Oracle® Communications Convergent Charging Controller

Installation Guide

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About This Document

Audience

This guide is for system administrators who install or uninstall Oracle Communications Convergent Charging Controller.

Prerequisites

Before installing or uninstalling Convergent Charging Controller, you should have an understanding of UNIX, Oracle Solaris, Linux 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 Convergent Charging Controller:

- *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 Convergent Charging Controller documentation.

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

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

Convergent Charging Controller Installation Overview

Overview

Introduction

This chapter describes the Oracle Communications Convergent Charging Controller installed components and provides an overview of the Convergent Charging Controller installation procedure.

In this chapter

This chapter contains the following topics.

Convergent Charging Controller Installed Components Overview

About Convergent Charging Controller Installed Components

During the Convergent Charging Controller installation process, you install and configure the following components:

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

Convergent Charging Controller Software

The following table describes the Convergent Charging Controller software sub-components installed by their respective software packages.

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.

Component	Provides
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.
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.
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 and Oracle Database 12.1.0.2.0
- Linux 7.1 and Oracle Database 12.1.0.2.0

Obsoleted Support

This release makes obsolete support of the following:

- Solaris 10
- Oracle Database 10.2
- Oracle Database 11*g*

- Oracle Database 11*g* Client
- Java 1.6
- Java 1.7

Convergent Charging Controller Installation Procedure Overview

Overview of the Installation Procedure

You install Convergent Charging Controller 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. • Install and configure additional third-party software.
4	Install the Convergent Charging Controller product software on all nodes and optionally install service templates.
5	Perform mandatory post-installation configuration tasks.
6	Verify the installation.

Installation Options

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

Supporting Multi-Byte UTF-8 Character Sets

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

Ensuring a Successful Installation

Introduction

The Convergent Charging Controller installation should be performed only by qualified personnel. You must be familiar with the Oracle Solaris operating system, Linux operating system, and Oracle Database software. You should be experienced with installing Solaris 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 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.

Planning Your Convergent Charging Controller Installation

Overview

Introduction

This chapter explains how to plan an Oracle Communications Convergent Charging Controller installation.

In this chapter

This chapter contains the following topics.

About Planning Your Convergent Charging Controller Installation

Planning Your Convergent Charging Controller Installation

When planning your Convergent Charging Controller 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
- How to connect Convergent Charging Controller servers together in your network
- How to connect Convergent Charging Controller servers with the rest of your network
- How to integrate the Convergent Charging Controller solution into the telco infrastructure

Before installing Convergent Charging Controller, 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 Convergent Charging Controller architecture, see the discussion about the Convergent Charging Controller system architecture in C*onvergent Charging Controller Concepts*.

About Cohosting Convergent Charging Controller Nodes

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

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

Each node should have its own operating system, database instance, and storage layout.

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** columns in the following table show the type of information you will need when configuring replication.

Node		Replication		UpdateRequester ID			
Name	Type	Node ID	Internal IP Address	Alarms	AVD	Stats	Other ID
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**
- *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.

Convergent Charging Controller System Requirements

Overview

Introduction

This chapter describes the hardware and software requirements for Oracle Communications Convergent Charging Controller.

In this chapter

This chapter contains the following topics.

Network Requirements

Introduction

All Convergent Charging Controller 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 Convergent Charging Controller implementation comprises the following logical networks:

- Management
- Billing
- Internal communication
- Signaling

IP Networks

The following table describes the logical IP networks and their Convergent Charging Controller implementation.

Network	Type	Purpose
Management	External	Provides external component access to the Convergent Charging Controller 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).

Network	Type	Purpose
Billing	Internal	Use an internal network for billing communication between the Convergent Charging Controller nodes, such as call reservation requests or wallet information requests. The billing network should not be accessible by external systems.
Internal communication	Internal	Use for all internal communications between the Convergent Charging Controller 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 Convergent Charging Controller 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 Convergent Charging Controller 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 Convergent Charging Controller solution.

Memory Requirements

About Memory Requirements

You will require at least eight gigabytes of RAM per node to completely install Convergent Charging Controller. 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 Convergent Charging Controller 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 Convergent Charging Controller 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 Convergent Charging Controller Oracle database SGA settings for each Convergent Charging Controller 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

SGA Element	Recommended minimum setting (MB)		
shared_pool_size	512	512	512
pga_aggregate_target	256	64	256
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 Convergent Charging Controller 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 Convergent Charging Controller 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
Convergent Charging Controller 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)

Note: The **/IN** mount point is required and should be created prior to software installation. If no **/IN** mount point exists, then an **/IN** directory will be created automatically at installation and used on the root file-system

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
Convergent Charging Controller applications	/IN	20 GB
Oracle Database server (12*c* R1 Enterprise Edition)	/u01	6.4 GB
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
Convergent Charging Controller applications	/IN	20 GB
Oracle Database server	/u01	5 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
Convergent Charging Controller applications	/IN	20 GB
Oracle Database server	/u01	5 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

Component	Tablespace Name	Datafile Size (MB)	Number of Files	Total Size
	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
	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

Component	Tablespace Name	Datafile Size (MB)	Number of Files	Total Size
	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
	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

Component	Tablespace Name	Datafile Size (MB)	Number of Files	Total Size
	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
	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_PACK	NP_DATA	200	1	200

Component	Tablespace Name	Datafile Size (MB)	Number of Files	Total Size
	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
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 Convergent Charging Controller.

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 Convergent Charging Controller applications.

Hardware	Mandatory / Recommended	Required for
64-bit SPARC CPU architecture or Linux x86	Mandatory	All nodes
Storage Array (RID)	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 Convergent Charging Controller.

Software	Version	Where to install
Solaris operating system. This includes the packages listed below. The minimum version is Solaris 11.3.	11 64-bit	All nodes **Note:** When installing the nodes, ensure that all the nodes are installed on the same operating system.
Oracle Linux operating system. This includes the package listed below. The minimum version is Oracle Linux 7.1 with critical patch updates.	7 64-bit	All nodes **Note:** When installing the nodes, ensure that all the nodes are installed on the same operating system.
Oracle Database Server: 12*c* R1 Enterprise Edition	12.1.0.2.0	SMS nodes
Oracle Database Server: 12*c* R1 Standard Edition 2	12.1.0.2.0	SLC and VWS nodes
Oracle Database 32-bit Client	12.1.0.2.0	All nodes
Oracle Java Runtime Environment (JRE)	8u74 or later	SMS node GUI clients hosts
Oracle Java Development Kit (JDK)	8u74	All nodes
WebKit Browser		GUI clients hosts
Oracle Communications Billing and Revenue Management (BRM) SDK (on SLC nodes) See *Installing and Configuring BRM SDK* (on page 50) for more information.	BRM SDK 7.5.0.14.0 or later	

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.

Modifying Resource Control Values

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

Step	Action
1	Log in to the Convergent Charging Controller 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,4G,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`

Setting the Semaphore Parameters for Linux

To set the semaphore parameters:

Step	Action
1	Log in as the root user.
2	Open the `/etc/sysctl.conf` file in a text editor.
3	Search for the following entry: `kernel.sem = `*values* where *values* are the minimum total semaphore requirements
4	Set values to the appropriate semaphore requirements. For example: `kernel.sem = 250 32000 100 128`

Note: For more information about semaphore settings, see the guidelines for setting semaphore parameters in the Oracle Database documentation.

