```
/IN/bin/addUbeDomainNode.sh -d <domain_name> -m <node_name> -n <node_number> [-a <address>] [-r <remote_db>] [-s <oracle_sid>] [-c <client_port>] [-i <internal_port>]
```

-d <domain_name> mandatory. Domain name.

-m <node_name> mandatory. Node name.

-n <node_number> mandatory. The replication node id. Must be between 350 and 399.

-a <address> optional. The hostname or ip address of the node, derived from the node number if not supplied.

-r <remote_db> optional. Hostname of the remote database, only supply if database node is not on target node.

-s <oracle_sid> optional. Oracle SID on remote database, default E2BE.

-c <client_port> optional. Client port, default 1500.

-i <internal_port> optional. Internal port, default 1600.

Note: The domain is not fully created at the point.

To finalize the domain configuration and establish replication to each node in the domain, run the script as the NCC_runtime_user:

```
IN/bin/addUbeDomainReplication.sh -d <domain_name> -p <primary_node_id> [-s <secondary_node_id>]
```

-d <domain_name> mandatory. Domain name.

-p <primary_node_id> mandatory. Primary node replication id.

-s <secondary_node_id> optional. Secondary node replication id.

Note: The script will attempt to initiate a full replication resync. The resync will fail if the VWS node is not installed or the updateLoader is not running. The configuration will persist and a resync can be attempted at a later date by the user.

Changes by the addUbeDomainReplication.sh script can be undone. Run the script as the NCC_runtime_user:

```
/IN/bin/removeUbeDomainReplication.sh -d <domain_name>
```

<domain_name> mandatory. Domain name.

Creating a MFILE

To create the MFILE, see the discussion about MFILE generation in *Charging Control Services User Guide*.

About Java Applet Configuration

To enable secure SSL connections to the database, the following Java application configuration must be set in the **acs.jnlp**, **ccp.jnlp**, **sms.jnlp**, and **vpn.jnlp** files.

Follow these steps to configure the Java applet parameters for the secure SSL connections to the database if they have not been configured by the installation.

Step	Action
1	Log in as the root user.
2	Edit the **acs.jnlp**, **ccp.jnlp**, **sms.jnlp**, and **vpn.jnlp** files by using a text editor such as vi; for example: **`vi /IN/html/sms.jnlp`** The **acs.jnlp**, **sms.jnlp**, and **vpn.jnlp** files are located in the **/IN/html/** directory. The **ccp.jnlp** file is located in the **/IN/html/ccp** directory.
3	Configure the `secureConnectionDatabaseHost` Java property value in the resources section of the **.jnlp** file. Set PROTOCOL to **TCPS** and set PORT to **2484**. The property values must be all on one line in the **.jnlp** file: **`<property name="jnlp.sms.secureConnectionDatabaseHost" value="(DESCRIPTION= (ADDRESS_LIST= (ADDRESS=(PROTOCOL=TCPS) (HOST=`***`host_ip_addr`***`)(PORT=2484))) (CONNECT_DATA= (SERVICE_NAME=`***`db_sid`***` )))" />`** where: • ***`host_ip_addr`*** is the host name or IP address of the SMS node • ***`db_sid`*** is the database SID
4	Set the `EncryptedSSLConnection` property in the resources section of the **.jnlp** file to *true*: **`<property name="jnlp.sms.EncryptedSSLConnection" value="true" />`**
5	Set the `sslCipherSuites` property in the resources section of the .jnlp file to TLS_RSA_WITH_AES_128_CBC_SHA: **`<property name = "jnlp.sms.sslCipherSuites" value="(TLS_RSA_WITH_AES_128_CBC_SHA)" />`**
6	Save and close the file.

Chapter 8

NCC Post Template Installation Tasks

Overview

Introduction

This chapter provides information about service templates. It describes the additional tasks you must perform before the template configuration will be fully operational.

Note: If you did not select a template service configuration in the Installation Manager then you should perform the *Post-Installation Tasks* (on page 75) only.

For information about configuring the system, see *Configuration User's Guide*.

In this chapter

This chapter contains the following topics.

About Post Installation Tasks

Service Template Post Installation Tasks

This table lists the post installation tasks that you perform after installing the Prepaid Charging Service Template (PCST) configuration

Note: "Yes" in a column indicates that you should perform this task for this service template configuration. "No" in a column indicates that you should not perform this task for this service template configuration.

Post Install Task to Perform	NCC and PCST
SMS Node Configuration (on page 94)	Yes
OSD Configuration (on page 106)	Yes

Post Install Task to Perform	NCC and PCST
Configuration Files on the SMS (on page 109)	Yes
VWS Node Configuration (on page 111)	Yes
MFile Generation (on page 115)	Yes
Starting the SLEE on the VWS (on page 117)	Yes
SLC Node Configuration (on page 118)	Yes
Messaging Manager Configuration (on page 118)	Yes
Messaging Manager Scheme Configuration (on page 120)	Yes
M*M SMSCs Configuration and Node Mapping* (on page 125)	Yes
SCTP Configuration (on page 129)	Yes
Sigtran Configuration (on page 130)	Yes
eserv.config *Configuration on the SLC* (on page 132)	Yes
Configuring and Starting the SLEE (on page 134)	Yes

SMS Node Configuration

About SMS Node Configuration

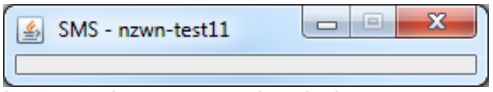
This section describes the minimum configuration tasks you should perform on the SMS node. You perform these tasks in the Service Management System UI:

- Configure the node details for all NCC nodes.
- Configure the nodes that will be used by the replication processes.
- Configure the resource limits and global business prefix for the service provider.
- Configure the VWS domains. In a standard configuration, a pair of VWS (primary and secondary) servers is used.
- Add VWS pair details to the VWS domains.
- Configure the replication tables used in replicating data to nodes.

Launching SMS Using Webstart

Follow these steps to launch Service Management System using Java Webstart. You can use this process to install a shortcut to the SMS on your desktop.

Note: To launch GUI applications using Java Webstart, you must ensure that the Web server supports the **jnlp** file type. For more information, see *Setting up the Screens* in *Service Management System Technical Guide*.

Step	Action
1	Using an Internet browser, open the SMS Webstart by using one of the following methods: a. Open the Service Management System default page on the `SMS_hostname`, then click the **WebStart** link. b. Open SMS Webstart directly. The address is in the format: http://*SMS_hostname*/**sms.jnlp** Where *SMS_hostname* is the hostname of the SMS which is running the SMS application. **Result:** You see the Opening **sms.jnlp** download screen.
2	Select **Open with** and click **OK**. **Result:** The following two windows open: a. The SMS - *SMS_hostname* window, for example:  b. The SMS Login window. See *Logging On To SMS* (on page 96). **Note:** When launching SMS for the first time using Webstart, a shortcut icon is downloaded and displayed on the Desktop.  This enables you to open the SMS GUI directly by double-clicking the shortcut icon. The icon is removed every time you clear the system cache and downloads again when launching SMS through Webstart.

Opening SMS Using Webstart

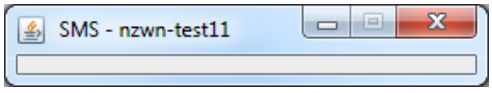
There are two methods to open SMS using Webstart. If by:

- Opening the **sms.jnlp** download screen, select **Open with** and click **OK**.
- Shortcut icon saved to the desktop, double-click the SMS **sms.jnlp** icon.

For more information, see *Launching SMS Using Webstart* (on page 94).

Result: The following two windows open:

1 The SMS - *SMS_hostname* window, for example:



2 The SMS Login window will appear. See *Logging On To SMS* (on page 96).

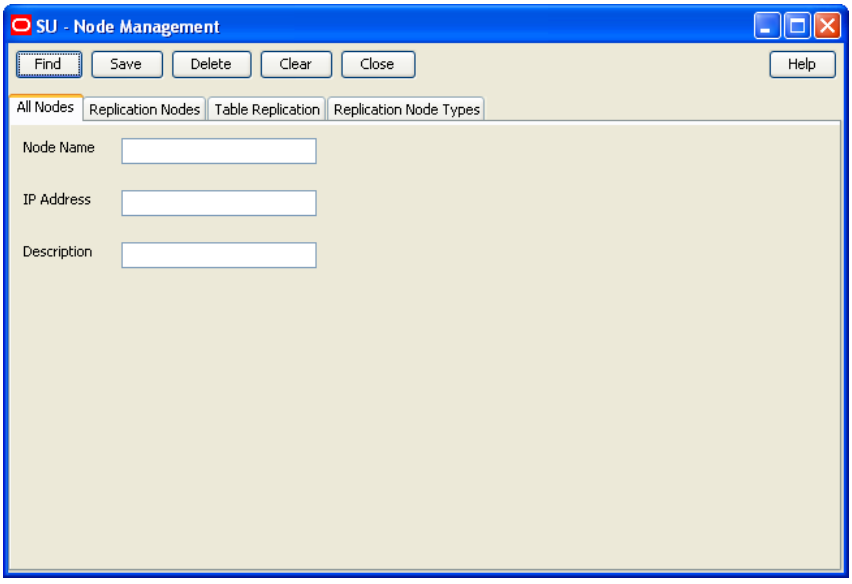
Logging On To SMS

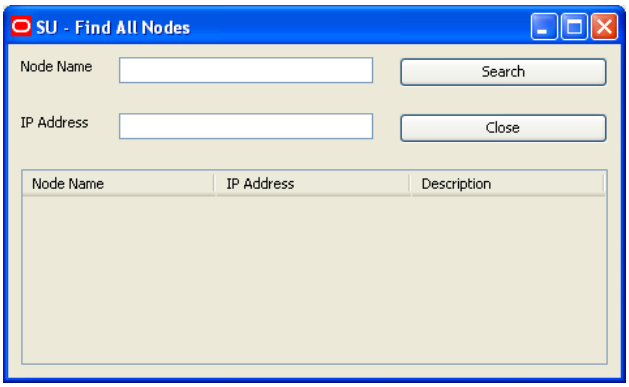
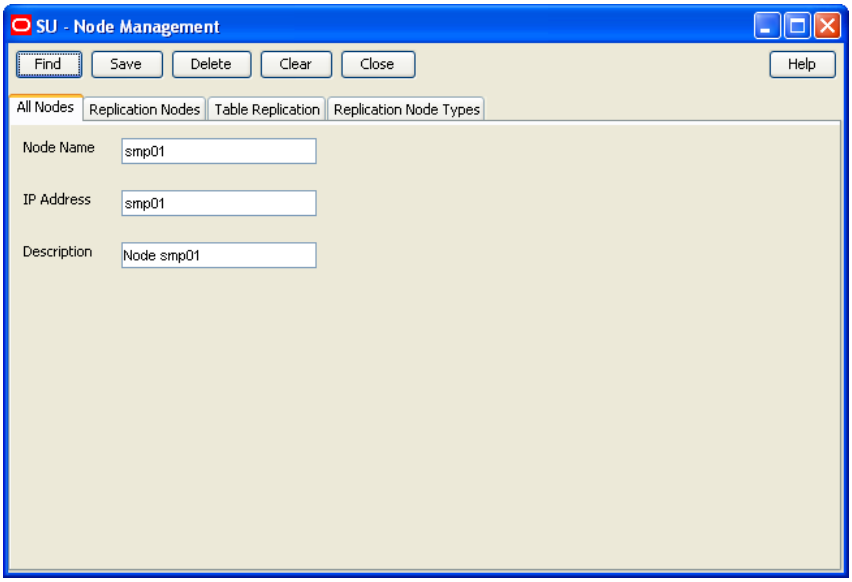
Follow these steps to log on to the SMS from the SMS Login screen.

Step	Action
1	In the **User Name** field, enter **su**.
2	In the **Password** field, enter the password for the SU user. Passwords are case sensitive.
	Note: This will be the password that you specified for the SU users on the **Environment** tab in the Installation Manager window.
3	Click **OK**. **Result:** A security warning will pop up.
4	Click **Run**.

Configuring Node Details

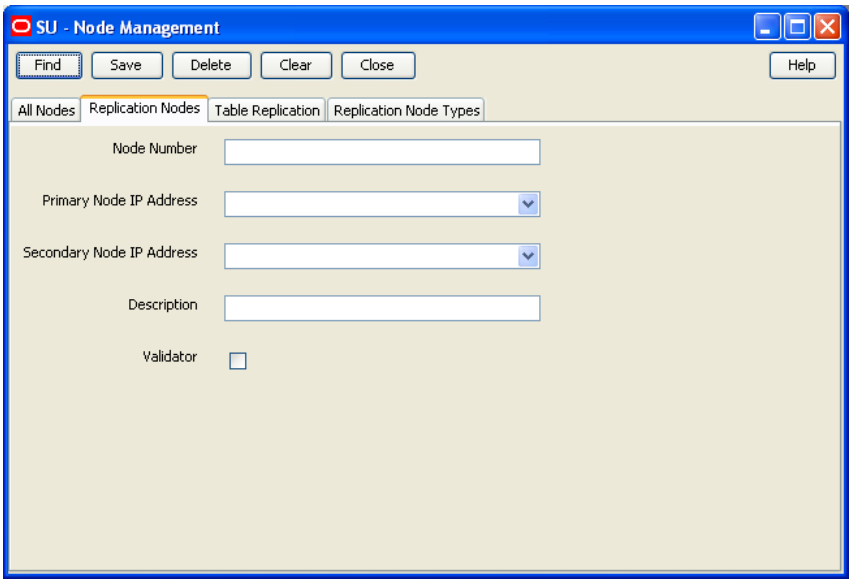
Follow these steps to configure the details for all nodes.

Step	Action
1	In the Service Management System UI, select **Operator Functions > Node Management**. **Result:** You see the **All Nodes** tab in the Node Management screen. 

Step	Action
2	Click **Find**. **Result:** You see the Find All Nodes screen. 
3	Click **Search**. **Result:** You should see an entry for the SMS node in the node table.
4	Select the node on the table and click **Close**. **Result:** You see the node details on the **All Nodes** tab. 
5	Verify the node details and make any necessary changes. **Note:** You should use the Internal IP Address for the node or hostname. If you use the hostname, then this must resolve to the correct internal IP address for the node.
6	Click **Save**. **Note:** If you are unable to save the node details after making changes to the **IP Address** field, then you will need to delete the existing record and create a new one.
7	Repeat steps 2 through 6 for all other nodes. To clear field values before adding another node, click **Clear**.

Configuring Replication Nodes

Follow these steps to configure the nodes used in replication.

Step	Action
1	Select the **Replication Nodes** tab in the Node Management screen. 
2	Enter the replication node information, referring to the table you created during *Replication Planning* (on page 7). In the **Node Number** field, enter the replication node ID. For example, for the primary SMS node you are configuring, enter `1`.
3	Select the corresponding internal IP address from the **Primary IP** drop down list.
4	Enter the node description in the **Description** field.
5	If you are configuring the SMS node, select the **Validator** check box. For all other nodes this box should not be selected.
6	Click **Save**.
7	Repeat steps 2 to 6 for all the other nodes, skipping step 5 for SLC and VWS nodes.

