

# Oracle® Communications Convergent Charging Controller Installation Guide



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The Oracle logo, consisting of a solid red square with the word "ORACLE" in white, uppercase, sans-serif font centered within it.

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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, 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  |
|--------------------------------|--|
| <b>Special Bold</b>            | Items you must select, such as names of tabs.<br>Names of database tables and fields.  |
| <i>Italics</i>                 | Name of a document, chapter, topic or other publication.<br>Emphasis within text.  |
| <b>Button</b>                  | The name of a button to click or a key to press.<br><b>Example:</b> To close the window, either click <b>Close</b> , or press <b>Esc</b> . |
| <b>Key+Key</b>                 | Key combinations for which the user must press and hold down one key and then press another.<br>Example: <b>Ctrl+P</b> or <b>Alt+F4</b> .  |
| Monospace                      | Examples of code or standard output.   |
| <b>Monospace Bold</b>          | Text that you must enter.  |
| <i>variable</i>                | 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.<br>Example: <b>Operator Functions &gt; Report Functions</b>                     |
| <a href="#">hypertext link</a> | Used to indicate a hypertext link.   |

# 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

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This chapter contains the following topics.

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## 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.

| Component | Provides  |
|-----------|---|
| SMS       | Service Management System (SMS) support for all other components. For example: <ul style="list-style-type: none"> <li>• Data replication.</li> <li>• Statistics and alarm collection.</li> <li>• Security (users and permissions).</li> <li>• Report generation.</li> </ul> |
| 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.    |
| DSY             | Diameter Sy Interface  |
| MM              | All messaging capabilities.  |
| MM Navigator    | Routing information lookup capabilities for messaging services.              |
| RAP             | CAMEL roaming capabilities.  |
| UIS and UPC     | USSD capabilities.   |
| DAP             | Outbound XML capabilities.   |
| OSD             | Inbound XML capabilities.  |
| LCP             | Location based capabilities.   |
| SCA             | SIP capabilities.  |
| VSSP            | ISUP capabilities.   |
| SIGTRAN         | M3UA and SUA capabilities.   |
| PI              | Provisioning capabilities.   |
| CAP3_GW         | CAP3 capabilities.   |
| DCA             | Inbound Diameter capabilities.   |
| DCD             | Outbound Diameter capabilities.  |
| ECA             | Inbound EDR/CDR processing capabilities.                                     |
| ENUM            | ENUM capabilities.   |
| IS41            | Inbound IS41 (CDMA) capabilities.  |
| LCA             | Inbound LDAP capabilities.   |
| MFW             | MAP Firewall capabilities.   |
| MOB_ROAM        | Additional roaming capabilities.   |
| NGW             | Notification Gateway capabilities.   |
| NP_SERVICE_PACK | Number portability capabilities.   |
| RCA             | RADIUS capabilities.   |
| SES             | Subscriber event capabilities.   |
| SEI             | SMS to email capabilities.   |
| SMINAP          | CAPv1 capabilities.  |
| TFR             | TCAP relay capabilities.   |
| VPN             | Virtual private networking capabilities.                                     |

## Certification

This release has been certified on:

- Solaris 11.3
- Oracle Database 12.2.0 and 19.3.0
- Oracle Linux 7 Update 9

## Obsoleted Support

This release makes obsolete support of the following:

- Solaris 10
- Oracle Database 10.2
- Oracle Database 11g
- Oracle Database 11g 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: <ul style="list-style-type: none"> <li>• Determine the scale of your implementation, for example, whether it is a small test system or a large production system.</li> <li>• Determine how many physical machines you need.</li> <li>• Plan the system topology, for example, which SMS, VWS, or SLC nodes will run on which machines.</li> </ul> |
| 2    | Review the following system requirements: <ul style="list-style-type: none"> <li>• Hardware requirements, such as disk space and memory size</li> <li>• Software requirements, such as operating system version, file system layout, and file sizes</li> <li>• Information requirements, such as IP addresses and host names</li> </ul>  |
| 3    | Perform pre-installation tasks: <ul style="list-style-type: none"> <li>• Perform system preparation tasks such as disabling services and configuring the location of log files.</li> <li>• Install and configure the Oracle database on local or remote server.</li> <li>• Install and configure additional third-party software.</li> </ul>   |
| 4    | Install the Convergent Charging Controller product software on all nodes and optionally install service templates. <p><b>Note:</b> If the database is on a remote server, ensure the required table spaces are added. See <i>Advanced Storage and Memory Sizing</i> (on page 25) for more details.</p>   |
| 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 either a 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 is installed successfully before continuing the installation process.
- Pay close attention to the system requirements. Before you begin installing the software, make sure your system has the required base software. In addition, make sure that you know all of the required configuration values, such as host names and port numbers.
- As you create new configuration values, write them down. In some cases, you might need to re-enter configuration values later in the procedure.