Tuning the System's ZFS Performance

For Solaris, set the following parameters in your **/etc/system** file.

To tune the Convergent Charging Controller 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`
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*.

For Linux, see the discussion on installing a system with a btrfs root file system in the Oracle Linux 7 documentation.

Setting the Time Zone

Introduction

The same time zone must be used for all machines on which the Convergent Charging Controller 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 Convergent Charging Controller GUI client runs.

Setting Time Zones to GMT

The Convergent Charging Controller 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.

To set the time zone:

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

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.

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 Convergent Charging Controller 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:** This command should return:   `TZ = GMT` This indicates that the time zone directory is set to GMT.

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 Convergent Charging Controller.

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 Convergent Charging Controller 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 Convergent Charging Controller 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 Convergent Charging Controller 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
	Convergent Charging Controller 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 Convergent Charging Controller 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
	Convergent Charging Controller 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 Convergent Charging Controller 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

	Convergent Charging Controller application data files	7702	2%	7856	
/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

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
	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

Component	Tablespace Name	Data File Size (MB)	Number of Files	Total Size (MB)
	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 Convergent Charging Controller 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
Convergent Charging Controller applications	4096	4096	4096

Medium Production System Example

Introduction

This section provides examples of the minimum storage and memory sizing requirements for deploying the Convergent Charging Controller 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 Convergent Charging Controller 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
	Convergent Charging Controller 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	Convergent Charging Controller 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 Convergent Charging Controller 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
	Convergent Charging Controller 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 Convergent Charging Controller 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
	Convergent Charging Controller 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)
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 w	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

Component	Tablespace Name	Data File Size (MB)	Number of Files	Total Size (MB)
	BE_VOUCHERS_I	2001	1	2001
CCS	CCS_DATA	200	5	1000
	CCS_INDEX	200	2	400
	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 Convergent Charging Controller 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
Convergent Charging Controller applications	8192	8192	8192

Large Production System Example

Introduction

This section provides examples of the minimum storage and memory sizing requirements for deploying the Convergent Charging Controller 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 Convergent Charging Controller 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
	Convergent Charging Controller 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	Convergent Charging Controller 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

Mount Point	Contents	Required Space (MB)	Block Overhead	Allocated Space (MB)	Total Mount Point Space (GB)
Private/Local				261120	258
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 Convergent Charging Controller 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
	Convergent Charging Controller 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 Convergent Charging Controller 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
	Convergent Charging Controller 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

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
	Convergent Charging Controller application data files	19708	2%	20102	
/oracle/redologs	Oracle redo logs	1600	2%	1632	2
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
	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 Convergent Charging Controller 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
Convergent Charging Controller applications	8192	8192	8192

Convergent Charging Controller Pre-Installation Tasks

Overview

Introduction

This chapter explains the tasks you should perform before installing Oracle Communications Convergent Charging Controller.

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 Convergent Charging Controller, you log in to each node in turn as the root user, and perform the following tasks:

- 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 40).
- Enable remote login for the root user. See *Enabling Remote Login* (on page 40).
- Configure the log notice alarms. See *Configuring Where to Log Notice Alarms* (on page 40).
- Configure the directory to use for reporting core dumps and storing core files. See Configuring Core Dump Reporting.
- Disable any unnecessary system services. See Disabling System Services.
- Ensure machines automatically boot following a temporary power loss. See *Configuring Machines to Boot Automatically* (on page 41).
- Enable the SSH root login. See *Enabling SSH Root Login* (on page 42).
- Ensure Java 1.8 is installed. See the Oracle Java documentation.
- Generate and exchange SSH keys to allow automatic login to different machines. See *Generating and Exchanging SSH Keys* (on page 42).
- Configure the SSH SMF service. See *Configuring the SSH SMF Service* (on page 42).
- Configure the **/etc/system** file to make buffer-overflow attacks more difficult. See *Preventing Buffer Overflow Attacks* (on page 42).
- Disable the keyboard abort sequence. See Disable Keyboard Abort Sequence.
- Create the **/IN** Directory. See *Creating the /IN Directory* (on page 44).

- Check that the **/oracle/datafiles** and **/oracle/redologs** directories are available. See *Checking the Directories for Data Files and Redologs* (on page 45).

Disabling automount for the Home Directory

You should 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	Comment out the line in the **/etc/auto_master** file containing `auto_home` by inserting **#** at the beginning of the line. For example: ` # /home    auto_home -nobrowse`

2	Restart autofs to remount the file system by running the command:
	For Solaris:
	` /usr/sbin/svcadm restart autofs`
	For Linux:
	
	` systemctl restart autofs.service`

3	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**
	` 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 generated during installation. Notice alarms contain informational messages generated during installation.

To log notice level alarms, include the following line in the **/etc/syslog.conf** file:

` *.notice;kern.debug;daemon.notice;mail.crit` *logfile*

where *logfile* is the log file name including the absolute path; for example, **/var/adm/messages**.

Configuring Core Dump Reporting

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.

For Solaris, 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
```

For Linux, the core files are not generated automatically. To turn core file generation on perform the following:

Step	Action
1	Log in as the root user.
2	Create **/etc/security/limits.d/core.conf** file.

3	Add the following lines:
	`* hard     core     unlimited`
	`* soft     core     unlimited`

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 **systemctl** command to disable the system service.

Example command:

```
systemctl stop ftp.service
systemctl stop telnet.service
systemctl stop rlogin.service
systemctl stop sendmail.service
```

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.
3	Run the following command:

Step 3 continued:

For Solaris:
```
$ svcadm -v restart svc:/network/ssh:default
```

For Linux:
```
$ systemctl restart sshd.service
```

Generating and Exchanging SSH Keys

Follow these steps to generate and exchange SSH key files. You can exchange the generated key files with other servers to allow automatic login to different machines without using a password.

Step	Action
1	Log in as the root user.
2	Run the following command:

Step 2 continued:
```
$ ssh-keygen  -t rsa
```

Result:
```
Generating public/private rsa key pair.
```

Step	Action
3	At the prompt, enter the file in which to save the key or accept the default.

```
Enter file in which to save the key (//.ssh/id_rsa):
```

Step	Action
4	Enter a passphrase, or leave empty if you require no passphrase.

```
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in //.ssh/id_rsa.
Your public key has been saved in //.ssh/id_rsa.pub.
The key fingerprint is:
0f:f2:28:8e:fb:5f:fa:0f:11:bd:cc:80:21:f7:7b:9b root@wlg1310
```

Step	Action
5	Use Secure Copy Protocol (SCP) to exchange the generated SSH keys between servers.

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
```

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 explains the procedures to create users and groups in each Convergent Charging Controller node.