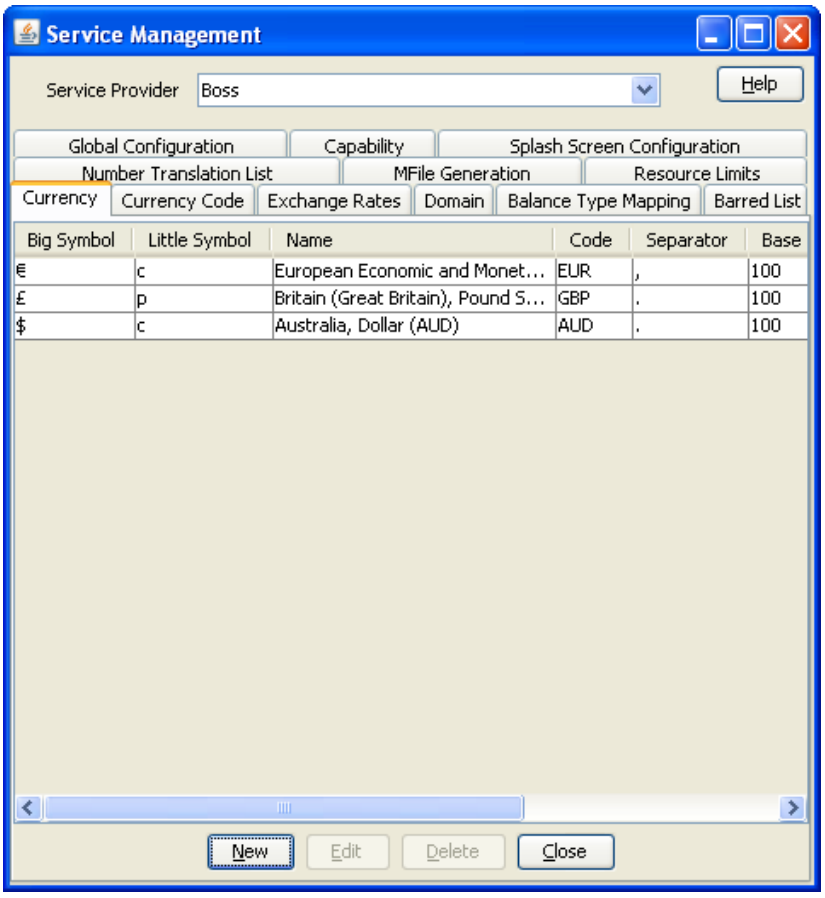
Tip: Use the Find screen for replication nodes to review replication node configuration. For further information on replication configuration, refer to the *Service Management System User's Guide*.

Configuring Resource Limits

Follow these steps to configure resource limits. You must set resource limits for your service provider before you create VWS domains.

Step	Action
1	From the **Services** menu in the Service Management System UI, select **Prepaid Charging > Service Management.** **Result:** You see the Service Management screen.

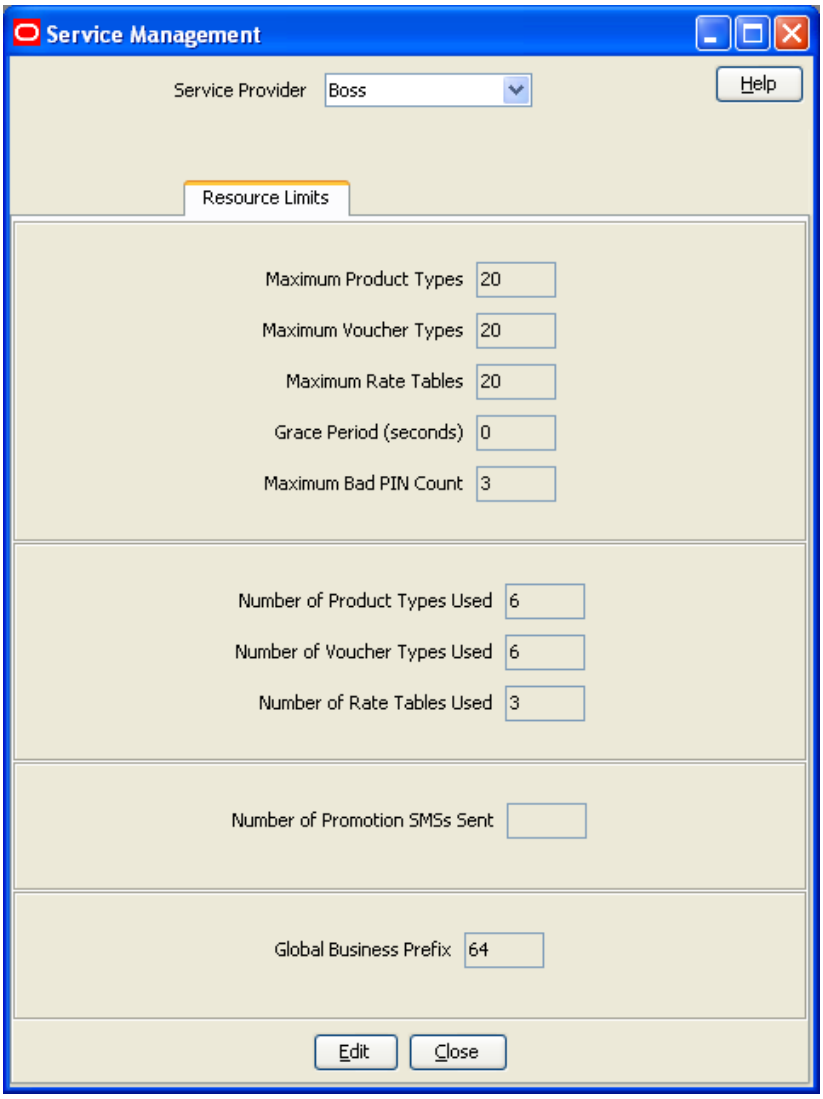
Step	Action



2 Select the **Resource Limits** tab.

Result: You see the **Resource Limits** tab on the Service Management screen.

Step	Action



3 Select the service provider for whom you want to set resource limits.

Note: The default service provider for the PCST is `OCNCCtemplate`.

4 Click **Edit**.

5 Select the **Limits** option and specify the service provider's limits for the following:

- Maximum Product Types
- Maximum Voucher Types
- Maximum Rate Tables
- Grace Period (period of time in seconds before a call begins to be charged)
- Maximum Bad Pin Count

6 Select the **Business Prefix** option, and specify the **Global Business Prefix** for the service provider.

7 Click **Save**.

Note: This defines the minimum configuration for service provider limits.

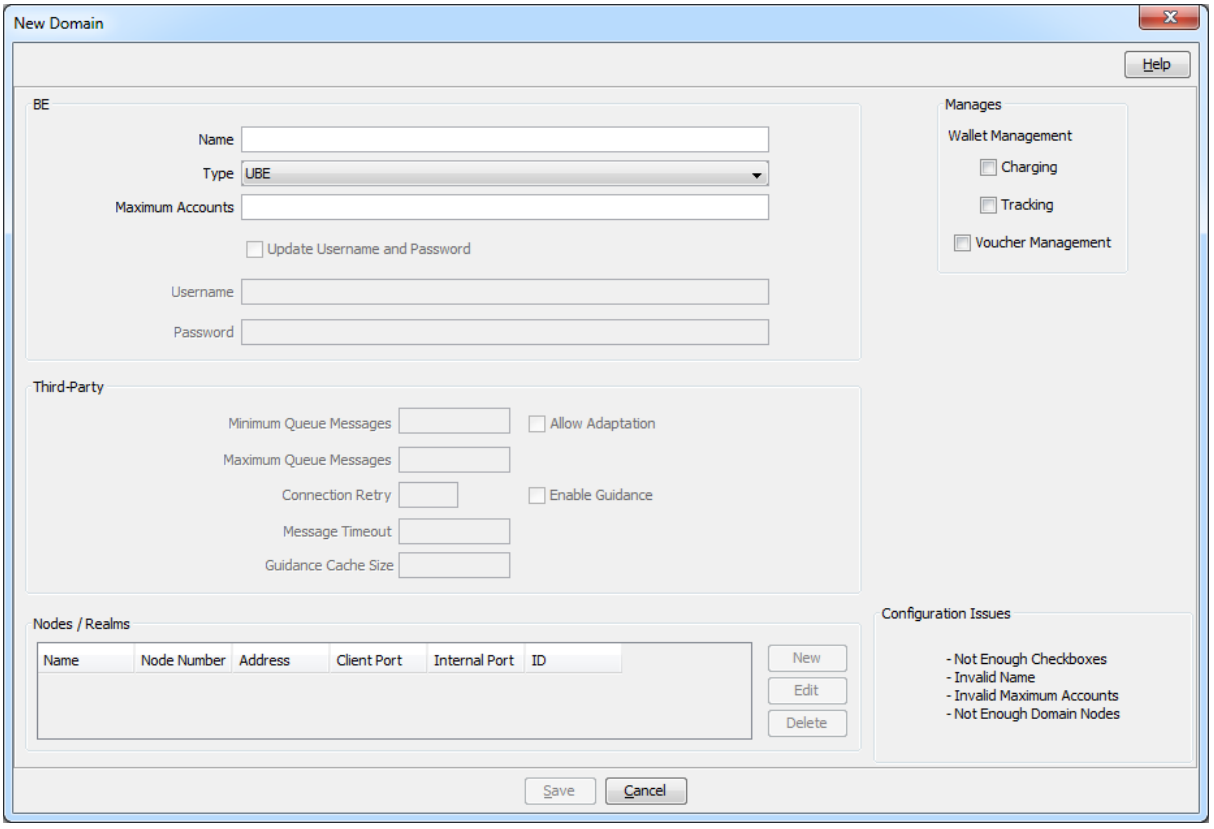
Configuring VWS Domains

Follow these steps to configure the VWS domains. For each domain you will need to define a pair of servers (a primary VWS and a secondary VWS).

Step	Action
1	From the **Services** menu in the Service Management System UI, select **Prepaid Charging > Service Management.**
2	Select the service provider for whom you want to configure the VWS domain. **Note:** The default service provider for the PCST is `OCNCCtemplate`.
3	Select the **Domain** tab, and click **New**. **Result:** The *New Domain screen* (See example on page 102) appears.
4	Enter the domain name in the **Name** field. For example, enter **`VWS Domain 1`**.
5	From the **Type** drop down list, select `UBE`.
6	Specify the maximum number of accounts this domain will be able to handle in the **Maximum Accounts** field. For example, enter **`1000000`**.
7	In the **Manages** section, select **Charging**, **Tracking** and **Voucher Management**.
8	In the **Nodes** section, add the primary and secondary nodes. See *Adding node details* (on page 102) for details.
9	Click **Save**.
10	Repeat steps 3 through 9 for each VWS domain. For more information on domains, refer to *Service Management* in *Charging Control Services User's Guide*.

Example New Domain Screen

Here is an example New Domain screen.

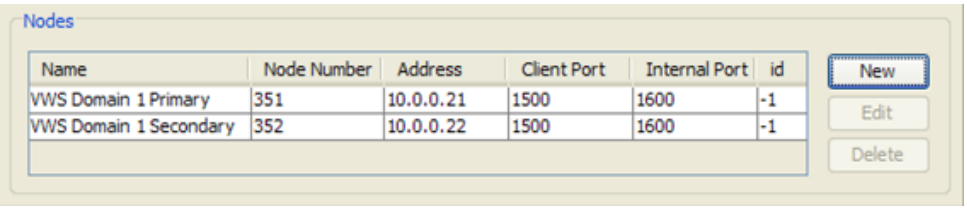


Adding Node Details

Follow these steps to add primary and secondary nodes to a VWS domain.

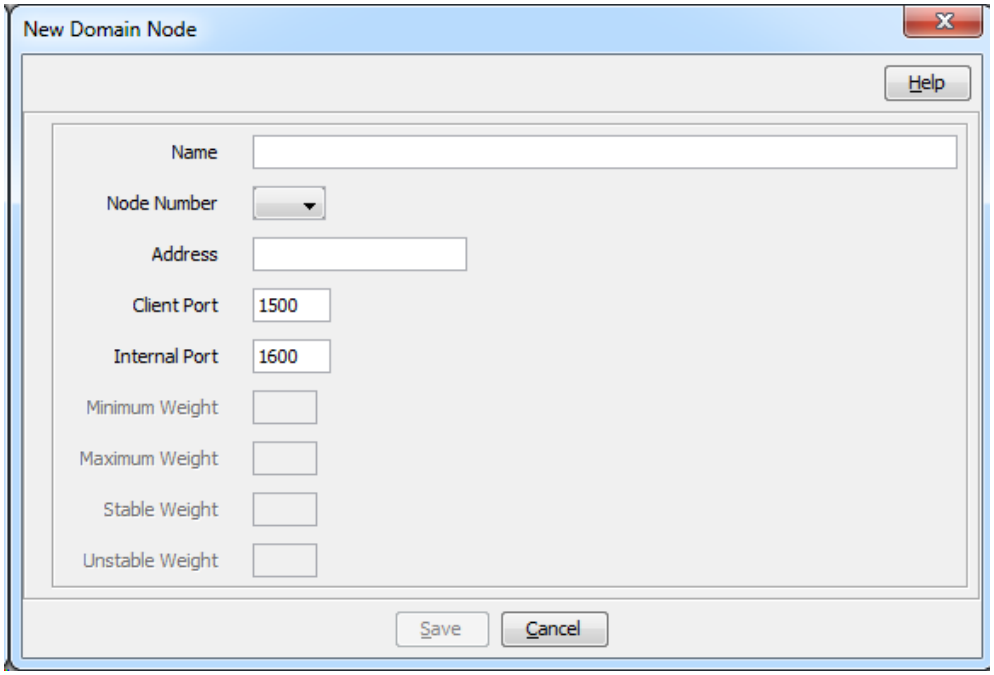
Step	Action
1	From the Nodes section of the New Domain screen, click **New**. **Result:** The *New Domain Node screen* (See example on page 103) appears.
2	Enter the node name in the **Name** field, for example, **`VWS Domain Primary`**. You must enter a unique name.
3	Select the **Node Number** from the drop down list. This will be the corresponding replication node ID for this VWS node. **Note:** Where there is more than one node for a domain, the lower numbered node is the primary node.
4	The node's IP address is automatically populated in the **Address** field. If you have a dedicated billing network, change this to the dedicated billing IP address for this node.
5	The **Client Port** field is automatically set to `1500`. You may change this if required.
6	The **Internal Port** field is automatically set to `1600`. You may change this if required.
7	Click **Save**.

Step	Action
8	Repeat steps 1 through 7 to add the secondary node for this domain. **Result:** The new nodes are listed in the Nodes section of the screen.



Example New Domain Node Screen

Here is an example New Domain Node screen.