# Planning Your Convergent Charging Controller Installation

## Overview

### Introduction

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

### In this chapter

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This chapter contains the following topics.

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## 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
- If databases will be co-located at nodes or located remotely
- 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 *Convergent 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 or Oracle VM for Linux
- Hardware partitioning such as dynamic domains

Each node should have its own operating system, database instance, and storage layout. You could also use an existing database available on a remote server. See *Installing the Oracle Database Software* (on page 55) for details.

## Detailed Planning

### Storage Planning

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

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

### Database Planning

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

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

### Network Planning

To plan the network implementation:

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

## Integration Planning

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

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

## OSD Configuration Planning

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

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

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

**Tip:** You should use an:

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

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

### OSD Configuration Example

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

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

## Replication Planning

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

### Replication Reference Table Example

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

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

The table headings map to the following configuration fields:

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

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

# Convergent Charging Controller System Requirements

## Overview

### Introduction

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

### In this chapter

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This chapter contains the following topics.

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## 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: <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> </ul> 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 25).

### 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 25).

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) |     |     |
|-----------------------|----------------------------------|-----|-----|
|                       | SMS                              | VWS | SLC |
| 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 <code>/var</code> file system and swap space                            | Boot disk                                    |
| Convergent Charging Controller applications (binaries, libraries, log files, temporary files) | <code>/IN</code> (mandatory)                 |
| Oracle Database Server (binaries, <code>\$ORACLE_BASE</code> , <code>\$ORACLE_HOME</code> )   | <code>/u01</code> (recommended)              |
| Oracle Database instance (for example, data files, log files)                                 | <code>/oracle/datafiles</code> (recommended) |
| Oracle redo log files   | <code>/oracle/redologs</code> (recommended)  |

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

For Oracle Enterprise Database 12c:

| 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<br>12c R2 Enterprise Edition / 19.3.0<br>Enterprise Edition | /u01              | 10 GB / 12 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              | 12 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              | 12 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<br>1 | 200                | 4               | 800        |
| CCS       | CCS_CDR               | 2001               | 1               | 2001       |
|           | CCS_CDR_I             | 2001               | 1               | 2001       |
|           | CCS_DATA              | 2001               | 1               | 2001       |

| Component       | Tablespace Name | Datafile Size (MB) | Number of Files | Total Size |
|-----------------|-----------------|--------------------|-----------------|------------|
|                 | CCS_EVENT       | 2001               | 1               | 2001       |
|                 | CCS_EVENT_I     | 2001               | 1               | 2001       |
|                 | CCS_INDEX       | 2001               | 1               | 2001       |
|                 | CCS_SUBS        | 2001               | 1               | 2001       |
|                 | CCS_SUBS_I      | 2001               | 1               | 2001       |
|                 | CCS_VOUCHERS    | 2001               | 1               | 2001       |
|                 | CCS_VOUCHERS_I  | 2001               | 1               | 2001       |
|                 | 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        |

| Component | Tablespace Name | Datafile Size (MB) | Number of Files | Total Size |
|-----------|-----------------|--------------------|-----------------|------------|
|           | SMF_INDEX       | 200                | 1               | 200        |
|           | SMF_STATS       | 2001               | 1               | 2001       |
|           | SMF_STATS_I     | 2001               | 1               | 2001       |
|           | SYSAUX          | 2001               | 1               | 2001       |
|           | SYSTEM          | 512                | 1               | 512        |
|           | TOOLS           | 2001               | 1               | 2001       |
|           | UNDOTBS2        | 2001               | 5               | 10005      |
|           | 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      |