Creating esg group for Each Node

Follow these steps to create esg group for each Convergent Charging Controller 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 an unique group id for the operating system

Adding Users to the Groups

Follow these steps to add users to the groups:

Step	Action
1	Login as root user.
2	Run the following command to add a user to the esg and dba group: For Solaris: **usermod -G esg,dba -S files** *InstallUserName* **usermod -G esg,dba -S files oracle** For Linux: **usermod -G esg,dba** *InstallUserName* **usermod -G esg,dba oracle** where *InstallUserName* is the user installing Convergent Charging Controller with sudo access
3	Run the following command to verify that the user installing Convergent Charging Controller software belongs to the esg and dba groups: **groups** *username* For example: **groups oracle** **groups InstallUserName**

Creating Users in Each Node

Follow these steps to create users in each node and add to the group:

Step	Action
1	Log in as the root user.
2	Run the following command to create a user and add the user to the esg group: For Solaris: **/usr/sbin/useradd -c 'OUI installer' -d** *home_directory* **-g esg -s** **/usr/bin/ksh -u** *uid username* For Linux: **/usr/sbin/useradd -c 'OUI installer' -d** *home_directory* **-M -g esg -** **s /usr/bin/ksh -u** *uid username* Where: *home_directory* is the user's home directory specified in the following table *username* is the username for the user. *uid* is the unique ID of the username.
3	Run the following to set the password for the user: **passwd** *username*

The following table lists the users you must create:

Name	SMS Node	SLC Node	VWS Node	OS Group	User Home Directory
smf_oper	x	x	x	esg	/IN/service_packages/SMS
acs_oper	x	x	x	esg	/IN/service_packages/ACS
ccs_oper	x	x	x	esg	/IN/service_packages/CCS
ebe_oper	x	x	x	esg	/IN/service_packages/E2BE
upc_oper	x	x		esg	/IN/service_packages/UPC
uis_oper	x	x		esg	/IN/service_packages/UIS
xms_oper	x	x		esg	/IN/service_packages/XMS
sei_oper	x	x		esg	/IN/service_packages/SEI
ses_oper	x	x		esg	/IN/service_packages/SES
is41_oper	x	x		esg	/IN/service_packages/IS41
lcp_oper	x	x		esg	/IN/service_packages/LCP
rim_oper	x	x		esg	/IN/service_packages/RIMS

Creating the /IN Directory

Follow these steps to create the /IN directory. The directory must be accessed through the primary user account installing Convergent Charging Controller.

Step	Action
1	Log in as the root user.
2	Run the following command: $ **mkdir /IN**

Step	Action

3	Run the following command to set the permissions for the **/IN** directory:
	`chmod 775 /IN`
	`chown smf_oper:esg /IN`

Checking the Directories for Data Files and Redologs

The installer verifies whether the **/oracle/datafiles** and **/oracle/redologs** directories have been created with the correct ownership permissions. If the **/oracle/datafiles** and **/oracle/redologs** directories do not already exist, create the directories by using the following instructions:

Step	Action
1	Log in as the root user.

2	Run the following command to create the **oracle/datafiles** and **/oracle/redologs** directories:
	`mkdir -p /oracle/datafiles`
	`mkdir -p /oracle/redologs`

3	Run the following commands to set up the correct ownership and permissions:
	`chown oracle:dba /oracle`
	`chown oracle:dba /oracle/datafiles`
	`chown oracle:dba /oracle/redologs`
	`chmod 775 /oracle`
	`chmod 775 /oracle/datafiles`
	`chmod 775 /oracle/redologs`

Installing a Browser

Browser and Java for Convergent Charging Controller UI

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

Note: Convergent Charging Controller supports client systems that use Windows XP or higher.

Browser/Java	Description
Java	Java SE 8, 1.8.0_74 / 8u74 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
- Standard Edition for all other nodes (SLC, VWS1, VWS2)

Installing the Oracle Database Software

The following procedure describes the main steps for installing the Oracle Database Server software on each type of node.

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

Step	Action
1	Install Oracle Enterprise Database Server *release* 12*c* Release 1
2	Apply Oracle *server* 12*c* Release 1

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/12.1.0.2**
Oracle database datafile directory	**/oracle/datafiles**

Installation Entity	Guideline Value

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\nTERM=vt100\nexport TERM\n\ntty > /dev/null\nif [$? -eq 0] ; then\n # Set some options\n set -o vi\n stty erase "^H" kill "^U" intr "^C" eof "^D"\n stty hupcl ixon ixoff\n set -o vi\nfi\n\numask 022\n\nMAIL=/usr/mail/${LOGNAME:?}\nexport MAIL\n\nORACLE_BASE=/u01/app/oracle\nexport ORACLE_BASE\n\nORACLE_HOME=$ORACLE_BASE/product/release_version\nexport ORACLE_HOME\n\nLD_LIBRARY_PATH_64=$ORACLE_HOME/lib\nexport LD_LIBRARY_PATH_64\n\nLD_LIBRARY_PATH=$ORACLE_HOME/lib\nexport LD_LIBRARY_PATH\n\nPATH=$PATH:$ORACLE_HOME/bin:/usr/bin:/etc:/usr/ccs/bin:/usr/openwin/bin:/usr/local/bin:/usr/sbin\nEDITOR=vi\nexport EDITOR\n\nORACLE_SID=[SMF|SCP|E2BE]```
	
	where *release_version* is 12.1.0
	
	Note: ORACLE_SID must be set to one of:
	
	- **SMF** for SMS node
	- **SCP** for SLC nodes
	- **E2BE** for VWS nodes
	
	```export ORACLE_SID\n(Solaris only)ulimit -s unlimited\nulimit -n 4096\nexport 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```
	
	``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
	export PATH```
	
	```ORACLE_SID=[SMF|SCP|E2BE]```
	
	Where *release_version* is 12.1.0
	
	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```

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

Oracle 12c 32-bit Client Installation Guidelines

Follow these guidelines when using Oracle Universal Installer to install the Oracle 12*c* Release 1 32-bit 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

The Oracle database instances are automatically created during the installation of the Convergent Charging Controller software packages. A single database instance is created on each Convergent Charging Controller 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	10
JOB_QUEUE_INTERVAL	1

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`

5	Set the **JOB_QUEUE_PROCESSES** initialization parameter to:
	`ALTER SYSTEM SET JOB_QUEUE_PROCESSES=10 SCOPE=BOTH`
	`ALTER SYSTEM SET JOB_QUEUE_INTERVAL=1`

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 Convergent Charging Controller. This is not delivered with Convergent Charging Controller and must be installed separately. See *Convergent Charging Controller BRM Charging Driver Technical Guide* for details.

Installing Convergent Charging Controller

Overview

Introduction

This chapter describes how to install Oracle Communications Convergent Charging Controller. Before you install Convergent Charging Controller, read the following chapters:

- Convergent Charging Controller Installation Overview
- Planning Your Convergent Charging Controller Installation
- Convergent Charging Controller System Requirements
- Advanced Storage and Memory Sizing
- Convergent Charging Controller Pre-Installation Tasks

In this chapter

This chapter contains the following topics.

Convergent Charging Controller Installation Options

You can install Convergent Charging Controller 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 Convergent Charging Controller using the same configuration repeatedly. The silent mode does not use the GUI and it runs in the background. See "*Installing Convergent Charging Controller in Silent Mode*" for more information.

Convergent Charging Controller Installation Types

When installing Convergent Charging Controller in the GUI mode, you can select the type of installation:

SMS Node: Service Management System (SMS) installs the Convergent Charging Controller SMS application and the SMS database. See *Installing Convergent Charging Controller on the SMS Node Using the GUI* (on page 54).