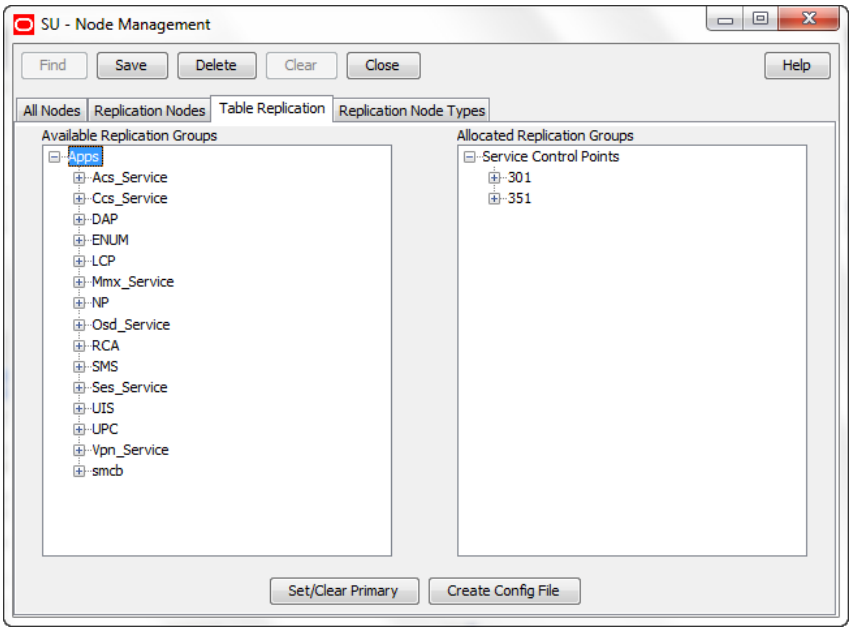
Configuring Replication Tables

Follow these steps to configure table replication for each node.

Note: You must add all tables to be replicated to each node. For VWS nodes, some replication tables will be configured automatically during the VWS domain creation.

Step	Action
1	In the Service Management System UI, select **Operator Functions > Node Management**, then select the **Table Replication** tab.

Step	Action



2 Add all the required tables to be replicated to each node (the node can be identified by replication ID).

To add a table, drag and drop the table from the **Available Groups** section on the left to the relevant node number in the **Allocated Replication Groups** section on the right.

3 The required tables for the SLC and VWS have been pre-configured. To immediately add all the required tables select `Apps` in the **Available Replication Groups** list.

4 Keeping the mouse button depressed, drag the icon across to the **Allocated Replication Groups** list. Drop on the required node name by releasing the mouse button.

Result: The **Node Type Filter Selection** dialog appears.

5 Select the **Node Type** from the drop-down list. Select:

- `scp` for SLC
- `be` for VWS

Note: Some replication groups are added automatically when you create a domain.

6 Click **OK**.

Result: The replication group will be allocated to the selected node.

7 When replication tables have been configured for all the nodes, click **Save**.

Result: You see the **Save Complete** message and the details are saved.

Note: Do not click **Create Config File** as you do not need to create the replication configuration file at this stage. This will be created as part of VWS node configuration.

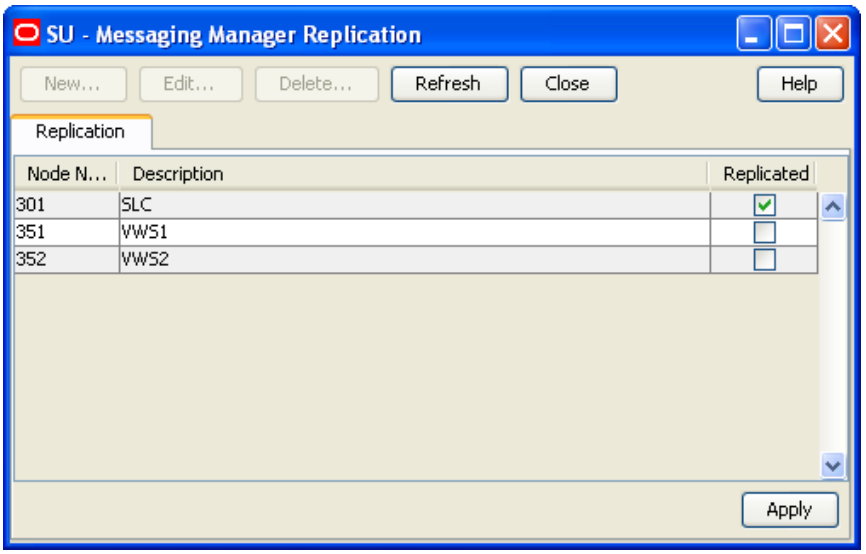
8 Click **Close**.

Result: The Node Management screen will be closed.

9 From the **File** menu on the Service Management System screen, select **Logout & Exit**.

Result: All your updates will be saved to the database, including any updates that have been cached.

10 Re-open the SMS main screen. See Accessing SMS for more information.

Step	Action
11	Select **Services > Messaging Manager > Replication**. **Result:** You see the **Replication** tab in the Messaging Manager Replication screen. 
12	Select only the check box for all SLC nodes. **Important:** You should ensure that check boxes for all VWS nodes are not selected.
13	Click **Apply**, and then click **Close**.

Configuring VSSP

To complete VSSP configuration, add the lines in the following files:

- **acs.conf**:
  ```
  ssf (vssp,NOA=4,Address=32495123452,interface=vssp)
  ssf (sca,NOA=4,Address=32495123452,interface=sca)
  ```
  See *acs.conf configuration file* (on page 110) for details.
- **sms.jnlp**:
  ```
  <param name="ssfs" value="sca" />
  ```
  This file is located at **/IN/html/sms.jnlp**

Setting Default Currency

You must set a default currency for your country. The system currency is set when you install the SMS software using the OUI. You configure the system currency in the Global Configuration screen and the Currency tab in the SMS GUI.

If you have installed a service template, the default currency is automatically set to the first country in the list that has the selected default currency. To correctly set the default currency for your country:

1 Create a new currency with the correct country.
2 Delete the old one.

See the discussion of currency configuration and global configuration in *Charging Control Services User's Guide* for more information.

OSD Configuration

About OSD Configuration

Open Services Development (OSD) enables third parties to submit html (WSDL) files that invoke control plans. You should perform the following configuration in the Open Services Development screen for OSD:

- On the **Service Providers** tab configure the OSD ports for all OSD interfaces on all SLC nodes.
- On the **Client ASPs** tab configure the clients that will be using OSD. For SMS notifications, this will be all the SMS and VWS nodes.

Note: Use the information you prepared in *OSD configuration planning* (on page 7) to configure details of the OSD interfaces, IP addresses and TCP port numbers.

If you will be using `beServiceTrigger` to send real time wallet notifications to OSD, then you must ensure that the `beServiceTrigger` user has been set up. See *Setting the beServiceTrigger User and Password* (on page 79). To enable `beServiceTrigger` to connect to the client ASP, you must set the user and password for `beServiceTrigger` and for the client ASP to be the same.

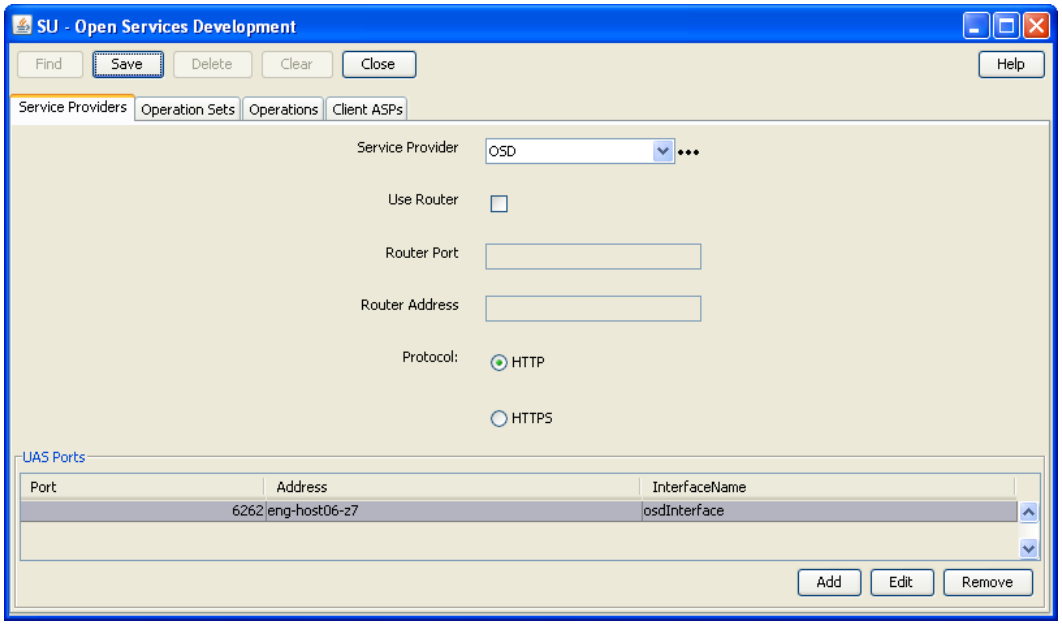
Accessing OSD

Follow these steps to open the Open Services Development (OSD) screen.

Step	Action
1	Launch the Service Management System UI. See *Opening SMS Using Webstart* (on page 95) for details.
2	From the **Services** menu, select **Open Services Development**. **Result:** You see the **Service Providers** tab in the Open Service Development window.

Service Providers Tab

Here is an example **Service Providers** tab in the Open Services Development screen.

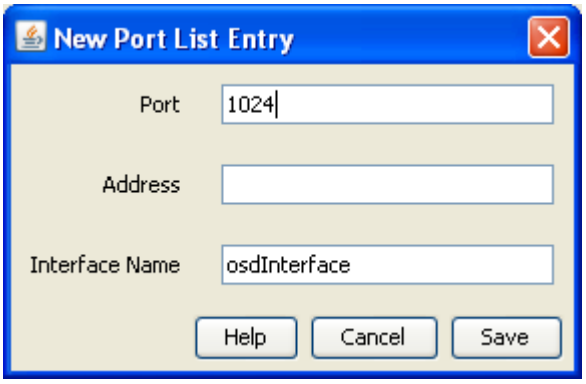


Configuring OSD Ports

Configure OSD ports by defining the IP address, port, and interface name for all OSD interfaces on all SLC nodes. Follow these guidelines:

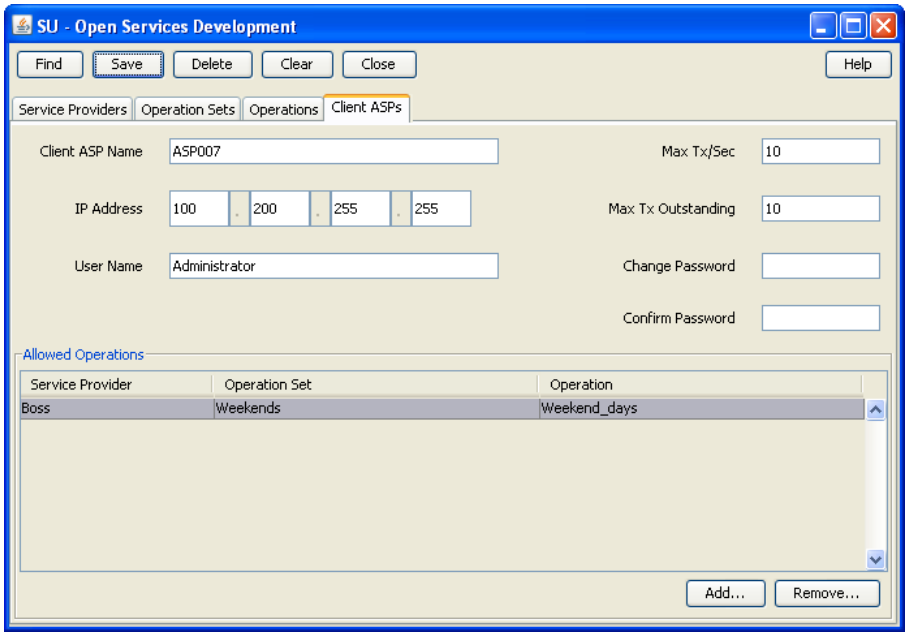
- If the OSD port will be used for internal communication between the SLC nodes, and the SMS or VWS nodes, then configure the SLC port and IP address to match the **eserv.config** file triggering section address and port information for the SMS or VWS nodes.
- Configure the interface name for the OSD port to match the configured OSD interface running on the SLC SLEE.

Follow these steps to configure OSD ports for the `OCNCCtemplate` service provider.

Step	Action
1	Click the **Service Providers** tab in the Open Service Development screen. **Result:** You see the **Service Providers** tab in the Open Services Development screen. For an example screen, see Service Providers tab.
2	Select `OCNCCtemplate` from the **Service Provider** drop down list.
3	Click **Add**. **Result:** You see the New Port List Entry screen. 
4	Add the IP **Address**, **Port** and **Interface Name** for all OSD interfaces on all SLC nodes using the information prepared in *OSD configuration planning* (on page 7).
5	After adding each entry, click **Save**.

Client ASPs Tab

Here is an example **Client ASPs** tab.



Configuring Client ASPs

Use the information you prepared in *OSD configuration planning* (on page 7) to configure the client ASPs that will be using OSD. You should add clients for:

- SMS notifications, for all the SMS and VWS nodes.

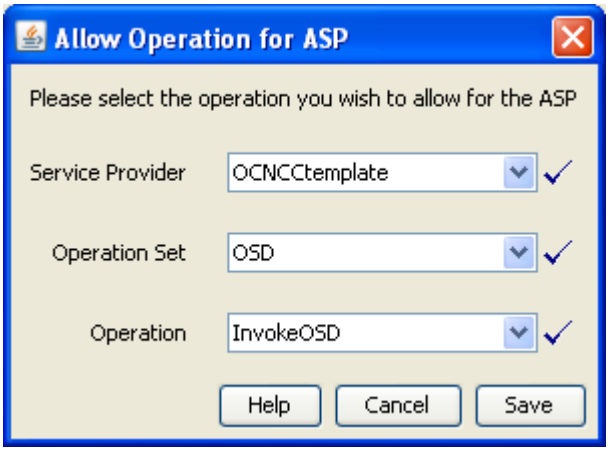
Follow these steps to configure the client ASPs.

Step	Action
1	Select the **Client ASPs** tab in the Open Services Development screen. **Result:** You see the **Client ASPs** tab. For an example screen, see Client ASPs tab.
2	Enter the name of the node in the **Client ASP Name** field. This will be one of the following: • The name of the SMS or VWS node for which you are configuring the ASP.
3	In the **IP Address** field, enter the IP address from which the client ASP node will connect to the SLC node.
4	In the **User Name** field, enter the username that the client ASP will use to authenticate itself on the SLC. **Important:** To enable `beServiceTrigger` to connect to the client ASP, you must specify the username for `beServiceTrigger` for VWS and SMS client ASPs.
5	Set **Max Tx/Sec** to `10`.
6	Set **Max Tx Outstanding** to `10`.
7	Set the password for the SOAP HTML header in the **Change Password** and **Confirm Password** fields. **Important:** To enable `beServiceTrigger` to connect to the client ASP, you must set password to the password for `beServiceTrigger` for VWS and SMS client ASPs.
8	Click **Save**. **Result:** The **Add** button becomes available.