| Component | Tablespace Name | Datafile Size (MB) | Number of Files | Total Size |
|-----------|-----------------|--------------------|-----------------|------------|
|           | REDO            | 101                | 16              | 1616       |
|           | TOOLS           | 200                | 1               | 200        |
|           | UNDO            | 2001               | 5               | 10005      |
|           | USERS           | 200                | 1               | 200        |
| CCS       | CCS_DATA        | 200                | 1               | 200        |
|           | CCS_INDEX       | 200                | 1               | 200        |
|           | CCS_SUBS        | 2001               | 1               | 2001       |
|           | 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_DATA            | 200                | 1               | 200        |

| Component       | Tablespace Name | Datafile Size (MB) | Number of Files | Total Size |
|-----------------|-----------------|--------------------|-----------------|------------|
| NP_SERVICE_PACK | 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  |
|--|-------------------------------|---|
| Oracle Solaris or Linux operating system. This includes the packages listed below.   | 11.3 (Solaris)<br>7.9 (Linux) | All nodes<br><b>Note:</b> When installing the nodes, ensure that all the nodes are installed on the same operating system.                                      |
| Linux Kernel Stream Control Transmission Protocol:<br>lksctp-tools.i686  | -                             | SLC nodes   |
| Oracle Database Server:<br>12c R2 Enterprise Edition<br>OR<br>19c Enterprise Edition   | 12.2.0.1.0<br><br>19.3.0.0.0  | SMS nodes   |
| Oracle Database Server:<br>12c R2 Standard Edition 2<br>OR<br>19c Enterprise Edition   | 12.2.0.1.0<br><br>19.3.0.0.0  | SLC and VWS nodes   |
| Oracle Java Runtime Environment (JRE)  | 8u271                         | SMS node<br>GUI clients hosts   |
| Oracle Java Development Kit (JDK). This includes the packages listed below:<br>JDK 8   | 8u221                         | All nodes   |
| Oracle Communications Billing and Revenue Management (BRM) SDK (on SLC nodes) See <i>Installing and Configuring BRM SDK</i> (on page 60) for more information. | BRM SDK<br>7.5.0.21.0         | SLC Node<br><b>Note:</b> Copy 64 bit libraries libnzsdk64.so, libpcnext64.so and libportal64.so into BRM SDK installed 'lib' directory with proper permissions. |

| Software          | Version | Where to install  |
|-------------------|---------|---|
| xinetd daemon     | N/A     | SMS nodes<br><b>Note:</b> This daemon is a prerequisite for running the cmnPushFiles and cmnReceiveFiles processes.         |
| Httpd             |         | SMS nodes   |
| Elasticsearch OSS | 7.10.2  | <b>Note:</b> These are optional and only required in case of EFK based logging support.                                     |
| Kibana OSS        | 7.10.2  |   |
| Fluentd           | 1.12.3  |   |
| Prometheus        | 2.27.1  | <b>Note:</b> These are optional and only required in case of implementing Prometheus and Grafana based monitoring solution. |
| Grafana           | 7.5.6   |   |

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

For Linux:

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

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

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

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

## Modifying Resource Control Values

Follow these steps to set resource controls for Solaris 11.3.

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

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

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

## Setting the Semaphore Parameters for Linux

To set the semaphore parameters:

| Step | Action   |
|------|--|
| 1    | Log in as the root user.   |
| 2    | Open the <code>/etc/sysctl.conf</code> file in a text editor.  |
| 3    | Set values to the appropriate semaphore requirements. For example:<br><pre>kernel.sem = 2048 65536 128 2048 fs.file-max = 6815744 kernel.sem = 2048          65536   128       2048 kernel.shmni = 4096 kernel.shmall = 1073741824 kernel.shmmax = 4398046511104 kernel.panic_on_oops = 1 net.ipv4.conf.all.rp_filter is 2 net.ipv4.conf.all.rp_filter = 2 net.ipv4.conf.default.rp_filter is 2 net.ipv4.conf.default.rp_filter = 2 fs.aio-max-nr = 1048576 net.ipv4.ip_local_port_range = 9000 65500 kernel.core_pattern = /var/crash/core-%h-%p-%e net.ipv4.tcp_rmem = 16777216 16777216 16777216 net.ipv4.tcp_wmem = 16777216 16777216 16777216 net.ipv4.tcp_mem = 16777216 16777216 16777216 net.core.optmem_max = 16777216 net.core.rmem_max = 2096304 net.core.wmem_max = 16777216 net.core.rmem_default = 16777216 net.core.wmem_default = 16777216</pre> |
| 4    | Save and close the file.   |
| 5    | Activate the new semaphore settings by entering the following command:<br><pre>/sbin/sysctl -p</pre>   |