SLC Node: Service Logic Controller (SLC) installs the Convergent Charging Controller SLC application and the SLC database. See *Installing Convergent Charging Controller on the SLC Node Using the GUI* (on page 57).

SLC With Test Tools: Service Logic Controller (SLC) installs the Convergent Charging Controller SLC application, the SLC Test Tools, and the SLC database. See *Installing Convergent Charging Controller on the SLC with Testing Tools Node Using the GUI* (on page 59).

VWS Node: Voucher and Wallet Server (VWS) installs the Convergent Charging Controller application, the VWS database, and the VWS application. See *Installing Convergent Charging Controller on the VWS Node Using the GUI* (on page 62).

Installing Convergent Charging Controller on the SMS Node Using the GUI

You can install Convergent Charging Controller on an Oracle Solaris 11.3 (64-bit) server or an Oracle Linux 7.1 server.

To install Convergent Charging Controller on an SMS node:

Step	Action
1	Create a temporary directory *(temp_dir)*.
2	Go to the Oracle software delivery Web site: http://edelivery.oracle.com/ and download the **CCC_v6_0_0_0_0_***platform***.zip** software pack to *temp_dir*, where *platform* is **Linux** or **SunOS**.
3	Copy the archive to a temporary directory on each target node on which you are installing Convergent Charging Controller.
	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.
4	Log in as the root user.
5	Create the CCC sub-directory in the **/var/spool/pkg** directory: `cd /var/spool/pkg` `mkdir CCC`
6	Go to the temporary directory that contains the software pack file and copy the **CCC_v6_0_0_0_0_***platform***.zip** file to the **/var/spool/pkg/CCC** directory: `cp CCC_v6_0_0_0_0_`*`platform`*`.zip /var/spool/pkg/CCC`
7	Unzip the **CCC_v6_0_0_0_0_***platform***.zip** file: `unzip CCC_v6_0_0_0_0_`*`platform`*`.zip`
	Note: You must extract the Convergent Charging Controller archive to each Service Management System (SMS), Voucher and Wallet Server (VWS), and Service Logic Controller (SLC) node.
8	Log in as the user installing Convergent Charging Controller, and go to the **/IN** directory.
	Note: Ensure that the user installing Convergent Charging Controller has access to esg and dba groups and also has the sudo access without timeout.

Step	Action

9	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 Convergent Charging Controller GUI installer appears.
	Note: You may require an X-server if the GUI installer screen is to appear on a computer running Windows.
	• *Java_home* is the directory in which JDK 1.8 is installed.
	
	Do one of the following:
	
	• To start the Installer:
	`touch /IN/oraInst.loc`
	`${JAVA_HOME}/bin/java -jar ./cccInstaller_platform.jar`
	• To start the Installer and create a silent installer response file during the installation
	`java -jar ./cccInstaller_platform.jar -logLevel finest -record -destinationFile path`
	
	where:
	
	• *destinationFile path* is the response file location.
	
	The installer screen appears. The welcome screen appears.

10	Click **Next.** The Installation Location screen appears. In the **Name** field, enter **/IN**.
11	Click **Next.** The Installation Type screen appears. **Note:** The Convergent Charging Controller 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. The default location of the **oraInventory** directory is in the **/etc/oraInst.loc** (Linux) file or the **/var/opt/oracle/oraInst.loc** (Solaris) file. Select **SMS.** The Convergent Charging Controller SMS application and the SMS database are installed.
12	Click **Next.** The Oracle User screen appears. In the **Oracle DB Owner** field, retain the default **oracle**, which is the user name with permissions to create the Oracle database instance.
13	Click **Next**. The Database Server Paths screen appears. In the **Base directory** field, retain the value, **/u01/app/oracle**. In the **Oracle home directory** field, retain the value, **/u01/app/oracle/product/12.1.0**. Select the **Install Convergent Charging Controller database schema** checkbox.

Step	Action
14	Click **Next.**
	The Database Datafiles screen appears.
	In the **Datafile directory** field, enter the path to the **datafiles** directory in which to create Convergent Charging Controller database instance data files.
	Note: You should have created this directory already.
	In the **Redolog directory** field, enter the path to the **redolog** directory in which to create Convergent Charging Controller database redo log files.
	Note: The **Redolog directory** field is required only if you install the database schema files.
15	Click **Next.**
	The Database Password screen appears.
	Note: The database password is required only if you install the database schema files.
	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.
16	Click **Next.**
	The Oracle Client screen appears.
	In the **Oracle client home** field, enter the full path to the Oracle database client home directory to install the Oracle Database client.
17	Click **Next.**
	The SMS GUI screen appears.
	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.
	In the **Confirm password** field, enter the password again to confirm.
	In the **Timezone** field, enter the timezone in which the date and time are displayed in the SMS GUI.
18	Click **Next.**
	The PI Admin screen appears.
	In the **PI admin password** field, enter the password for the PI administrator user account.
	In the **Confirm password** field, enter the password again to confirm.
19	Click **Next.**
	The SMS EDR Paths screen appears.
	In the **CDR Loader Input directory** field, retain the default path to the directory of a single system to store CDR input files.
	In the **CDR Loader Output directory** field, retain the default path to the directory of a single system to store CDR output files.
20	Click **Next.**
	The Installation Summary screen appears.
21	Review the selections you have made in the preceding screens, and click **Install.**
	The Installation Progress screen appears.
22	Click **Next**.
	The Installation Complete screen appears.
23	Click **Finish** to exit the Installer.

Installing Convergent Charging Controller on the SLC Node Using the GUI

You can install all the Convergent Charging Controller on an Oracle Solaris 11.3 (64-bit) server or Oracle Linux 7.1 server.

Note: Ensure that SMS is installed before installing SLC.

To install Convergent Charging Controller on the SLC node:

Step	Action
1	Create a temporary directory *(temp_dir)*.
2	Go to the Oracle software delivery Web site: http://edelivery.oracle.com/ and download the **CCC_v6_0_0_0_0_***platform***.zip** software pack to *temp_dir*, where *platform* is **Linux** or **SunOS.**
3	Copy the archive to a temporary directory on each target node on which you are installing Convergent Charging Controller. **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.
4	Log in as the root user.

5	Create the CCC sub-directory in the **/var/spool/pkg** directory:
	 `cd /var/spool/pkg`
	 `mkdir CCC`

6	Go to the temporary directory that contains the software pack file and copy the **CCC_v6_0_0_0_0_***platform***.zip** file to the **/var/spool/pkg/CCC** directory: `cp CCC_v6_0_0_0_0_`*`platform`*`.zip /var/spool/pkg/CCC`
7	Unzip the **CCC_v6_0_0_0_0_***platform***.zip** file: `unzip CCC_v6_0_0_0_0_`*`platform`*`.zip` **Note:** You must extract the Convergent Charging Controller archive to each Service Management System (SMS), Voucher and Wallet Server (VWS), and Service Logic Controller (SLC) node.
8	Log in as the user installing Convergent Charging Controller, and go to the **/IN** directory. **Note:** Ensure that the user installing Convergent Charging Controller has access to esg and dba groups and also has the sudo access without timeout.