Step	Action
9	Click **Add** to add allowed operations for this ASP. To add allowed operations for VWS or SMS clients, see Adding allowed operations for VWS and SMS clients.
10	Repeat these steps until all the clients have been configured.

Adding Allowed Operations for VWS and SMS Clients

Follow these steps to add the `InvokeOSD` operation to the list of allowed operations for a VWS or SMS client ASP.

Step	Action
1	On the **Client ASPs** tab, click **Add**. **Result:** The **Allow Operation for ASP** screen appears, with the following default field values: • **Service Provider** is the currently selected provider in other tabs. • **Operation Set** is the first in the list for the provider. • **Operation** is the first in the list for the operation set. 
2	Select the `OCNCCtemplate` **Service Provider** from the drop down list. **Note:** The selected provider will be updated in the other OSD tabs and you will be prompted to save any unsaved changes.
3	Select the `OSD` **Operation Set** from the drop down list.
4	Select the `InvokeOSD` **Operation** from the drop down list.
5	Click **Save**.

Configuration Files on the SMS

About SMS Configuration Files

Some configuration for the NCC software components is set in the following configuration files on the SMS node:

- **eserv.config**
- **acs.conf**

You should review the configuration in these files. For details, see *Checking* **eserv.config** *File Parameters* (on page 132).

eserv.config Configuration File

The **eserv.config** file is a shared configuration file, from which most NCC applications read their configuration. Each NCC node (SMS, VWS, and SLC) has its own version of the configuration file, containing configuration relevant to that machine. The configuration file contains many different parts or sections, each application reads the parts of the **eserv.config** file that contains data relevant to it. It is located in the **/IN/service_packages/** directory.

The **eserv.config** file format allows hierarchical groupings, and most applications make use of this to divide up the options into logical groupings.

Example eserv.config Parameter Section

This example shows CCS wallet handler configuration in **eserv.config**.

```
CCS = {
    reservationHandler = {
        reservationLengthTolerance = 60 # in milliseconds
        summariseWalletTolerance = 60000
    }
}
```

To identify a particular configuration item in the file, use notation such as this:

```
CCS.reservationHandler.summariseWalletTolerance
```

acs.conf Configuration File

The **acs.conf** configuration file contains configuration specific to the ACS application. It is located in the **/IN/service_packages/ACS/etc/** directory.

Checking Configuration File Parameters

This table lists the configuration parameters that you should review in **eserv.config** and **acs.conf**.

To make changes, log in as the user root and edit the relevant configuration file.

Parameter	Description	File name
`CCS.ccsProfileDaemon.triggering.osd_scps`	Set to a comma separated list of the IP:port combinations for all OSD interfaces on the SLC nodes that will be used for sending notification SMS messages. (Use the source IP address). **Example** `osd_scps=[ "10.1.0.10:2222","10.1.0.20.2222"]`	**eserv.config**
`CCS.ccsCDRLoader.AcctHistPlugin.acsCustomerIdData.acsCustomerId`	Change the parameter value to the ID of the 'OCNCCtemplate' ACS Customer. To determine the ACS Customer ID enter the following SQL command: **`select id from acs_customer where name = 'OCNCCtemplate';`**	**eserv.config**

Parameter	Description	File name
`triggering.scps`	Defined in the triggering section for the smsTrigDaemon process. This sets the SLC that will receive BPL execution requests from the SMS. Set to a comma separated list of the IP:port combinations for the SLCs. Set port to **3072**, and use the internal IP address, if configured. **Example** `scps=["10.1.0.10:3072","10.1.0.20.3072"]`	**eserv.config**
`acsStatisticsDBInserter.MasterServerLocation`	Set to an IP address or hostname for the SLC running the acsStatsMaster. Normally set to the first SLC node. You should use the default setting: "acsStatsMaster". The hostname must resolve to the correct SLC IP address using the **/etc/hosts** file. See *Setting IP Addresses and Hostnames* (on page 76). **Example** `MasterServerLocation acsStatsMaster`	**acs.conf**

VWS Node Configuration

Introduction

The configuration tasks in this section define the minimum configuration for the VWS node. They are:

- Replicate data to the VWS domains. See *Replicating Data to the VWS* (on page 111).
- Check configuration in **eserv.config**. See *Checking* **eserv.config** (on page 113).
- Reread configuration for the inittab processes. See *Rereading Configuration for inittab Processes* (on page 114).

You should perform the tasks in this section if you installed:

- NCC software and Prepaid Charging Service Template (PCST)

After completing these configuration tasks you must:

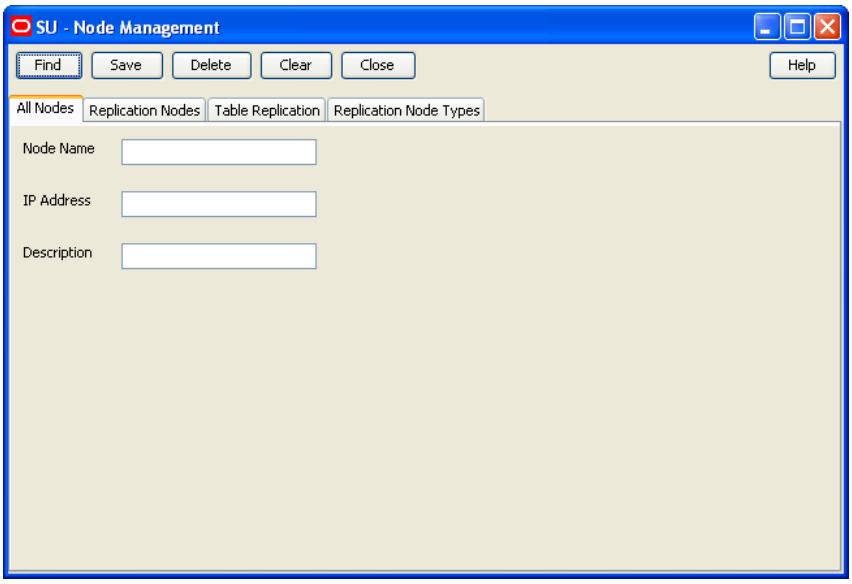
- Generate MFiles. See *MFile Generation* (on page 115)
- Start the SLEE. See *Starting the SLEE* (on page 117)

Replicating Data to the VWS

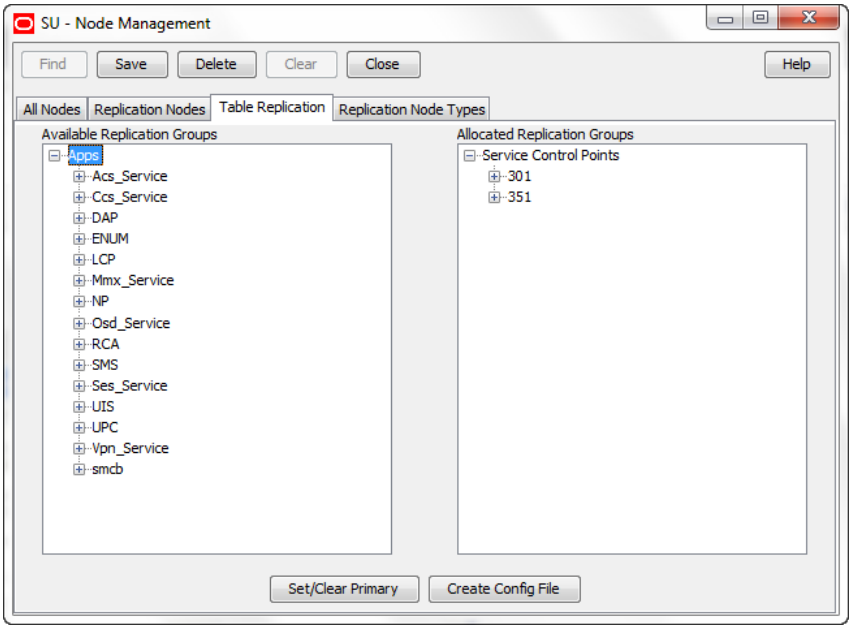
Follow these steps to enable replication between the SMS and VWS, and to perform initial synchronization of the data.

Step	Action
1	In the Service Management SystemUI, select **Operator Functions > Node Management**. **Result:** You see the **All Nodes** tab on the Node Management screen.

Step	Action



2 Select the **Table Replication** tab.



3 Click **Create Config File**.

4 Click **OK**.

5 On the VWS nodes, open a shell session and review the output in the **updateLoader** log file. This file is located at **/IN/service_packages/CCS/tmp/**.

Example command

```
tail -20f /IN/service_packages/CCS/tmp/updateLoaderWrapper.log
```

Step	Action

Example output

```
Node 351 sms comparison / resync cient ready.
Sep 29 15:09:36.750197 updateLoader (4369)  NOTICE: Update Loader replication
process started (node 351)
Canceling any current client action.
Sep 29 15:09:36.753543 updateLoader (4369)  NOTICE: Reached master node 1 at
'192.168.44.40'
RES: Wed Sep 29 15:09:39 2010: Node 351, started processing 781 SMS and 0 SCP
records.
RES: Wed Sep 29 15:09:39 2010: Node 351, resynchronization pass 1, started
processing of 781 SMS and 0 SCP records.
Sep 29 15:09:39.282806 smsCompareResyncClient (4383) NOTICE: Beginning
resynchronisation for node 351.
RES: Wed Sep 29 15:09:39 2010: Node 351, resynchronization pass 1, finished
processing 781 of 781 SMS and 0 of 0 SCP records.
Sep 29 15:09:39.803041smsCompareResyncClient (4383) NOTICE: Ending
resynchronization for node 351. Resynchronization was successful.
RES: Wed Sep 29 15:09:39 2010: Node 351, finished processing 781 of 781 SMS and 0
of 0 SCP records, resync completed successfully.
Sep 29 15:09:40.827498 updateLoader (4369) NOTICE: Resynchronization Finished.
Processing Queued Updates
Node 351 SMS comparison/resync client ready.
```

Checking eserv.config

This table lists the configuration parameters that you should review in **eserv.config** on the VWS node. It is located at **/IN/service_packages/**. For more information, see **eserv.config** *configuration file* (on page 110).

Refer to *Voucher and Wallet Server Technical Guide* for details about **eserv.config** on the VWS.

To make changes, log in as the user root and edit the **eserv.config** file.

Parameter	Description
`cmnPushFiles = [ "-h", "host"]`	Set this parameter to an IP address or hostname of the SMS that will be used by the VWS to transfer files, such as CDRs, to the SMS. You should set this parameter in the following sections of **eserv.config**: • `CCS.ccsVWARSExpiry` • `CCS.ExpiryMessages` • `CCS.notificationPlugin` • `BE.cmnPushFIles` **Note:** You should use the default host "usms.CdrPush", and ensure that this hostname resolves to the correct SMS IP address through the **/etc/hosts** file. See *Setting IP Addresses and Hostnames* (on page 76).
`BE.serverId`	Set this parameter to the ID of the domain to which this VWS belongs. To determine the domain IDs, log on to the SMS as the user smf_oper, and enter the following SQL query: **`sqlplus /`** **`SQL> select domain_id, name from ccs_domain;`** **`DOMAIN_ID NAME`** **`--------- --------`** **`1 TESTVWS`**
`BE.amPrimary`	Set this parameter to: • True - if this is the primary VWS in the domain • False - if this is the secondary VWS

Parameter	Description
BE.triggering.scps	Set this parameter to a comma separated list of IP:port combinations for all xmlTcap interfaces on SLC nodes. **Example** `scps = ["10.1.0.10.3072","10.1.0.20:3072"]`
BE.triggering.osd_scps	Set this parameter to a comma separated list of IP:port combinations for all OSD interfaces on the SLC nodes that are used for sending notification SMS messages. **Example** `osd_scps = ["10.1.0.10.2222","10.1.0.20:2222"]`
BE.beVWARS.plugins	The entry `"ccsVWARSReservationExpiry.so"` must only be included on the primary VWS. You must stop the VWS and remove this line from the list of plug-ins.

SLEE.cfg Configuration

The **SLEE.cfg** file is located on both primary and secondary VWS nodes in the **/IN/service_packages/SLEE/etc/** directory.

It includes the following configuration for the ccsSLEEChangeDaemon interface:

```
INTERFACE=ccsSLEEChangeDaemon ccsSLEEChangeD.sh /IN/service_packages/CCS/bin 1 EVENT
```

The ccsSLEEChangeDaemon should run on the primary VWS node only. Edit **SLEE.cfg** on the secondary VWS to ensure that the SLEE does not try to run this interface from the secondary VWS. You should comment out the following line:

```
# INTERFACE=ccsSLEEChangeDaemon ccsSLEEChangeD.sh /IN/service_packages/CCS/bin 1
EVENT
```

Note: Attempts by the SLEE to run ccsSLEEChangeDaemon from the secondary VWS node will result in recurring alarms being generated.

Rereading Configuration for inittab Processes

Follow these steps to force the system to reread the configuration for inittab processes on the VWS.

Step	Action
1	Log in to the VWS as the user `root`.
2	Cycle between inittab run level 2 and run level 3. Set the inittab run level to 2 by entering the following command: **`init 2`**
3	Check the run level by entering: **`who -r`** **Example output** `run-level 2 Jan 13 10:46 2 0 3`
4	Set the inittab run level to 3 by entering: **`init 3`**
5	Check the run level by entering: **`who -r`** **Example output** `run-level 3 Jan 13 10:46 3 1 2`

MFile Generation

Introduction

MFiles are files which are generated on the Voucher and Wallet Server (VWS) nodes, and provide a fast lookup for a subset of the data in the E2BE database. MFiles can be generated to provide either CLI-DN rating data or event data.

Following the NCC installation and after any rating change, you must compile new MFiles for each VWS node. You compile MFiles on the **MFile Generation** tab in the Service Management screen.

Note: For more information, see *Charging Control Services User's Guide*.