**Note:** For more information about semaphore settings, see the Oracle Database documentation.

## Tuning the System's ZFS Performance

**Note:** If ZFS filesystem supports Oracle data files, ensure that ZFS record size is same as the Oracle block size. Set ZFS record size before the Oracle data files are created.

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:<br><code>set zfs:zfs_nocacheflush=1</code>  |
| 2    | Set the ZFS file system's maximum cache size. For example, to set the maximum cache size to 5 GB:<br><code>set zfs:zfs_arc_max=0x140000000</code>           |
| 3    | Set the ZFS file system's minimum cache size. For example, to set the minimum cache size to 5 GB:<br><code>set zfs:zfs_arc_min=0x140000000</code>           |
| 4    | If your file system cache is small, disable prefetching:<br><code>set zfs:zfs_prefetch_disable=1</code><br><code>set zfs:zfs_immediate_write_sz=8000</code> |

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.

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

To set the time zone to GMT in Solaris:

| Step | Action                   |
|------|--------------------------|
| 1    | Log in as the root user. |

- 2 Run the following command:
- ```
svccfg -s timezone:default setprop timezone/localtime= astring:
GMT
svcadm refresh timezone:default
```

To set the time zone to GMT in Linux:

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Log in as the root user.                                                                                                                                                                                                                                                                                                                                                                                                     |
| 2    | Run the following command:<br><code>timedatectl set-timezone GMT</code>                                                                                                                                                                                                                                                                                                                                                      |
| 3    | If the application is configured to read RTC time in local timezone, run the following command to set RTC in UTC:<br><code>timedatectl set-local-rtc 0</code>                                                                                                                                                                                                                                                                |
| 4    | Edit <code>/etc/profile</code> and alter the TZ line to:<br><code>export TZ=GMT</code>                                                                                                                                                                                                                                                                                                                                       |
| 5    | Run the following command to check the time zone:<br><code>-bash-4.2\$ timedatectl</code><br>The result would appear as:<br>Warning: ignoring the TZ variable, reading the system's timezone setting only.<br><br>Local time: Thu 2017-03-16 04:10:02 GMT<br>Universal time: Thu 2017-03-16 04:10:02 UTC<br>Timezone: GMT (GMT, +0000)<br>NTP enabled: no<br>NTP synchronized: yes<br>RTC in local TZ: no<br>DST active: n/a |

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

**Important:** It is critical that the date and time are synchronized across all 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:<br><code>env   grep TZ</code><br><b>Result:</b><br>TZ = GMT<br>This indicates that the time zone directory is set to GMT. |

Follow these steps to verify time zone on Linux machine.

| Step | Action                                                                                    |
|------|-------------------------------------------------------------------------------------------|
| 1    | Log in as a root user to the machine for which you want to check the time zone.           |
| 2    | Run the following command to check the time zone:<br><code>-bash-4.2\$ timedatectl</code> |

**Result:**

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

Local time: Thu 2017-03-16 04:10:02 GMT

Universal time: Thu 2017-03-16 04:10:02 UTC

Timezone: GMT (GMT, +0000)

NTP enabled: no

NTP synchronized: yes

RTC in local TZ: no

DST active: n/a

This indicates that the time zone is set to GMT.