Step	Action

9	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 Convergent Charging Controller GUI installer appears.
	Note: You may require an X-server if the GUI installer screen is to appear on a computer running Windows.
	
	• *`Java_home`* is the directory in which JDK 1.8 is installed.
	Do one of the following:
	
	• To access the Installer:
	`touch /IN/oraInst.loc`
	`${JAVA_HOME}/bin/java -jar ./cccInstaller_`*`platform`*`.jar`
	• To start the Installer and create a silent installer response file during the installation
	`java -jar ./cccInstaller_`*`platform`*`.jar -logLevel finest -record`
	`-`*`destinationFile path`*
	where:
	• *`destinationFile path`* is the response file location.
	The Installer screen appears. The welcome screen appears.

10	Click **Next.** The Installation Location screen appears. In the **Name** field, enter **/IN**.
11	Click **Next.** The Installation Type screen appears. **Note:** The Convergent Charging Controller 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. The default location of the **oraInventory** directory is in the **/etc/oraInst.loc** (Linux) file or the **/var/opt/oracle/oraInst.loc** (Solaris) file. Select **SLC.** The Convergent Charging Controller SLC application and the SLC database are installed.
12	Click **Next.** The Oracle User screen appears. In the **Oracle DB Owner** field, retain the default **oracle**, which is the user name with permissions to create the Oracle database instance.
13	Click **Next**. The Database Server Paths screen appears. In the **Base directory** field, retain the value, **/u01/app/oracle**. In the **Oracle home directory** field, retain the value, **/u01/app/oracle/product/12.1.0**. Select the **Install Convergent Charging Controller database schema** checkbox.

Step	Action
14	Click **Next.**
	The Database Datafiles screen appears.
	In the **Datafile directory** field, enter the path to the **datafiles** directory in which to create Convergent Charging Controller database instance data files.
	Note: You should have created this directory already.
	In the **Redolog directory** field, enter the path to the **redolog** directory in which to create Convergent Charging Controller database redo log files.
	Note: The **Redolog directory** field is required only if you install the database schema files.
15	Click **Next.**
	The Database Password screen appears.
	Note: The database password is required only if you install the database schema files.
	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.
16	Click **Next.**
	The Oracle Client screen appears.
	In the **Oracle client home** field, enter the full path to the Oracle database client home directory to install the Oracle database client.
17	Click **Next.**
	The Replication screen appears.
	In the **Node number** field, enter an unique identification number for the node. The Node number that is used as a replication ID should be between **1** and **99**.
	Note: If 1 is entered, the SLC will be given the replication ID of 301. If 2 is entered, the SLC will be given the replication ID of 302, and so on.
	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.
18	Click **Next.**
	The Installation Summary screen appears.
19	Review the selections you have made in the preceding screens, and click **Install.**
	The Installation Progress screen appears.
20	Click **Next**.
	The Installation Complete screen appears.
21	Click **Finish** to exit the Installer.

Installing Convergent Charging Controller on the SLC with Testing Tools Node Using the GUI

You can install all the Convergent Charging Controller on an Oracle Solaris 11.3 (64-bit) server or Oracle Linux 7.1 server.

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

To install Convergent Charging Controller on the SLC With Testing Tools node:

Step	Action
1	Create a temporary directory *(temp_dir)*.
2	Go to the Oracle software delivery Web site: http://edelivery.oracle.com/ and download the **CCC_v6_0_0_0_0_***platform***.zip** software pack to *temp_dir*, where *platform* is **Linux** or **SunOS**.
3	Copy the archive to a temporary directory on each target node on which you are installing Convergent Charging Controller. **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.
4	Log in as the root user.

5	Create the CCC sub-directory in the **/var/spool/pkg** directory:
	`cd /var/spool/pkg`
	`mkdir CCC`

6	Go to the temporary directory that contains the software pack file and copy the **CCC_v6_0_0_0_0_***platform***.zip** file to the **/var/spool/pkg/CCC** directory: `cp CCC_v6_0_0_0_0_`*platform*`.zip /var/spool/pkg/CCC`
7	Unzip the **CCC_v6_0_0_0_0_***platform***.zip** file: `unzip CCC_v6_0_0_0_0_`*platform*`.zip` **Note:** You must extract the Convergent Charging Controller archive to each Service Management System (SMS), Voucher and Wallet Server (VWS), and Service Logic Controller (SLC) node.
8	Log in as the user installing the Convergent Charging Controller, and go to the **/IN** directory. **Note:** Ensure that the user installing the Convergent Charging Controller has access to esg and dba groups and also has the sudo access without timeout.

9	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 Convergent Charging Controller GUI Installer appears.
	  Note: You may require an X-server if the GUI installer screen is to appear on a computer running Windows.
	• *Java_home* is the directory in which JDK 1.8 is installed.
	Do one of the following:
	• To access the Installer:
	`touch /IN/oraInst.loc`
	`${JAVA_HOME}/bin/java -jar ./cccInstaller_`*platform*`.jar`
	• To start the Installer and create a silent installer response file during the installation
	`java -jar ./cccInstaller_`*platform*`.jar -logLevel finest -record -`*destinationFile path*
	where:
	• *destinationFile path* is the response file location.
	The Installer screen appears. The welcome screen appears.

Step	Action
10	Click **Next.**
	The Installation Location screen appears.
	In the **Name** field, enter **/IN.**
11	Click **Next.**
	The Installation Type screen appears.
	Note: The Convergent Charging Controller 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. The default location of the **oraInventory** directory is in the **/etc/oraInst.loc** (Linux) file or the **/var/opt/oracle/oraInst.loc** (Solaris) file.
	Select **SLC With Test Tools.** The Convergent Charging Controller SLC application, SLC WIth Testing Tools, and the SLC database are installed.
12	Click **Next.** The Oracle User screen appears.
	In the Oracle DB Owner field, retain the default **oracle**, which is the user name with permissions to create the Oracle database instance.
13	Click **Next**.
	The Database Server Paths screen appears
	In the **Base directory** field, retain the value, **/u01/app/oracle**.
	In the **Oracle home directory** field, retain the value, **/u01/app/oracle/product/12.1.0.**
	Select the **Install Convergent Charging Controller database schema** checkbox.
14	Click **Next.**
	The Database Datafiles screen appears.
	In the **Datafile directory** field, enter the path to the **datafiles** directory in which to create Convergent Charging Controller database instance data files.
	Note: You should have created this directory already.
	In the **Redolog directory** field, Enter the path to the **redolog** directory in which to create Convergent Charging Controller database redo log files.
	Note: The **Redolog directory** field is required only if you install the database schema files.
15	Click **Next.** The Database Password screen appears.
	Note: The database password is required only if you install the database schema files.
	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.
16	Click **Next.**
	The Oracle Client screen appears.
	In the **Oracle client home** field, enter the full path to the Oracle database client home directory to install the Oracle database client.