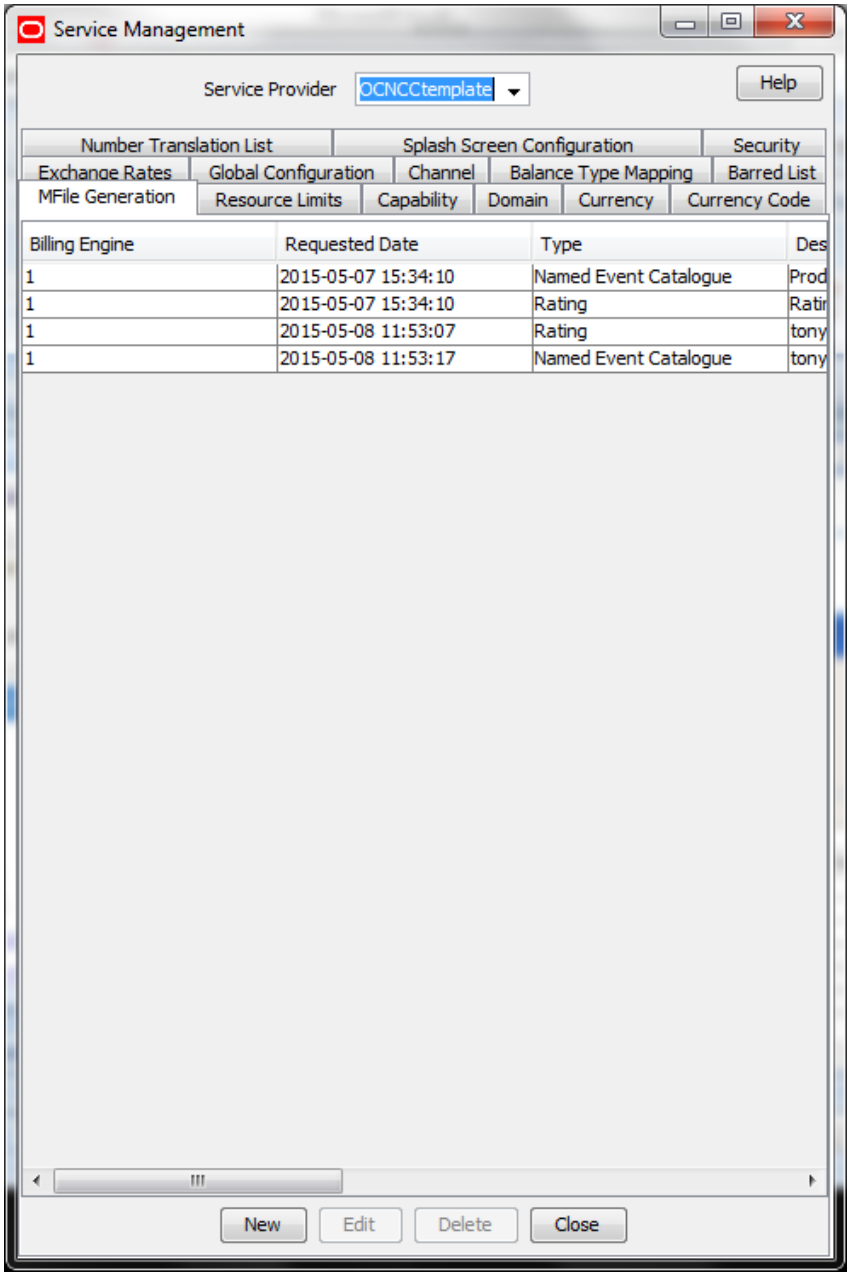
Accessing the MFile Generation Tab

Follow these steps to access the **MFile Generation** tab in the Service Management window.

Step	Action
1	Open the Service Management System main screen if it is not already open. See *Opening SMS Using Webstart* (on page 95) for more information.
2	Select **Services > Prepaid Charging > Service Management** and select the **MFile Generation** tab.

MFile Generation Tab

Here is an example **MFile Generation** tab.



MFile Fields

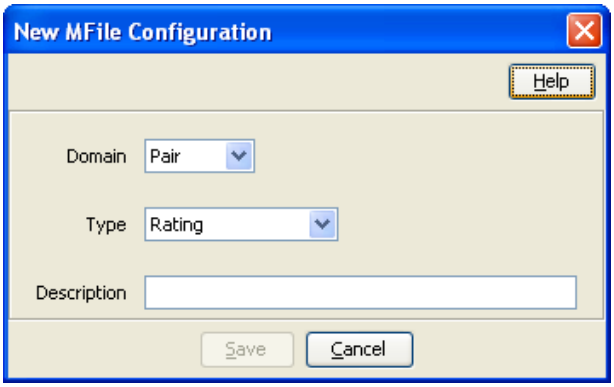
This table describes the function of each field.

Field	Description
Domain	The Voucher and Wallet Server pair you will send the MFile to. This field is populated by the **Domain** tab. This field cannot be edited once it is initially saved.
Description	The description of the MFile.
Request Date	The date the MFile was last requested to run.

Field	Description
	Note: This field is only available on the Edit MFile screen.
Type	Whether the MFile is for: • Rating • Named event catalogue

Compiling MFiles

Follow these steps to compile MFiles.

Step	Action
1	On the **MFile Generation** tab, click **New**. **Result:** You see the New MFile Configuration screen. 
2	Select the name of the primary Domain from the **Domain** drop down list.
3	Select `Rating` from the **Type** drop down list.
4	Enter a description such as **`Initial install`** in the **Description** field.
5	Click **Save**. **Result:** The ccsMFileCompiler on the VWSs within the chosen domain will build up a new MFile and notify the VWS processes.
6	Repeat these steps to create MFiles for **Type** `Named Event Catalogue`.
7	Repeat these steps to create the MFiles for any other configured VWS domain.

Starting the SLEE

Starting the SLEE on the VWS

All critical application processes on the VWS node run in the SLEE.

To manually start the SLEE on the VWS node, log on as the user `NCC_runtime user` and enter the following command:

```
/IN/bin/slee-ctrl start
```

To restart the SLEE, enter the following command as the user `NCC_runtime user`:

```
/IN/bin/slee-ctrl restart
```

SLC Node Configuration

Checking acs.conf on the SLC

This table lists the configuration parameters that you should review in **acs.conf** on the SLC node. The **acs.conf** file is located in the **/IN/service_packages/ACS/etc/** directory.

To edit the **acs.conf** file you must be logged in as the user `NCC_runtime user`.

For more information on **acs.conf**, see *acs.conf configuration file* (on page 110).

Parameter	Description
acsStatsMaster masterStatsServer acsStatsLocal masterStatsServer	Set both parameters to an IP address or hostname of the SLC running the acsStatsMaster, normally the primary SLC node. See *Setting IP Addresses and Hostnames* (on page 76). **Note:** You should use the default setting of `acsStatsMaster` and ensure that this hostname resolves to the correct SLC IP address in the **/etc/hosts** file.

Messaging Manager Configuration

Introduction

The Messaging Manager (MM) application handles receiving, routing, and sending SMS messages through a variety of protocols. This section explains how to implement a basic initial configuration of MM to enable:

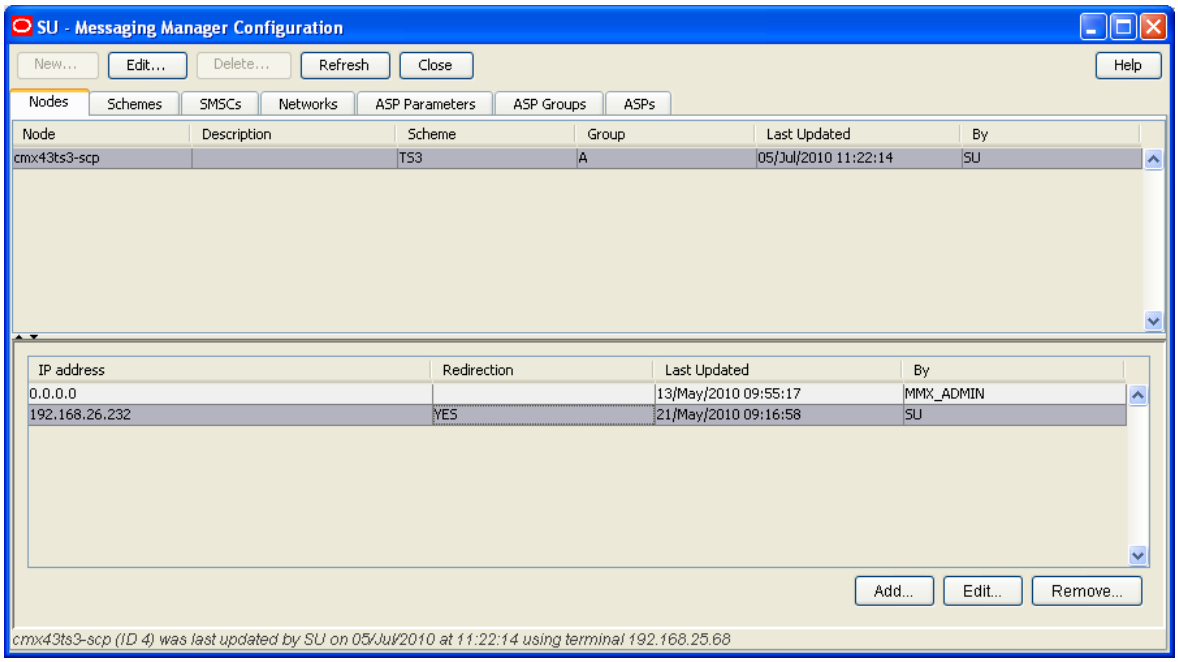
- Inbound SMS messages to be received through EMI, SMPP or MAP (MO_FwdSM).
- All inbound SMS messages to trigger the prepaid charging services to charge the sender.
- SMS messages to be routed using FDA (First Delivery Attempt). The FDA will be attempted using MAP. If this fails, then the SMS will be submitted to the SMSC using the MAP, SMPP or EMI protocol. MMX routing node should be added as per the instructions described in the Messaging Manager Technical Guide.

For more information on configuring MM, see *Messaging Manager User's Guide* and *Messaging Manager Technical Guide*.

Accessing the Messaging Manager Configuration Screen

Follow these steps to open the Messaging Manager Configuration screen.

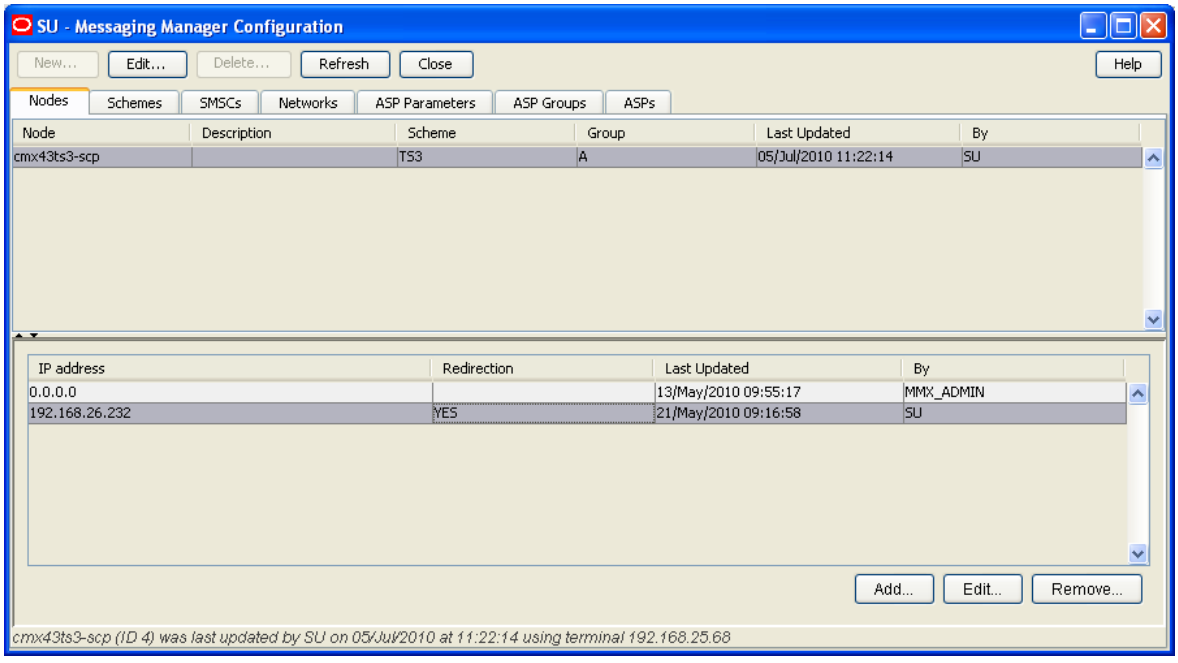
Step	Action
1	On the Service Management System main menu, select the **Services** menu.
2	Select **Messaging Manager**, then **Configuration.** **Result:** You see the Messaging Manager Configuration screen.



Viewing the Nodes

Follow these steps to view the MM nodes.

Step	Action
1	Select the **Nodes** tab on the Messaging Manager Configuration screen. **Result:** You see the MM nodes listed on the tab.



Messaging Manager Scheme Configuration

Introduction

The **Schemes** tab in the Messaging Manager Configuration screen allows you to manage all the routing definitions for the Messaging Manager configuration.

A scheme is a set of rules that define how to treat and route messages.

You specify rules for multiple protocols to define:

- Paths to use
- Connections to use
- Billing domain to use
- Filtering to use
- Actions to take

PrepaidPack Schemes

The MM PrepaidPack scheme is automatically created when you install the Prepaid Charging Service Template (PCST).

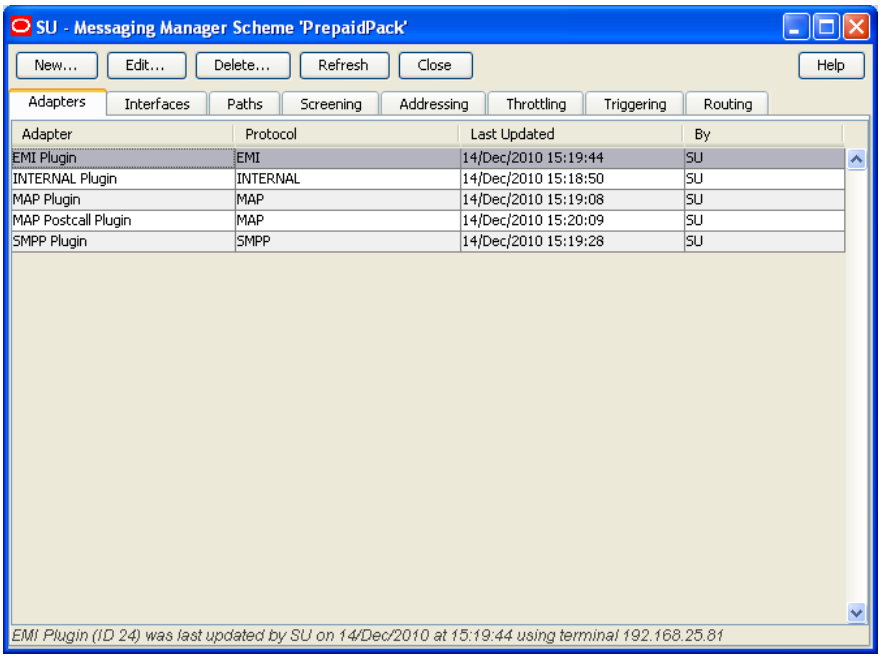
You will need to perform some additional configuration for these schemes. The additional configuration tasks are described in this section.

Opening the Scheme

Follow these steps to open the template scheme that you want to configure.

Step	Action
1	Select the **Schemes** tab in the Messaging Manager Configuration screen.
2	In the table on the **Schemes** tab, select the scheme record to open. Select `PrepaidPack`.
3	Open the record, by performing one of the following actions: • Double-click on the record in the table • Click **Open**. **Result:** You see the Messaging Manager Scheme screen for the selected scheme record.

Step	Action



Scheme Tabs

The Scheme screen enables you to configure the scheme details.

This table describes the tabs on the screen and tells you whether any configuration is required.