# 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.

|                                        |    |
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## 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 | <p>This is the basic system installed as a minimum using the Convergent Charging Controller Installer. It comprises:</p> <ul style="list-style-type: none"> <li>• One SMS node</li> <li>• One VWS pair (two nodes)</li> <li>• One SLC node</li> </ul> <p>This system corresponds to the minimum storage requirements detailed in <i>Storage Requirements</i> (on page 12).</p> |

| Scenario                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Small production system  | <p>A production system covering:</p> <ul style="list-style-type: none"> <li>• Less than 1 million subscribers</li> <li>• Less than 24 million vouchers</li> <li>• Less than 1 million EDRs per day with 4 weeks retention</li> </ul> <p>Comprising:</p> <ul style="list-style-type: none"> <li>• One SMS node</li> <li>• One VWS pair (two nodes)</li> <li>• Two SLC nodes</li> </ul> <p>For details, see <i>Small Production System Example</i> (on page 26).</p>           |
| Medium production system | <p>A production system covering:</p> <ul style="list-style-type: none"> <li>• Less than 1 million subscribers</li> <li>• Less than 120 million vouchers</li> <li>• Less than 10 million EDRs per day with 12 weeks retention</li> </ul> <p>Comprising:</p> <ul style="list-style-type: none"> <li>• One SMS node</li> <li>• Two VWS pairs (four nodes)</li> <li>• Four SLC nodes</li> </ul> <p>For details, see <i>Medium Production System Example</i> (on page 32).</p>    |
| Large production system  | <p>A production system covering:</p> <ul style="list-style-type: none"> <li>• Less than 10 million subscribers</li> <li>• Less than 240 million vouchers</li> <li>• Less than 20 million EDRs per day with 24 weeks retention</li> </ul> <p>Comprising:</p> <ul style="list-style-type: none"> <li>• One SMS node</li> <li>• Four VWS pairs (eight nodes)</li> <li>• Eight SLC nodes</li> </ul> <p>For details, see <i>Large Production System Example</i> (on page 36).</p> |

## 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

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

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

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

| Component | Tablespace Name | Data File Size (MB) | Number of Files | Total Size (MB) |
|-----------|-----------------|---------------------|-----------------|-----------------|
|           | 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             |
|           | 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_Ww<br>w       | 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             |

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

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

| 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/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           | 2001      | 37700          | 19                  | 13                          | 532266                     |

## Additional Oracle Datafiles on the VWS

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

| Component | Tablespace Name | Data File Size (MB) | Number of Files | Total Size (MB) |
|-----------|-----------------|---------------------|-----------------|-----------------|
| BE        | BE_SUBS         | 2001                | 3               | 6003            |
|           | BE_SUBS_I       | 2001                | 2               | 4002            |
|           | BE_VOUCHERS     | 2001                | 1               | 2001            |
|           | BE_VOUCHERS_I   | 2001                | 1               | 2001            |
| CCS       | CCS_DATA        | 200                 | 5               | 1000            |
|           | CCS_INDEX       | 200                 | 2               | 400             |
|           | 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) |
|-------------------------------------|-------------------------------------------------------|---------------------|----------------|----------------------|------------------------------|
| <i>Data files (shared / global)</i> |                                                       |                     |                |                      |                              |
| ASM +DATA<br>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<br>Diskgroup              | Oracle redo logs                                      | 1600                | 2%             | 1632                 | 2                            |
| ASM +TEMP<br>Diskgroup              | Oracle TEMP tablespace                                | 50025               | 2%             | 51026                | 50                           |
| <i>Other (shared / global)</i>      |                                                       |                     |                |                      |                              |

| Mount Point                    | Contents                                    | Required Space (MB) | Block Overhead | Allocated Space (MB) | Total Mount Point Space (GB) |
|--------------------------------|---------------------------------------------|---------------------|----------------|----------------------|------------------------------|
| 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                           |
| <i>Other (private / local)</i> |                                             |                     |                |                      |                              |
| /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                          |
| <i>Total</i>                   |                                             |                     |                |                      |                              |
| Shared/Global                  |                                             |                     |                | 2549009              | 2495                         |
| 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                           |

| 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                            |
| 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                           |
| 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            |