Step	Action
17	Click **Next.**
	The Replication screen appears.
	In the **Node number** field, enter an unique identification number for the node. The Node number that is used as a replication ID should be between **1** and **99**.
	Note: If 1 is entered, the SLC will be given the replication ID of 301. If 2 is entered, the SLC will be given the replication ID of 302, and so on.
	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
18	Click **Next.**
	The Installation Summary screen appears.
19	Review the selections you have made in the preceding screens, and click **Install.**
	The Installation Progress screen appears.
20	Click **Next**.
	The Installation Complete screen appears.
21	Click **Finish** to exit the Installer.

Installing Convergent Charging Controller on the VWS Node Using the GUI

You can install all the Convergent Charging Controller on an Oracle Solaris 11.3 (64-bit) server or Oracle Linux 7.1 server.

Note: Ensure that SMS is installed before installing VWS.

To install Convergent Charging Controller on VWS node:

Step	Action
1	Create a temporary directory *(temp_dir)*.
2	Go to the Oracle software delivery Web site:
	http://edelivery.oracle.com/
	and download the **CCC_v6_0_0_0_0_***platform***.zip** software pack to *temp_dir*, where *platform* is **Linux** or **SunOS**.
3	Copy the archive to a temporary directory on each target node on which you are installing Convergent Charging Controller.
	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.
4	Log in as the root user.
5	Create the CCC sub-directory in the **/var/spool/pkg** directory:
| | ```
cd /var/spool/pkg
mkdir CCC
``` |
| 6 | Go to the temporary directory that contains the software pack file and copy the **CCC_v6_0_0_0_0_***platform***.zip** file to the **/var/spool/pkg/CCC** directory: |
| | ```
cp CCC_v6_0_0_0_0_platform.zip /var/spool/pkg/CCC
``` |
| 7 | Unzip the **CCC_v6_0_0_0_0_***platform***.zip** file: |
| | ```
unzip CCC_v6_0_0_0_0_platform.zip
``` |
| | **Note:** You must extract the Convergent Charging Controller archive to each Service Management System (SMS), Voucher and Wallet Server (VWS), and Service Logic Controller (SLC) node. |

Step	Action
8	Log in as the user installing Convergent Charging Controller, and go to the **/IN** directory.
	Note: Ensure that the user installing Convergent Charging Controller has access to esg and dba groups and also has sudo access without timeout.
9	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 CCC GUI installer appears.

  Note: You may require an X-server if the GUI installer screen is to appear on a computer running Windows

- *Java_home* is the directory in which JDK 1.8 is installed.

Do one of the following:

- To access the Installer:

```
touch /IN/oraInst.loc
${JAVA_HOME}/bin/java -jar ./cccInstaller_platform.jar
```

- To start the Installer and create a silent installer response file during the installation

```
java -jar ./cccInstaller_platform.jar -logLevel finest -record
-destinationFile path
```

where:

- *destinationFile path* is the response file location.

The Installer screen appears. The welcome screen appears.

Step	Action
10	Click **Next.**
	The Installation Location screen appears.
	In the **Name** field, enter **/IN.**
11	Click **Next.**
	The Installation Type screen appears.
	Note: The Convergent Charging Controller 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. The default location of the **oraInventory** directory is in the **/etc/oraInst.loc** (Linux) file or the **/var/opt/oracle/oraInst.loc** (Solaris) file.
	Select **VWS**. The Convergent Charging Controller VWS application and the VWS database are installed.
12	Click **Next.**
	The Oracle User screen appears.
	In the **Oracle DB Owner** field, retain the default **oracle**, which is the user name with permissions to create the Oracle database instance.
13	Click Next.
	The Database Server Paths screen appears.
	In the **Base directory** field, retain the value, **/u01/app/oracle.**
	In the **Oracle home directory** field, retain the value, **/u01/app/oracle/product/12.1.0.**
	Select the **Install Convergent Charging Controller database schema** checkbox.

Step	Action
14	Click **Next.**
	The Database Datafiles screen appears.
	In the **Datafile directory** field, enter the path to the **datafiles** directory in which to create Convergent Charging Controller database instance data files.
	Note: You should have created this directory already.
	In the **Redolog directory** field, Enter the path to the **redolog** directory in which to create Convergent Charging Controller database redo log files.
	Note: The **Redolog directory** field is required only if you install the database schema files.
15	Click **Next.**
	The Database Password screen appears.
	Note: The database password is required only if you install the database schema files.
	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.
16	Click **Next.**
	The Oracle Client screen appears.
	In the **Oracle client home** field, enter the full path to the Oracle database client home directory to install the Oracle database client.
17	Click **Next.**
	The Replication screen appears.
	In the **Node number** field, enter an unique identification number for the node. The Node number that is used as a replication ID should be between **1** and **99**.
	Note: If 1 is entered, the VWS will be given the replication ID of 351, if 2 is entered, the VWS will be given the replication ID of 352, and so on.
	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.
18	Click **Next.**
	The VWS Config screen appears.
	In this screen, enter the information for VWS configuration.
	In the **SMS EDR Input directory** field, enter the full name and path to the directory to store SMS EDR input files.
	Select the **Primary VWS node** check box to install the primary node of a VWS pair.
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** to exit the Installer.

Installing Convergent Charging Controller in Silent Mode

Use silent install mode when you are installing Convergent Charging Controller 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 Convergent Charging Controller GUI installation.

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

` java -jar ./cccInstaller_`*`platform`*`.jar -logLevel finest -record -`*`destinationFilePath`*
where *`destinationFilePath`* is the response file location.

Note: The generated response file does not have 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 Oracle Database, Convergent Charging Controller screens,and PI Admin

`password_confirm` is the same password entered for Oracle Database, Convergent Charging Controller screens, and PI Admin

Installing Convergent Charging Controller in Silent Mode

To install Convergent Charging Controller 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.
2	Enter the values in the parameters to reflect the Convergent Charging Controller installation requirements. **Note:** In silent install mode, the Convergent Charging Controller installer treats incorrect context, format, or type values within a response file as if no value were specified.
3	Save and close the file.

Step	Action
4	Go to the **/IN** directory and run the following command: **java -jar ./cccInstaller_*Platform*.jar -logLevel finest -silent -responseFile** *path* where *path* is the Convergent Charging Controller response file name and location. For example: `java -jar ./cccInstaller_Linux.jar -logLevel finest -silent -responseFile /tmp/smsinstallresponse.rsp` The installation runs silently in the background.

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.

Post-Installation Tasks

Overview

Introduction

This chapter describes the post-installation tasks you must perform after installing Oracle Communications Convergent Charging Controller.

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 Convergent Charging Controller node. You should perform these tasks after completing the Convergent Charging Controller installation on all nodes.

See *Post-Installation Initial Configuration* (on page 69) 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 73).

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

About SSL Configuration Tasks

Convergent Charging Controller supports secure network logins through Secure Socket Layer (SSL) connections from the Convergent Charging Controller UI to the database. You specify whether SSL connection to the database is enabled on your system by setting the `EncryptedSSLConnection` Java applet parameter in **.jnlp** files. At installation, the `EncryptedSSLConnection` Java applet parameter is not set, and SSL connections to the database are enabled by default. To disable SSL connections to the database, set `EncryptedSSLConnection` to *false*. See *Disabling SSL Connections to the SMS Database* (on page 68) for more information.

If you will be using SSL connections to the database, you must perform a number of additional configuration tasks. See *Enabling SSL Connections to the Database* (on page 74) for more information.

Disabling SSL Connections to the SMS Database

Follow these steps to disable SSL connections to the database.

Step	Action
1	Edit 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 `EncryptedSSLConnection` Java applet parameter to *false* by adding the following entry in **.jnlp** files: `<param name="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:

```
<param name="EncryptedSSLConnection" value="false" />
```

Configuring Password-less SSH Logins

Configure password-less SSH logins to connect to all the servers.

To configure password-less SSH logins:

Step	Action
1	Log in the SMS as an LDAP install user.

2	Run the following command:
	For Solaris:
	`ssh-keygen -t rsa`
	For Linux:
	`ssh-keygen`
	If the **~/.ssh/id_rsa.pub'** and **'~/.ssh/authorized_keys** files do not contain the same data, link the two files by running the following command:
	`ln -s ~/.ssh/id_rsa.pub ~/.ssh/authorized_keys`

3	Append the key to the **~/.ssh/known_hosts** file on all servers by running the following commands:
	For Solaris:
	`ssh-keyscan -t rsa <server hostname> <server hostname> <server hostname> >>`
	`~/.ssh/known_hosts`
	For Linux:
	`ssh-keyscan <server hostname> <server hostname> <server hostname> >>`
	`~/.ssh/known_hosts`

Step	Action
4	Verify that the LDAP user can ssh to the SLC and VWS servers from SMS without using a password and that a path to sudo exists: `ssh <server hostname> "which sudo"` **Note:** If sudo not found on the target server, the path needs to be updated in the LDAP user's default shell.
5	Distribute the smf_key to all servers using the following command: `/var/spool/pkg/CCC/smf_key_distribute.sh <SMS hostname> <SLC hostname> <VWS1 hostname> <VWS2 hostname>`
6	Run the following script to place the SMS hostname first in the distribution list: `/var/spool/pkg/CCC/seed_disperse.sh <SMS hostname> <SLC hostname> <VWS1 hostname> <VWS2 hostname>`

Post-Installation Initial Configuration

About Initial Configuration Tasks

Perform the following initial configuration tasks after completing the Convergent Charging Controller installation on all nodes:

- Set SSH StrictHostKeyChecking for user `smf_oper` on each node. See *Setting SSH StrictHostKeyChecking* (on page 69).
- Set up IP addresses and hostnames to servers. See *Setting IP Addresses and Hostnames* (on page 70).
- 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 70).
- Update Oracle SGA parameters on each node. See *Update Oracle SGA Parameters* (on page 70).
- Update the Oracle `cpu_count` parameter. See *Update Oracle cpu_count Parameter* (on page 70).
- Update the Oracle Database default profile password for life time. See *Update Oracle Database Default Profile Password Life Time* (on page 71).
- Set shared memory limits for the Convergent Charging Controller system. See *Setting Shared Memory Limits* (on page 71).
- Set the number of database connections. See *Setting the Number of Connections to the Database* (on page 71).
- 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 72).

Setting SSH StrictHostKeyChecking

Follow these steps on each node to set SSH `StrictHostKeyChecking` for the `smf_oper` user.

Step	Action
1	Log in to the SMS as the `smf_oper` user.
2	Using a text editor, create the **/IN/service_packages/SMS/.ssh/config** file.

3	Include these lines:
	`Host *`
	`    StrictHostKeyChecking no`

Step	Action
4	Save the **config** file.
5	Repeat these steps for the SLC and VWS nodes, logging on as the `smf_oper` user each time.

Setting IP Addresses and Hostnames

You should 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 Convergent Charging Controller, 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
```

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 Convergent Charging Controller.

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.

Update Oracle Database Default Profile Password Life Time

An Oracle database user is created for each Convergent Charging Controller 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 Convergent Charging Controller 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 Convergent Charging Controller 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`

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 Convergent Charging Controller installation, set this parameter to 400 or a higher.

Example configuration in initSMF.ora

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

. . .

Setting the beServiceTrigger User and Password

`beServiceTrigger` sends BPL requests to the Convergent Charging Controller 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 directory where the `beServiceTriggerUser` utility is located.
3	Run the following command to set the username and password for `beServiceTrigger`: `beServiceTriggerUser [-d user/password] [-u st_user] [-p st_password]` where: • *user/password* is the login ID for the Oracle database. The login specified in the `oracleUserAndPassword` parameter is used if you omit the `-d` option. If this is not set, "/" is used. • *st_user* is the remote login name for the `beServiceTrigger` user. If you omit the `-u` option, `beServiceTriggerUser` prompts for a name. • *st_password* is the new password for the `beServiceTrigger` user. If you omit the `-p` option, `beServiceTriggerUser` prompts for a password.
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 Convergent Charging Controller.

/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 *Convergent Charging Controller 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 Convergent Charging Controller in a production environment, configure CDR table partitioning to define how CDRs will be stored.

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.

Step	Action
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.

Enabling SSL Connections to the Database

About SSL Connections to the Database

Convergent Charging Controller supports secure network logins through Secure Socket Layer (SSL) connections from the Convergent Charging Controller 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* (on page 74).
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 77).
3	Update the **sqlnet.ora** file to define the location of the Oracle wallet. See *Updating the sqlnet.ora file* (on page 79).
4	The Convergent Charging Controller installation automatically sets Java applet parameter configuration to enable SSL connections to the database. Check the configuration in **.jnlp** files to ensure that Java applet configuration has been set correctly. See *About Java Applet Configuration* (on page 82).
5	Clear the temporary Internet files from the Java cache.

About Creating the Oracle Wallet

The Oracle wallet is the single-sign-on wallet that is used when connecting securely to the database and that contains certificate information for identifying the Oracle server. You must create the Oracle wallet if you are using SSL connections to the database.

You create the Oracle wallet by running the **setupOracleWallet.sh** script. The script prompts you to enter the following information:

- Oracle wallet base directory. Specify the base directory to use for the Oracle root and Oracle server wallets. The default location for the Oracle wallet base directory is: **/u01/app/wallets/oracle**
- ISO country code. Specify the two-letter international country code for your country.
- The wallet passwords to use for the root CA wallet and the server wallet. You will be prompted for the password each time the wallet is accessed.

  The 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.

When you run **setupOracleWallet.sh**, you specify whether you want to use self-signed certificates. If you will be using:

- Self-signed certificates, the script completes after creating the Oracle wallet and self-signed certificate. You must then update the Java keystore on client PCs with the trusted certificates.
- Certificates signed by a commercial CA, the script initially completes after creating the certificate-signing request. You must send the certificate signing request to the commercial CA for signing. When the commercial CA returns the signed certificate, you re-run **setupOracleWallet.sh** to add the trusted CA certificate and the signed CA certificate to the Oracle server wallet.

After creating the Oracle wallet, the script prints details of the additional configuration that you must set in the Oracle **listener.ora** and **sqlnet.ora** files.

For more information about the Oracle wallet and for information about **setupOracleWallet.sh**, see *SMS Technical Guide*.

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.
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.

Step	Action
3	When prompted, enter the password for the keystore.

> **Note:** The Java installation sets the keystore password to **changeit** by default.