Tab	Description	Configuration
Adapters	Defines the adapters which route traffic to and from this scheme. Entries in the **eserv.config** file identify which adapters will be loaded by Messaging Manager at startup. The link between **eserv.config** and the adapter configuration values is made on this tab.	No changes required.
Interfaces	Defines the interfaces which are available to this scheme.	No changes required.
Paths	Defines the paths available to this scheme.	See *Paths Configuration* (on page 122).
Screening	Defines the anti-spam rules for the Scheme.	Screening is not used in this configuration.
Addressing	Defines the addressing rules for the scheme.	Addressing has been pre-configured so that all inbound SMS messages are assigned a domain named "SMSMO", while all internally generated SMS messages are assigned a domain named "Notification SMS".
Throttling	Reports summary of all the domain throttling values.	Throttling is not used in this configuration.
Triggering	Defines the triggering rules for the scheme.	See *Configuring Triggering Rules* (on

Tab	Description	Configuration
		page 123).
Routing	Defines the routing rules for the scheme.	See *Configuring Routing Rules* (on page 124).

Paths Configuration

A number of paths have been pre-configured for the service template schemes. This table lists the possible configuration for each path.

Path	Configuration
To SMSC using EMI	For sending SMS messages to an SMSC using the EMI protocol. If you do not require this scenario: • Select the path and click **Edit** • Deselect the **Enabled** check box • Click **Save** If you do require this scenario: • Select the path • In the Connection panel, select the connection labeled "To SMSC using EMI" • In the Connection panel, click **Edit** • In the **Remote Listen** field, configure the SMSC TCP/IP address and port Messaging Manager will use to connect to the SMSC • In the **Remote username** and **Remote password** fields configure the username and password MM will use to log into the SMSC. • Click **Save**
To SMSC using SMPP	For sending SMSs to an SMSC using the SMPP protocol. If you do not require this scenario: • Select the path and click **Edit** • Deselect the **Enabled** check box • Click **Save** If you do require this scenario: • Select the path • In the Connection panel, select the connection labeled "To SMSC using SMPP" • In the Connection panel, click **Edit** • In the **Remote Listen** field, configure the SMSC TCP/IP address and port MM will use to connect to the SMSC • In the **Remote username** and **Remote password** fields configure the username and password MM will use to log into the SMSC. • Click **Save**
Internal_DR INTERNAL_SME	These paths are used internally between MM and other NCC components. No configuration is required.

Path	Configuration
To SMSC using MAP	For sending SMS messages to an SMSC using the MAP protocol. If you do not require this scenario: • Select the path and click **Edit** • Deselect the **Enabled** check box • Click **Save** If you do require this scenario: • Select the path • In the Connection panel, select the connection labeled "SMSC" • You can configure the SSN and PC or GT values of the SMSC in the corresponding fields. MM will set these values in outgoing MAP messages to reach this SMSC. • Click **Save**

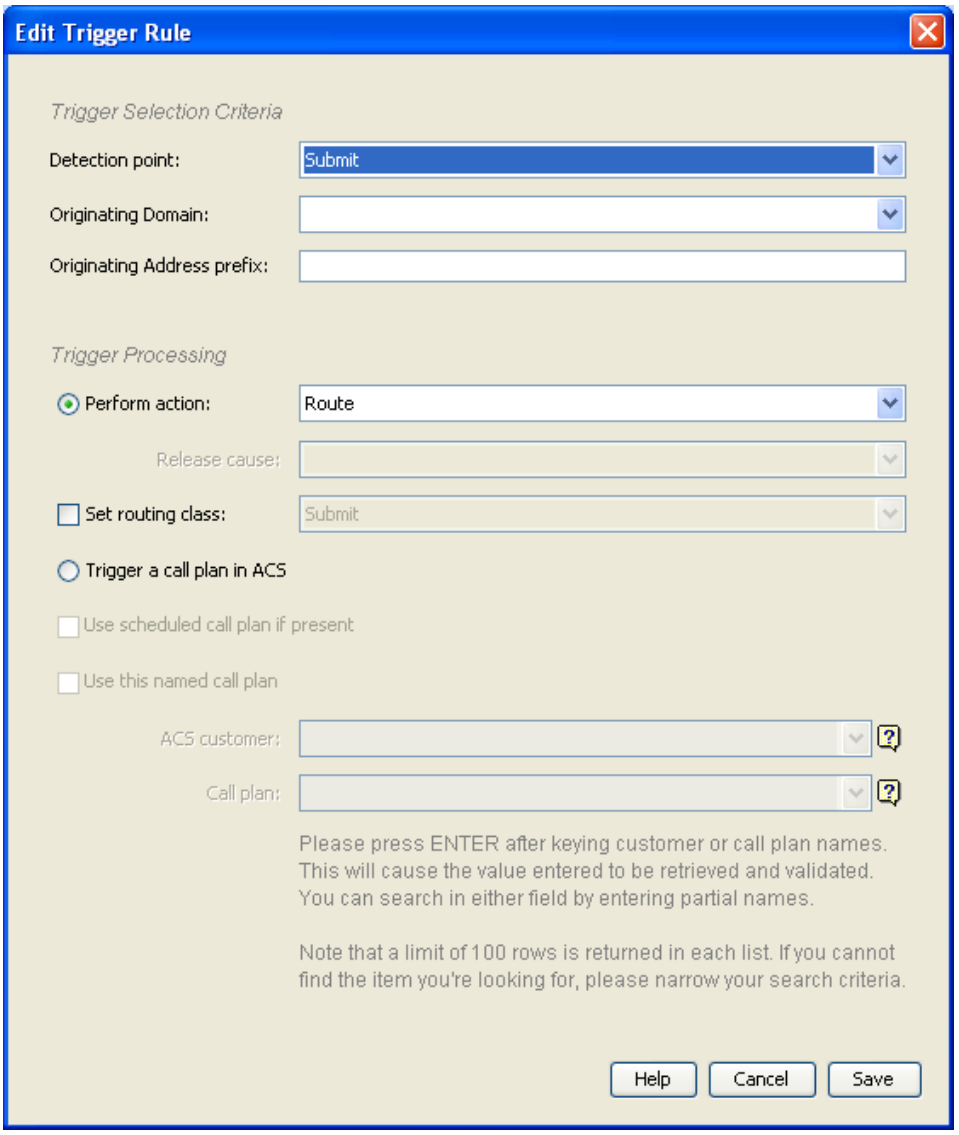
Configuring Triggering Rules

Triggering for all inbound SMS messages has been pre-configured to trigger the template service. In general, all other internally generated SMS messages will be routed to their destination.

Follow these steps to configure whether or not direct delivery (FDA) is attempted for inbound SMS messages.

Step	Action
1	Select the **Triggering** tab in the Messaging Manager Scheme screen.
2	From the table on the tab, select the `Submit` detection point.
3	Select the rule for `Orig.Domain = SMSMO` in the PrepaidPack scheme.
4	Click **Edit**. **Result:** The Edit Trigger Rule screen appears.

Step	Action



5 Select the **Set routing class** check box.

6 Select one of the following options from the **Set routing class** drop down list:

- Submit - if no FDA is required. SMS messages will be sent to the SMSC
- FDA - if FDA is required. MM will first attempt to deliver SMS messages directly before sending them to the SMSC

7 Click **Save.**

Configuring Routing Rules

Routing has been pre-configured so that the SMS messages sent to the SMSC are sent using the MAP path (using the MAP protocol). If required you can change this to route SMS messages using the EMI or SMPP path.

Follow these steps to configure routing for the selected service template using EMI or SMPP.

Step	Action
	Select the **Routing** tab in the Messaging Manager Scheme screen.
1	Select the `Submit` routing class. **Result:** All rules for the selected routing class are displayed in the table on the tab.
2	Select a rule in the table.
3	Click **Edit**. **Result:** The Edit Routing Rule screen applicable to the routing class for the selected record appears.
4	Remove the path named `To SMSC using MAP` from the rule. In the Path table in the **Paths Sequencing** section of the Edit Routing Rule screen, select the path `To SMSC using MAP` and click **Remove**.
5	From the **Paths sequencing** drop down list, select either the EMI or SMPP path by selecting one of the following paths: • `To SMSC using EMI` • `To SMSC using MAP`
6	Click **Add**.
7	Click **Save** to save the routing rule to the configuration database.
8	Repeat these steps for each rule.
9	Click **Close** to close the scheme.

MM SMSC Configuration and Node Mapping

Introduction

To complete Messaging Manager (MM) configuration for the Prepaid Charging Service Template (PCST), you should:

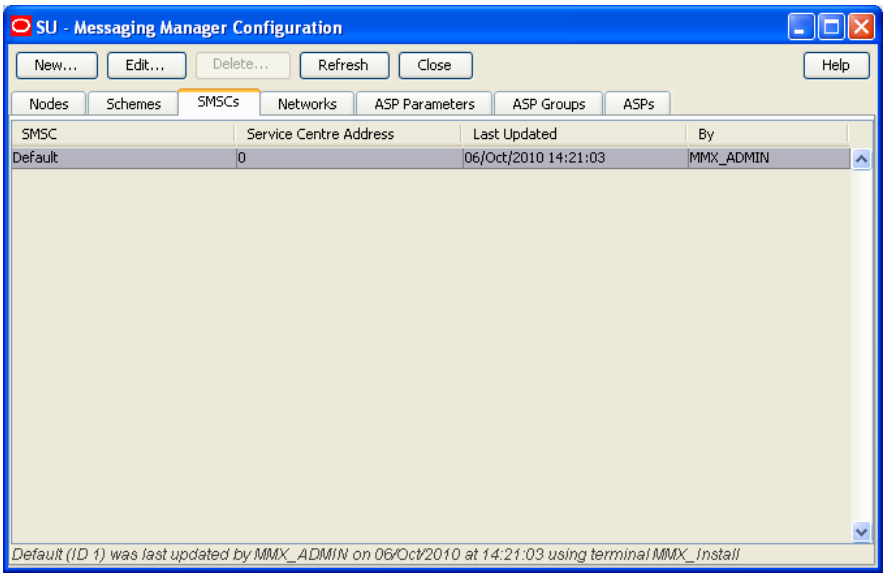
- Configure the default SMSC
- Map the Messaging Manager nodes to the `PrepaidPack`

Configuring Default SMSC

Follow these steps to configure the default SMSC.

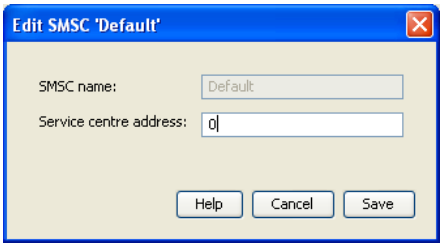
Step	Action
1	Select the **SMSCs** tab in the Messaging Manager Configuration screen. **Result:** You see the available SMSCs listed on the tab.

Step	Action



2 Select the `Default` SMSC record in the table and click **Edit**.

Result: You see the Edit SMSC 'Default' screen.



3 In the **Service centre address** field, enter the address to set in outbound MAP messages.

4 Click **Save**.

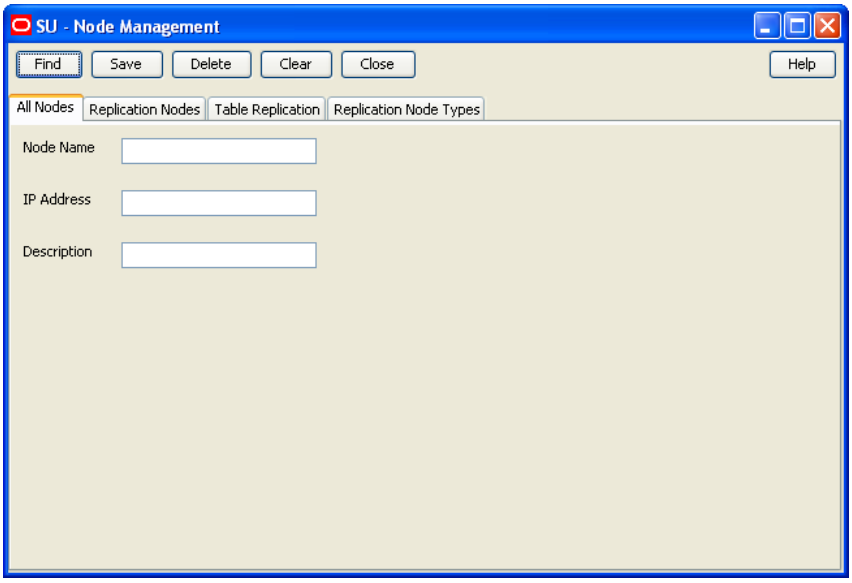
Mapping Nodes to Service Template Schemes

Follow these steps to map MM nodes to the required service template scheme.

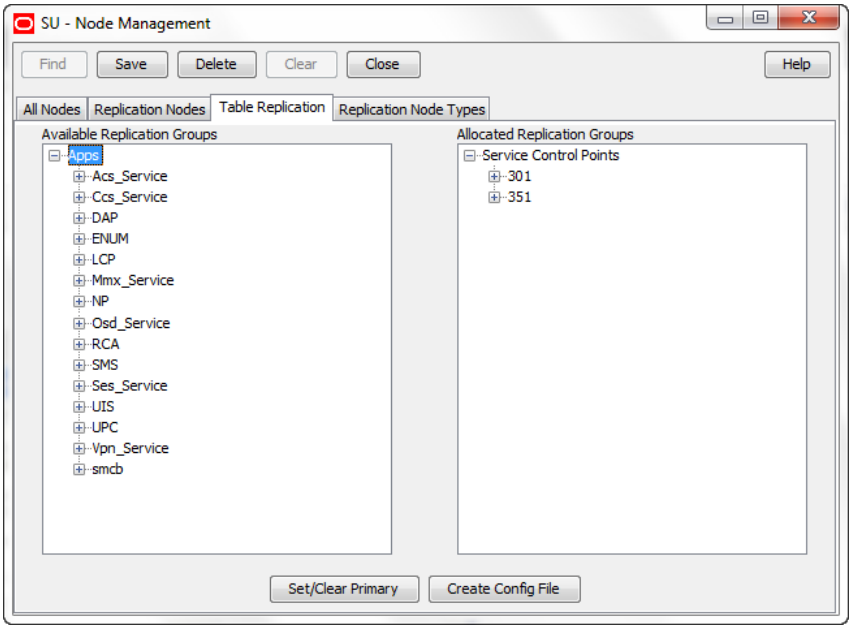
Step	Action
1	Select the **Nodes** tab in the Messaging Manager Configuration screen. **Result:** You see the available MM nodes listed on the tab. For an example screen, see *Viewing the Nodes* (on page 119).
2	Select the first node in the table and click **Edit**.
3	In the Edit Node <*node name*> screen, select the service template **Routing Scheme**.
4	In the table, select the IP address for the NIC_A interface. This will be the IP address this SLC will use for EMI and SMPP connections.
5	Click **Save**.
6	Repeat these steps for each MM node.

Replicating Data to the SLC

Follow these steps to enable replication between the SMS and SLC and perform initial synchronization of the data.