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

## Node-Specific Users

### Introduction

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

### Users on SMS Database Instance

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

| GRANTEE | PRIVILEGE           | ADMIN OPTION |
|---------|---------------------|--------------|
| SMF     | ALTER ANY INDEX     | YES          |
| SMF     | ALTER ANY PROCEDURE | YES          |
| SMF     | ALTER ANY ROLE      | YES          |
| SMF     | ALTER ANY SEQUENCE  | YES          |
| SMF     | ALTER ANY TABLE     | YES          |

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

| GRANTEE | PRIVILEGE            | ADMIN OPTION |
|---------|----------------------|--------------|
| SMF     | UNLIMITED TABLESPACE | NO           |
| SMF     | UPDATE ANY TABLE     | YES          |

## Users on SLC Database Instance

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

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

| GRANTEE | PRIVILEGE             | ADMIN OPTION |
|---------|-----------------------|--------------|
| SCP     | DROP PUBLIC SYNONYM   | NO           |
| SCP     | DROP TABLESPACE       | NO           |
| SCP     | DROP USER             | NO           |
| SCP     | EXECUTE ANY PROCEDURE | NO           |
| SCP     | GRANT ANY PRIVILEGE   | NO           |
| SCP     | GRANT ANY ROLE        | NO           |
| SCP     | INSERT ANY TABLE      | YES          |
| SCP     | SELECT ANY TABLE      | YES          |
| SCP     | UNLIMITED TABLESPACE  | NO           |
| SCP     | UPDATE ANY TABLE      | YES          |

### Users on VWS Database Instance

Ensure the VWS database instance contains a user called E2BE\_ADMIN with the following privileges:

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



# 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.

|                                                  |    |
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| Preparing the System for Installation .....      | 45 |
| About Checking Prerequisite Requirements .....   | 52 |
| Installing a Browser .....                       | 54 |
| Installing and Configuring Oracle Database ..... | 55 |
| Installing and Configuring BRM SDK .....         | 60 |

## 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:

- (Optional) Disable automount for the top directory of the mount point for all entries in the `auto_home` map file. See *Disabling automount for the Home Directory* (on page 46).
- Enable remote login for the root user. See *Enabling Remote Login* (on page 46).
- Configure the log notice alarms. See *Configuring Where to Log Notice Alarms* (on page 46).
- Configure the directory to use for reporting core dumps and storing core files. See *Configuring Core Dump Reporting* (on page 47).
- Disable any unnecessary system services. See *Disabling System Services* (on page 48).
- Open ports to Convergent Charging Controller in your Linux firewall. See *Opening Ports in Your Linux Firewall* (on page 48).
- Ensure machines automatically boot following a temporary power loss. See *Configuring Machines to Boot Automatically* (on page 50).
- Enable the SSH root login. See *Enabling SSH Root Login* (on page 50).
- Ensure Java 1.8 is installed. See the Oracle Java documentation.
- Configure the SSH SMF service. See *Configuring the SSH SMF Service* (on page 50).
- Configure the `/etc/system` file to make buffer-overflow attacks more difficult. See *Preventing Buffer Overflow Attacks* (on page 51).
- Disable the keyboard abort sequence. See *Disabling Keyboard Abort Sequence* (on page 51).
- Create the `/IN` Directory. See *Creating the /IN Directory* (on page 52).

## Disabling automount for the Home Directory

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

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

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

## Enabling Remote Login

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

```
# CONSOLE=/dev/console
```

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

## Configuring Where to Log Notice Alarms

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

Follow these steps to log notice level alarms.

| Step | Action                                                                                                                                     |
|------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Open the following file in a text editor:<br>For Solaris:<br><code>/etc/syslog.conf</code><br>For Linux:<br><code>/etc/rsyslog.conf</code> |

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2    | <p>Add the following line:</p> <p>For Solaris:</p> <pre>*.notice;kern.debug;daemon.notice;mail.crit logfile</pre> <p>where <i>logfile</i> is the log file name including the absolute path; for example, <i>/var/adm/messages</i>.</p> <p>For Linux:</p> <pre>*.=notice;kern.=debug;daemon.=notice;mail.=crit logfile</pre> <p>where <i>logfile</i> is the log file name including the absolute path; for example, <i>/var/log/messages</i>.</p> |
| 3    | Save and close the file.                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 4    | For Linux only, restart logging by running the command:<br>systemctl restart rsyslog.service                                                                                                                                                                                                                                                                                                                                                     |

## Configuring Core Dump Reporting

### On Linux

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

```
ulimit -S -c unlimited > /dev/null 2>&1
```

This will set the soft limit for core files to be unlimited.