Step	Action
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.
2	Run the following command:

/IN/service_packages/SMS/bin/setupOracleWallet.sh

Step	Action
3	Answer y to the following prompt:

```
Do you wish to proceed with the configuration (y/n):
```

Step	Action
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.

Step	Action

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 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 Oracle Database is installed.

3	Edit the **listener.ora** file by using a text editor such as vi; for example: `vi listener.ora`

Step	Action
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 specify to use the protocol **TCPS** and the port number **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.

If there is a firewall between screen clients and the SMS, you will need to open port 2484 in the firewall.

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.

Step	Action
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 `sslCipherSuites` Java applet parameter in **.jnlp** files and the SSL_CIPHER_SUITES entry to the same value.

Step	Action
7	Save and close the file.
8	Stop the listener and then 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 `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 the Oracle binaries is correct and that file ownership for Oracle files is preserved.

Step	Action
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 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.
	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

Follow these steps to modify **eserv.config** file.

Step	Action
1	Log in to each node as `oracle` user, or run the following command from a root login to become the `oracle` user: **su - oracle**
2	Go to the directory containing the **eserv.config** file. **/IN/service_packages/eserv.config**
3	Edit the **eserv.config** file by using a text editor such as vi; for example: **vi eserv.config**

Step	Action

4	Search for the following line:
	`${OUI_value}`
	
	where *value* is the name of the value required to configure SMS, SLC, or VWS nodes.
	
	Example: The following example shows **BE.serverId** configuration for VWS node where value required is **BE_SERVER_ID**:
	<pre>BE = {
	    # BE shared items
	    serverId = ${OUI_BE_SERVER_ID}
	    # amPrimary = true
	
	    .
	    .
	    .
	    .
	}</pre>

5	Replace `${OUI_BE_SERVER_ID}` with a valid value.
	
	Example: The following example shows `BE.serverId` configuration for VWS node:
	
	<pre>BE = {
	    # BE shared items
	    serverId = 1
	    # amPrimary = true
	
	    .
	    .
	    .
	    .
	}</pre>

7	Save and close the file.

8	Restart the Convergent Charging Controller service daemons in all the nodes:
	For Solaris:
	`init q`
	or use kill commands to kill the Convergent Charging Controller service daemon
	For Linux:
	`/IN/bin/OUI_systemctl.sh`

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

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

Configuring Secondary VWS Replication Ids

You are required to modify the replication IDs in the secondary VWS node to make the replication IDs unique.

For example:

```
replicationIF.sh (SLEE/bin) - 952
smsAlarmDaemonStartup.sh (SMS/bin) - 652
smsStatsDaemonStartup.sh (SMS/bin) - 752
updateLoaderWrapperStartup.sh (CCS/bin) - 352
```

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

To create a domain, see the discussion about domain in *Charging Control Services User Guide.*

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 applet configuration must be set in **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 applet parameter entry. Set PROTOCOL to **TCPS** and set PORT to **2484**. The parameter value must be all on one line in the **.jnlp** file:
	
	`<param name="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` Java applet parameter to *true*: `<param name="EncryptedSSLConnection" value="true" />`
5	Set the `sslCipherSuites` Java applet parameter to TLS_RSA_WITH_AES_128_CBC_SHA: `<param name = "sslCipherSuites" value="(TLS_RSA_WITH_AES_128_CBC_SHA)" />`
6	Save and close the file.

Verifying the Convergent Charging Controller Installation

Overview

Introduction

This chapter explains how to verify that the Oracle Communications Convergent Charging Controller applications work correctly following the installation.

In this chapter

This chapter contains the following topics.

About Verifying the Installation

Introduction

Verify the Convergent Charging Controller installation to ensure the system works correctly after installation. This chapter describes how to set up Convergent Charging Controller 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.
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 Convergent Charging Controller 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 Convergent Charging Controller 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 Convergent Charging Controller Systems

RDA HCVE performs a variety of checks of your Convergent Charging Controller 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 Convergent Charging Controller system is configured to startup and shutdown the Oracle database appropriately
- The appropriate permissions for running scripts are set correctly

HCVE Validations on Convergent Charging Controller Databases

RDA HCVE performs a variety of checks of your Convergent Charging Controller 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_interval** and **_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 Convergent Charging Controller System

Follow these steps to collect data about your Convergent Charging Controller 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 Convergent Charging Controller Databases

Follow these steps to collect data about your Convergent Charging Controller database:

Step	Action
1	Log in as the oracle 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:Pncc44db_gen.xml`
4	Answer the prompts.
	Result: HCVE generates an output file.
5	Send the output file to Oracle Technical Support.

Convergent Charging Controller OUI Installer Screens

Overview

This appendix describes the information you need to provide for each screen when you install Oracle Communications Convergent Charging Controller in interactive mode. You can also access the information by clicking Help during installation.

Note: This document does not substitute for Convergent Charging Controller installation instructions. You should read all chapters in Convergent Charging Controller Installation Guide in preparation for installing Convergent Charging Controller, including "*Convergent Charging Controller System Requirements* (on page 9)" for information you need to collect in preparation for installation, and "*Installing Convergent Charging Controller* (on page 53)" for installation procedures.

Convergent Charging Controller OUI Installer Screens

Installation Location

Specify the name and location of the directory in which to install Convergent Charging Controller.

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

Installation Type

Select the installation type.

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

Field	Description
VWS	Installs the Convergent Charging Controller 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.

Database Paths

Enter the paths to the Oracle database path details to install Convergent Charging Controller DB schema scripts.

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.
Install Convergent Charging Controller database schema?	Select the check box if you want to install the Convergent Charging Controller database schema creation scripts.

Database Password

Enter the previously existing Oracle database password administrative account.

Field	Description
Oracle database password	Enter the password for the Oracle database administrative accounts.
Confirm password	Enter the password again for confirmation.

Note: If the password is less than 8 characters, a warning appears. You can click **OK** to proceed.

Oracle Client

Enter information about the Oracle database client.

Field	Description
Oracle client home	Enter the full path to the Oracle database client home directory in which Oracle Database Client is installed.

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.

Replication

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

Field	Description
Node number	Enter a unique identification number for the node. The Node number that is used as a replication ID should be between **1** and **99**. **Note:** If 1 is entered, the VWS will be given the replication ID of 351, **if** 2 is entered, the VWS will be given the replication ID of 352, and so on.
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.

Glossary of Terms

AAA

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

ACS

Advanced Control Services configuration platform.

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.

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 (or Prepaid Charging) 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).

Connection

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

Convergent

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

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

cron

Unix utility for scheduling tasks.

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.

ENUM

E.164 Number Mapping.

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.

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.

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.

Messaging Manager

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

MGC

Media Gateway Controller

MM

Messaging Manager. Formerly MMX, see also *XMS* (on page 101) and *Messaging Manager* (on page 96).

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.

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.

RIMS

Routing Information for Mobile Services. Used to cache HLR lookup information.

Note: Now known as "Messaging Manager Navigator".

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.

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

SMS

Depending on context, can be:

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

SN

Service Number

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 - 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).

SS7

A Common Channel Signalling system 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

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 and Friends and Family Access.

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).

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 Convergent Charging Controller *Messaging Manager* (on page 96) service and the Short Message Service. The published code is *MM* (on page 96) (formerly MMX).

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