Step	Action
1	Open the Service Management System screen. **Note:** If the SMS UI is already running from previous tasks, close the running instance first and then start a new instance. To start a new instance, select **Logout & Exit** from the **File** menu in the Service Management System screen.
2	Select **Operator Functions > Node Management** in the Service Management System screen. **Result:** You see the **All Nodes** tab on the Node Management screen. 

Step	Action
3	Select the **Table Replication** tab.



4	Click **Create Config File**.

Note: If you have already created a replication configuration file as part of another task and you have not changed the replication configuration, then you do not need to re-create the replication configuration file.

5	Click **OK**.
6	On the SLC node, open a shell session and review the output in the **updateLoader.log** file. This file is located at **/IN/service_packages/SMS/tmp/updateLoader.log**.

Example output

```
# tail -20f /IN/service_packages/SMS/tmp/updateLoader.log

RES: Wed Sep 29 15:09:39 2010: Node 301, started processing.
RES: Wed Sep 29 15:09:39 2010: Node 301, resynchronization pass 1, started
processing.
Sep 29 15:09:39.282806 smsCompareResyncClient (1052) NOTICE: Beginning
resynchronization for node 301.
RES: Wed Sep 29 15:09:39 2010: Node 301, resynchronization pass 1, finished
processing 0 SMS and 0 SCP records.
Sep 29 15:09:39.803041smsCompareResyncClient (1052) NOTICE: Ending
resynchronization for node 301. Resynchronization was successful.
RES: Wed Sep 29 15:09:39 2010: Node 301, finished processing 0 SMS and 0 SCP
records, resync completed successfully.
Sep 29 15:09:40.827498 updateLoader (858) NOTICE: Resynchronization Finished.
Processing Queued Updates
Node 301 SMS comparison/resync client ready.
Sep 29 15:09:40.872190 updateLoader (858) NOTICE: Finished Processing Queued
Updates
```

Configuring xmsTrigger.sh on the SLC

You must update the **xmsTrigger.sh** file to add the Messaging Manager node name configuration for the SLC node.

Follow these steps to update **xmsTrigger.sh**.

Step	Action
1	Log in to the SLC node as the user root.
2	Edit the **xmsTrigger.sh** script to add the Messaging Manager node name in the *exec* line.

SCTP Configuration

Introduction

The NCC SIGTRAN software uses the native Solaris SCTP stack for transport. You should review the default and suggested values for the SCTP parameters and adapt these to suit your network environment.

SCTP Parameters

This table describes the most important SCTP parameters and provides a suggested value for use with SIGTRAN networking environments.

Note: These are suggested values only. Optimal values will depend on local network conditions and desired behavior. For more information, including default values and value ranges, see *Oracle Solaris Tunable Parameters Reference Manual*.

Parameter	Description	Suggested Value
sctp_xmit_hiwat	Sets the default send window size in bytes	1048576
sctp_recv_hiwat	Controls the default receive window size in bytes	256000
sctp_rto_min	Sets the lower boundary in milliseconds for the retransmission timeout (RTO) for all the destination addresses of the peer.	500
sctp_rto_max	Controls the upper bound in milliseconds for the retransmission timeout (RTO) for all the destination addresses of the peer.	5000
sctp_rto_initial	Controls the initial retransmission timeout (RTO) in milliseconds for all the destination addresses of the peer.	1000
sctp_pp_max_retr	Controls the maximum number of retransmissions over a specific path. When this number is exceeded for a path, the path (destination) is considered unreachable.	4
sctp_pa_max_retr	Controls the maximum number of retransmissions (over all paths) for an SCTP association. The SCTP association is aborted when this number is exceeded.	8
sctp_max_in_streams	Controls the maximum number of inbound streams permitted for an SCTP association.	10
sctp_initial_out_streams	Controls the maximum number of outbound streams permitted for an SCTP association.	10

Editing SCTP Parameters

Follow these steps to edit the SCTP parameters and apply the new values automatically on startup.

Step	Action
1	Log in to the SLC as the user root.

2	Set the value for the parameter you want to change using the ndd -set command.
	Example commands
	`ndd -set /dev/sctp sctp_xmit_hiwat 1048576`
	`ndd -set /dev/sctp sctp_recv_hiwat 256000`
	`ndd -set /dev/sctp sctp_rto_min 500`

3	To apply these values automatically on startup, the commands should be placed in a script and run from rc2.d.
	Example
	Place the commands in the **/etc/init.d/nettune** file and then enter the following commands:
	`chown root:root /etc/init.d/nettune`
	`chmod 744 /etc/init.d nettune`
	`ln -s /etc/init.d/nettune /etc/rc2.d/S99nettune`

SIGTRAN Configuration

Introduction

The NCC SIGTRAN component provides SIGTRAN M3UA and SUA capabilities for sending and receiving traffic. The NCC template configuration defines four default M3UA Sigtran stack instances. These are for:

- Inbound CAMEL traffic
- Inbound INAP traffic
- Inbound USSD traffic
- Inbound and outbound MAP traffic

Each stack is a separate instance of the m3ua_if process, controlled by individual startup scripts and configuration files and started from the SLEE. You will need to edit each startup script to change the settings to match the target sigtran network.

For more information on SIGTRAN, please refer to the SIGTRAN specific user documentation.

SIGTRAN Startup Scripts and Configuration Files

This table lists the startup scripts and configuration files for the sigtran SLEE interfaces.

Note: All startup scripts are located in the **/IN/service_packages/SLEE/bin** directory on the SLC. All configuration files are located in the **/IN/service_packages/SLEE/etc** directory on the SLC.

SLEE Interface	Protocol	Startup Script	Configuration File
m3uaCapIf	CAMEL	**m3ua_CAP_if.sh**	**m3ua_CAP.config**
m3uaInapIf	INAP	**m3ua_INAP_if.sh**	**m3ua_INAP.config**
m3uaUssdIf	USSD	**m3ua_USSD_if.sh**	**m3ua_USSD.config**
m3uaMmxIf	MAP	**m3ua_MMX_if.sh**	**m3ua_MMX.config**

Startup Script Parameters

The startup scripts are used to configure SCCP (for example, Global Titles, SSNs) and maximum traffic rates.

This table describes the mandatory parameters which must be configured.

Parameter	Description	Default Value
`retgt`	Sets the default SCCP Origination Global Title Address. The format depends on the GT type: • 1 = "1,N*oa,Address_Digits*" • 2 = "2,*Trans_TypeAddress_Digits*" • 3 = "3,*Trans_Type,Num_Plan,Address_Digits*" • 4 = "4,*Trans_Type,Num_Plan,Noa,Address_Digits"* **Example** "4,0,1,4,123456789" - replace 123456789 with the GTA to be used for each SLC/stack	"4,0,1,4,123456789"
`retni`	Sets the National Indicator in a return address. • 0 - to set the NI to 0 (ITU). • 1 - to set the NI to 1 (ANSI).	0
`retpc`	Sets the default SCCP Origination Point Code. If 0, then no Point Code is set	0
`retri`	Sets the default SCCP Origination Address's routing indicator. • 0 - route on GT • 1 - route on PC	0
`retssn`	Sets the default SCCP Origination Address SSN value.	CAMEL: 146 INAP: 242 USSD: 8 MAP: 8
`ssns`	A comma separated list of SCCP subsystem numbers (SSNs) that this stack will register to.	CAMEL: 146 INAP: 242 USSD: 8 MAP: 8
`rejectlevel`	Sets the maximum number of new inbound transaction attempts (TCAP_BEGIN) per second that will be accepted by this stack.	CAMEL: 400 INAP: 50 USSD: 50 MAP: 200

Configuration File Parameters

The configuration files are used to configure SCTP and M3UA.

This table describes the mandatory configuration file parameters that you should configure.

Parameter	Description	Default Value
`opc`	Local point-code for this SLC/stack.	

Parameter	Description	Default Value
stpPCs	List of the SG-STPs (signaling gateways) to which outbound traffic will be routed.	[1,2]
remote_host	For each signaling gateway, the primary and secondary SCTP IP address (or hostname) to be used to connect to this SG.	["sg1_sig1", "sg1_sig2"]
remote_port	SCTP port on the SG to connect to.	2900
local_host	For each signaling gateway, the primary and secondary SCTP IP address (or hostname) to be used on the SLC to connect to this SG.	["hostname_sig1", "hostname_sig2"]
local_port	SCTP port on the SLC to connect from.	

eserv.config Configuration on the SLC

Checking eserv.config File Parameters

The **eserv.config** file on the SLC defines configuration for NCC. It is located at **/IN/service_packages/eserv.config**.

For more information on **eserv.config**, see **eserv.config** *configuration file* (on page 110).

You should review the configuration parameters listed in the following table in the **eserv.config** file. You must log in to the SLC as the user root to edit the configuration.

Parameter	Description

BeClient.clientName	Set to a unique name on each SLC node.
	Example configuration
	`BeClient = {`
	`  clientName = "slc`*X*`-ccsBeClient"`
	`}`
	Where *X* is a unique number per SLC node.

CCS.smcbMacroNodes.HomeCountryCode	Set this to the country code of the HPLMN.
	Example configuration
	`CCS = {`
	`  smcbMacroNodes = {`
	`  HomeCountryCode = "44"`
	`  }`
	`}`

CCS.ccsMacroNodes.BSAnnBalanceTypes.acsCustomerId	Change the parameter value to the ID of the 'OCNCCtemplate' ACS Customer. To determine the ACS Customer ID enter the following SQL command: **`select id from acs_customer where name = 'OCNCCtemplate';`**
CCS.ccsMacroNodes.BSAnnBalanceTypes.balTypeIds	Change the parameter value to the ID of the General Cash Balance. To determine the General Cash Balance ID enter the following SQL command: **`select id from ccs_balance_type where acs_cust_id =`** *`ID`* **`and name = 'General Cash';`** Where: • *ID* is the ACS Customer ID

Parameter	Description

XMS.xmsTrigger.adapters.GT
XMS.xmsTrigger.adapters.SCA
	Set these values to the GT and SCA which will be used in inbound MAP messages addressed to this SLC node.
	Example configuration
	`adapters = [`
	`{`
	`GT = "5114406267"`
	`SCA = "5114406267"`
	`}`
	`]`
	Note: Set these parameters in all the adapters sections of xmsTrigger.

RIMS.MAP.GT RIMS.MAP.SCA	Set these values to the GTA and SCA that will be used in outbound MAP SRI_SM messages sent out by Messaging Manager for the FDA functionality.

LCP.sriPlugin.gmscAddress
LCP.atiPlugin.gsmScfAddress
	Set these values to the GT that will be set as the originating address in outbound SRI and ATI messages used for location based capabilities.
	Example configuration
	`LCP = {`
	`sriPlugin = {`
	`gmscAddress = "441234567890"`
	`}`
	`atiPlugin = {`
	`gsmScfAddress=441234567890`
	`}`
	`}`

Rereading Configuration for inittab Processes

Follow these steps to force the system to reread the configuration for inittab processes on the SLC.

Step	Action
1	Log on to the SLC as the user root.
2	Cycle between inittab run level 2 and run level 3. Set the inittab run level to 2 by entering the following command: **`init 2`**
3	Check the run level by entering: **`who -r`** **Example output** `run-level 2 Jan 13 10:46 2 0 3`
4	Set the inittab run level to 3 by entering: **`init 3`**
5	Check the run level by entering: **`who -r`** **Example output** `run-level 3 Jan 13 10:46 3 1 2`

Configuring and Starting the SLEE

SLEE Configuration File

The Service Logic Execution Environment (SLEE) is configured in the **SLEE.cfg** file located in the **/IN/service_packages/SLEE/cfg** directory.

For information on the SLEE, see *Service Logic Execution Environment Technical Guide*.

SLEE Commands

All critical application processes on the SLC run in the SLEE.

To manually start the SLEE, log in as the user `NCC_runtime user`, and enter the command:

```
/IN/bin/slee-ctrl start
```

To restart the SLEE, log in as the user root, and enter:

```
/IN/bin/slee-ctrl restart
```

To check the status of the SLEE, and see a list of the processes that are running, enter:

```
/IN/bin/slee_ctrl status
```

Chapter 9

Verifying the NCC Installation

Overview

Introduction

This chapter explains how to verify that the Oracle Communications Network Charging and Control (NCC) applications work correctly following the installation.

In this chapter

This chapter contains the following topics.

About Verifying the Installation

Introduction

Verify the NCC installation to ensure the system works correctly after installation. This chapter describes how to set up NCC and the tests that you should run to verify the installation. These tests cover the basic features of the installation.

Prerequisites

Before you start verifying the installation, you must ensure that all:

- Nodes are running
- Post-installation tasks are completed

Note: If you have the Application Management Pack for Communications available in your Oracle Enterprise Manager installation, the availability test will be automatically reported after discovery of the nodes. Otherwise the following manual steps can be performed:

On the SMS Node

Check that the SMS processes are running by runniing the following commands:

```
ps -ef | grep smsNamingServer
ps -ef | grep smsTaskAgent
ps -ef | grep smsMaster
ps -ef | grep ccsBeOrb
```

Check the Oracle listener is running by running the following command:

```
lsnrctl status
```

To verify the SLC and VWS nodes on SMS:

Step	Action
1	Log into SMS as the root user.

Step	Action
2	Click the **Operators** tab and select **Node Management.**
3	In the **All Nodes** screen, enter the node details in the **Node Name** field. The node name can be either SLC or VWS.
4	In the **Replication Nodes** screen, enter the node number in the **Node Number** field.
5	Click **Find**. The **Find Replication Node** dialogue box appears.
6	Click **Search**. **Result:** The available nodes details are displayed.

On the SLC Node

Check that the SLC processes are running by running the following commands:

```
ps -ef | grep slee_acs
ps -ef | grep replicationIF
ps -ef | grep diameterBeClient
ps -ef | grep BeClient
```

On VWS Node

Check that the SLC processes are running by running the following commands:

```
ps -ef | grep beServer
ps -ef | grep beVWARS
ps -ef | grep beSync
ps -ef | grep beGroveller
```

About Collecting Diagnostic Data with RDA HCVE

Overview

Remote Diagnostic Agent (RDA) is an Oracle standard tool that you use to collect diagnostic data about your NCC system. When you submit a service request (SR) to Oracle Technical Support, you must also provide an RDA output file. The RDA output file provides a comprehensive view of your system configuration and contains diagnostic data used by Oracle Technical Support to diagnose problems. This minimizes the number of requests from Oracle Technical Support for additional information, which can reduce the service request resolution time.

RDA includes a Health Check Validation Engine (HCVE) module that checks your NCC installation for known issues and common practices that impact performance, availability, and functionality. When you run HCVE, it generates a detailed report in both HTML and text formats that detail possible issues it has found on your system. You can then use the report for preventive maintenance to avoid any service disruption.

HCVE Validations on NCC Systems

RDA HCVE performs a variety of checks of your NCC system, such as ensuring that:

- Sufficient memory and disk space is available.
- The appropriate packages and scripts are installed and are configured correctly.
- The appropriate flags and parameters are set.
- acsDbCleanup.sh is configured correctly.

- The log files are set up correctly.
- The NCC system is configured to startup and shutdown the Oracle database appropriately.
- The appropriate permissions for running scripts are set correctly.

HCVE Validations on NCC Databases

RDA HCVE performs a variety of checks of your NCC database, such as ensuring that:

- The user running HCVE has sufficient privileges
- There are no invalid objects in the Oracle Database instance
- Database parameters, such as **_job_queue_process**, are set to appropriate values

Downloading and Installing RDA

Follow these steps to download and install the RDA software:

Step	Action
1	Go to the My Oracle Support Web site: http://support.oracle.com
2	In the **Knowledge Base Search & Browse** section, enter `314422.1` in the **Enter Search Terms** field, and then click **Search**.
3	In the search results, click the **Remote Diagnostic Agent (RDA) - Getting Started** link. **Result:** The Remote Diagnostic Agent (RDA) - Getting Started page is displayed.
4	In the **RDA Bundle** section of the page, click the link for the appropriate operating system.
5	Follow the directions in the **Installation Instructions** section of the page to install the RDA software.

Running HCVE on Your NCC System

Follow these steps to collect data about your NCC system:

Step	Action
1	Log in as the root user.
2	Go to the directory in which you installed RDA. **Note:** The default RDA installation directory is **/IN/service_packages/SUPPORT/rda**.
3	Run data collection by entering the following command: `./rda.pl -dT hcve:Pncc44os_sol`
4	Answer the prompts. **Result:** HCVE generates an output file.
5	Send the output file to Oracle Technical Support.

Running HCVE on NCC Databases

Follow these steps to collect data about your NCC database:

Step	Action
1	Log in as the oracle user.

Step	Action
2	Go to the directory in which you installed RDA. **Note:** The default RDA installation directory is **/IN/service_packages/SUPPORT/rda**.
3	Run data collection by entering the following command: `./rda.pl -dT hcve:Pncc44db_gen.xml`
4	Answer the prompts. **Result:** HCVE generates an output file.
5	Send the output file to Oracle Technical Support.

Appendix A

NCC OUI Installer Screens

Overview

This appendix describes the information you need to provide for each screen when you install Oracle Communications Network Charging and Control (NCC) in interactive mode. You can also access the information by clicking Help during installation.

Note: This document does not substitute for NCC installation instructions. You should read all chapters in NCC Installation Guide in preparation for installing NCC, including "*NCC System Requirements* (on page 9)" for information you need to collect in preparation for installation, and "*Installing NCC* (on page 59)" for installation procedures.

NCC OUI Installer Screens

Installation Inventory

Specify the name and location of the directory where all Oracle installations are done.

Field	Description
Inventory Directory	Enter the name and the full path to the directory where all Oracle installations are done.
Operating System Group	Select the primary Oracle inventory group.

Installation Location

Specify the name and location of the directory in which to install NCC.

Field	Description
Name	Enter the name and the full path to the **/IN** directory in which to install NCC.

Installation Type

Select the installation type.

Field	Description
SMS	Installs the NCC Service Management System (SMS) application and the SMS database. You use the SMS GUI to configure and manage NCC.
SLC	Installs the NCC Service Logic Controller (SLC) application and the SLC database. You use SLC to provide the logic to manage the calls, sessions, messages in NCC. **Note:** Ensure that SMS is installed before installing SLC.

Field	Description
SLC With Test Tools	Installs the NCC Service Logic Controller (SLC) application, the SLC database, and the SLC test tools. **Note:** Ensure that SMS is installed before installing SLC With Test Tools.
VWS	Installs the NCC Voucher and Wallet Server (VWS) application and VWS database. The Voucher and Wallet Server manages charging, vouchers, balances, and subscribers. **Note:** Ensure that SMS is installed before installing VWS.

Oracle User

Enter the Oracle database user details.

Field	Description
Oracle DB owner	Retain the default, **oracle**, which is the user name with permissions to create the Oracle database instance.
Oracle DB group	The OS group which owns the Oracle database. For example ‘dba’.

Application User

Enter the NCC runtime user details.

Field	Description
Application owner	The NCC_runtime_user i.e. the OS user that will run the application.
Application group	The NCC OS group. Fixed to ‘esg’.

Database Paths

Select one from the provided options.

Option	Description
The database, schema and application will all be installed	Select this option to install all items on the same node.
The database already exists and both the schema and application will be installed	Select this option if you have already created the database including datafiles on this or a remote node but not the database schema or application.
The database and schema already exists and only the application will be installed	Select this option if the database and schema already exists on this or a remote node and you want to only install the application.

Database Datafiles

Database Server Paths

Specify the location of the base directory and the Oracle home directory.

Field	Description
Base directory	Enter the name and the full path to the **oracle** base directory in which the database creation scripts are installed. The **oracle** base directory is the directory in which the Oracle database is installed.
Oracle home	Enter name and the full path to the Oracle Database home directory in which Oracle 12*c* database is installed.

Datafile and Redolog Paths

Specify the location of the datafile and redo log directories.

Field	Description
Datafile directory	Enter the full path to the directory where the oracle datafiles are stored.
Redo log directory	Enter the full path to the directory to store the database redo log files.

Existing Database

Database User Password

Enter the previously existing Oracle database password administrative account.

Field	Description
Oracle SID	Enter the Oracle SID.
Database hostname	Enter the hostname where the database is located.
Database user (smf, scp or e2be)	Enter the database user name.
Oracle database password	Enter the password for the Oracle database administrative accounts.

SMS GUI

Enter the information for SMS GUI.

Field	Description
Screen superuser password	Enter the password for the SMS GUI administrator user account. **Note:** The password must match with the Oracle password defined for the Oracle database installed on the SMS node.
Confirm password	Enter the password again for confirmation.
Timezone	Enter the time zone in which the date and time are displayed in the SMS GUI.

PI Admin

Enter the information for Provisioning Interface (PI) configuration.

Field	Description
PI admin password	Enter the password for PI administrator user account.
Confirm password	Enter the password again for confirmation.

SMS EDR Paths

Enter the path to the directories in which the SMS event data record (EDR) files are stored.

Field	Description
CDR Loader Input directory	Retain the default path to the directory of a single file system to store CDR input files.
CDR Loader Output directory	Retain the default path to the directory of a single file system to store CDR output files.

Default Template

Select the option to install default template.

Field	Description
Install PCST	Check the box to install Prepaid Charging Service Template (PCST).

Default Currency

Enter the details of default system currency.

Field	Description
System Currency	Select the currency name from the Name drop down box. **Note**: Only valid currency names are available from the list.
Base Value	Enter the ratio of subunits to main units of currency in the Base field. Example: 100 cents per euro = a ratio of 100.
Big Symbol	Enter the symbol that represents the main unit of the currency in the Big Symbol field (for example, € for euros).
Little Symbol	Enter the symbol that represents the subunit of the currency in the Little Symbol field (for example, c for cents).
Seperator	Enter the separator used to separate the main unit from the subunit of the currency in the Separator field. Example: In the currency of: Euros - the separator is a comma (for example, 3,20) Dollars - the separator is a decimal point (for example, $4.00)

Replication

Enter the information of the SMS host from which the current node is replicated.

Field	Description
SMS Host name	Enter the qualified hostname for the SMS server used to configure the clients that will connect to the SMS server.

VWS Config

Enter the information Voucher and Wallet Server (VWS) configuration.

Field	Description
SMS EDR Input directory	Enter the name and the full path to the directory in which the SMS event data record (EDR) input files are stored.
Primary VWS node	Select to install the primary node of a VWS pair.

Appendix B

Maintaining a Remote Database

If the SMS node is on a remote database, the following scripts (which require DBA privileges) should be run on the database node, or equivalent schema management for partitioning needs to be implemented:

- smsAddArchiveLog.sh
- hotbackup.sh
- archbackup.sh
- oraLockMonitor.sh
- fragmentation_install_oui.sh
- CCSPART_uninstall.sh
- CCSPART_create_schema.sh
- CCSPART_maintenance.sh
- CCSPART_statistics.sh
- CCSPART_capacity_monitor.sh
- CCSCPART_check_oracle.sh
- CCSCPART_statistics.sh
- CCSCPART_add_week.sh
- CCSCPART_capacity_monitor.sh
- CCSCPART_restart_job_processes.sh
- CCSCPART_install.sh
- CCSCPART_rman_exclude.sh
- CCSCPART_maintenance.sh
- CCSCPART_uninstall.sh
- CCSCPART_drop_week.sh
- CCSCPART_list_partitions.sh
- CCSVCHRPART_uninstall.sh
- CCSVCHRPART_statistics.sh
- CCSVCHRPART_capacity_monitor.sh
- CCSVCHRPART_maintenance.sh
- CCSVCHRPART_create_schema.sh

Glossary of Terms

AAA

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

ACS

Advanced Control Services configuration platform.

ANI

Automatic Number Identification - Term used in the USA by long-distance carriers for CLI.

API

Application Programming Interface

ASP

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

ATI

Any Time Interrogation - this process is used on a GSM network to interrogate the HLR for location and or subscriber information.

Base Directory

This manual assumes that the application was installed into the default directory, and with the default directory structure.

If you have installed the application into a non-standard directory or directory structure, you will have to amend some of the instructions where a full directory path has been supplied.

Note: It is not recommended to install the application in anywhere other than the default directory, and with the default directory structure.

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.

CCS

1) Charging Control Services component.

2) Common Channel Signalling. A signalling system used in telephone networks that separates signalling information from user data.

CDMA

Code Division Multiple Access is a method for describing physical radio channels. Data intended for a specific channel is modulated with that channel's code. These are typically pseudo-random in nature, and possess favourable correlation properties to ensure physical channels are not confused with one another.

CDR

Call Data Record

Note: The industry standard for CDR is EDR (Event Detail Record).

CLI

Calling Line Identification - the telephone number of the caller. Also referred to as ANI.

Connection

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

CORBA

Common Object Request Broker Architecture. It is a framework that provides interoperability between objects built in different programming languages, running on different physical machines perhaps on different networks. It specifies an Interface Definition Language, and API that allows client / server interaction with the ORB.

CPU

Central Processing Unit

DAP

Data Access Pack. An extension module for ACS which allows control plans to make asynchronous requests to external systems over various protocols including XML and LDAP.

DB

Database

Diameter

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

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.

EMI

Exchange Message Interface protocol

ENUM

E.164 Number Mapping.

FDA

First Delivery Attempt - the delivery of a short message directly to the SME rather than relaying it through the MC.

FTP

File Transfer Protocol - protocol for electronic transfer of files

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.

GUI

Graphical User Interface

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

HTML

HyperText Markup Language, a small application of SGML used on the World Wide Web.

It defines a very simple class of report-style documents, with section headings, paragraphs, lists, tables, and illustrations, with a few informational and presentational items, and some hypertext and multimedia.

HTTP

Hypertext Transport Protocol is the standard protocol for the carriage of data around the Internet.

IN

Intelligent Network

INAP

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

IOR

Inter-operable Object Reference. A reference that is used in the CORBA world that clients can use to send their requests to a particular process executing on a particular machine. Every CORBA based server has an IOR that uniquely identifies it within a distributed computing platform. IOR consists of information such as the IP address of the machine on which the process is executing, or the port number to which it is listening. This IOR is usually exported/sent to some form of central registry when the process is started up. Clients can then retrieve this information, that is, IORs, from the central registry if they want to send a request to a server.

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

LCP

Location Capabilities Pack - set of software components used by other applications to look up the location of mobile devices.

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.

MC

Message Centre. Also known as SMSC.

Messaging Manager

The Messaging Manager service and the Short Message Service components of Oracle Communications Network Charging and Control product. Component acronym is MM (formerly MMX).

MGC

Media Gateway Controller

MM

Messaging Manager. Formerly MMX, see also *XMS* (on page 156) and *Messaging Manager* (on page 151).

MO

Mobile Originated

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.

NP

Number Portability

ORB

Object Request Broker. Within an Object based communication system, an ORB keeps track of the actual addresses of all defined objects and thus is used to route traffic to the correct destination. The CORBA defines the ORB in a series of standards enabling different platforms to share common information.

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.

PI

Provisioning Interface - used for bulk database updates/configuration instead of GUI based configuration.

PL/SQL

Oracle's Procedural Language for stored procedures and packages.

PLMN

Public Land Mobile Network

RADIUS

Remote Authentication Dial-In User Service - a system of distributed security that secures remote access to networks and network services against unauthorised access.

SCA

1) Service Centre Address

2) Session Control Agent for Session Initiation Protocol (SIP)

SCCP

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

SCP

Service Control Point. Also known as SLC.

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.

Service Provider

See Telco.

SES

Subscriber Event Service is an application that enables a service provider to send text messages to roaming subscribers (both their own and foreign subscribers) when they roam in and out of their network.

Session

Diameter exchange relating to a particular user or subscriber access to a provided service (for example, a telephone call).

SGML

Standard Generalized Markup Language. The international standard for defining descriptions of the structure of different types of electronic document.

SGSN

Serving GPRS Support Node

SIP

Session Initiation Protocol - a signaling protocol for Internet conferencing, telephony, event notification and instant messaging. (IETF)

SLC

Service Logic Controller (formerly UAS).

SLEE

Service Logic Execution Environment

SME

Short Message Entity - This is an entity which may send or receive short messages. It may be located in a fixed network, a mobile, or an SMSC.

SMPP

Short Message Peer-to-Peer protocol

SMS

Depending on context, can be:

- Service Management System hardware platform
- Short Message Service
- Service Management System platform
- NCC Service Management System application

SMSC

Short Message Service Centre stores and forwards a short message to the indicated destination subscriber number.

SN

Service Number

SNMP

Simple Network Management Protocol. Usually responsible for notifying faults on a network.

SOAP

Simple Object Access Protocol. An XML-based messaging protocol.

SQL

Structured Query Language is a database query language.

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).

SRI

Send Routing Information - This process is used on a GSM network to interrogate the HLR for subscriber routing information.

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.

SSL

Secure Sockets Layer protocol

SSN

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

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

SSP

Service Switching Point

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.

Telco

Telecommunications Provider. This is the company that provides the telephone service to customers.

Telecommunications Provider

See Telco.

TFR

TCAP Filter Relay

TLS

Transport Layer Security. Cryptographic protocol used to provide secure communications. Evolved from SSL.

UIS

USSD Interactive Services

UPC

USSD Portal Components

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.

VPN

The Virtual Private Network product is an enhanced services capability enabling private network facilities across a public telephony network.

VSSP

Virtual SSP

VWS

Oracle Voucher and Wallet Server (formerly UBE).

WSDL

Web Services Description Language.

XML

eXtensible Markup Language. It is designed to improve the functionality of the Web by providing more flexible and adaptable information identification.

It is called extensible because it is not a fixed format like HTML. XML is a `metalanguage' — a language for describing other languages—which lets you design your own customized markup languages for limitless different types of documents. XML can do this because it's written in SGML.

XMS

Three letter code used to designate some components and path locations used by the Oracle Communications Network Charging and Control *Messaging Manager* (on page 151) service and the Short Message Service. The published code is *MM* (on page 151) (formerly MMX).

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