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

```
* soft core unlimited
```

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

```
kernel.core_pattern = /var/crash/core-%h-%p-%e
```

where the format specifiers are

```
%h - system hostname
%p - PID of dumped process
%e - executable file name
```

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

```
fs.suid_dumpable = 2
```

Load the changed sysctl settings:

```
# sysctl -p
```

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

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

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

6. Restart the `abrt` daemon.

For Oracle Linux 7:

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

### On Solaris

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

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

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

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

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

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

## Disabling System Services

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

- FTP
- Telnet
- Rlogin
- Sendmail

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

**Example commands:**

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

For Linux, use the `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
systemctl disable --now ftp.service
```

## Opening Ports in Your Linux Firewall

Follow these steps to open ports in your Linux firewall.

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Log in as the root user.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 2    | Run the following command to configure the tables provided by the Linux kernel firewall:<br><b>yum install iptables-services</b>                                                                                                                                                                                                                                                                                                                                                                                      |
| 3    | Run the following command to view your firewall's current configuration:<br><b>iptables -L</b>                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 4    | Run the following command for each Convergent Charging Controller port through which the firewall should accept incoming traffic:<br><b>iptables -A INPUT -p tcp --dport <i>portNumber</i> -j ACCEPT</b><br>where <i>portNumber</i> is the Convergent Charging Controller port through which the firewall accepts incoming traffic. For more information on ports, see <i>List of Ports Used by Convergent Charging Controller</i> (on page 49).<br>The new configuration rule is added to your firewall rules table. |

| Step | Action                                                                                                                                                                                                                                                                                                                                                                             |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5    | Run the following command to save the configuration in the firewall rules table:<br><code>/sbin/service iptables save</code>                                                                                                                                                                                                                                                       |
| 6    | Run the following command to reinitialize the iptables service:<br><code>service iptables restart</code><br>The configuration changes take effect after you reinitialize the iptables service.                                                                                                                                                                                     |
| 7    | Run the following command to backup your firewall rules table to an external file:<br><code>iptables-save &gt; filename</code><br>where <i>filename</i> is the path and name of the file in which to save your firewall rules table.<br>You can use this file to distribute the firewall rules table to other nodes or to restore your firewall rules table after a system reboot. |

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

```
iptables-restore < filename
```

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

## List of Ports Used by Convergent Charging Controller

The following table lists the ports used by Convergent Charging Controller.

| Port Number | Description                                                                                                               |
|-------------|---------------------------------------------------------------------------------------------------------------------------|
| 25          | Email client port                                                                                                         |
| 53          | ENCA port                                                                                                                 |
| 80          | acsStatisticsDBInserter, acsStatsMaster, and acsStatsLocal port                                                           |
| 161         | smsAlarmRelay port                                                                                                        |
| 1490        | Used by ACS                                                                                                               |
| 1495        | ccsSSMMaster port                                                                                                         |
| 1500        | ccsMFileCompiler and beServer port                                                                                        |
| 1521        | SQL*Net port                                                                                                              |
| 1812        | radiusControlAgent core port                                                                                              |
| 1813        | radiusControlAgent accounting port                                                                                        |
| 2003        | SEI EMI report port                                                                                                       |
| 2027        | ccsVWARSEpiry and ccsExpiryMessageGenerator port<br>CCS GPG key import screens, cmnPushFiles/cmnReceiveFiles for CCS EDRs |
| 2028        | cmnPushFiles/cmnReceiveFiles for ACS EDRs                                                                                 |
| 2031        | cmnPushFiles/cmnReceiveFiles for UIS EDRs                                                                                 |
| 2484        | Oracle database secure listening port                                                                                     |
| 2500        | Email server port                                                                                                         |
| 2999        | piClientIF port                                                                                                           |
| 3033        | SMPP remote port                                                                                                          |
| 3072        | smsTrigDaemon and xmlTcapInterface port                                                                                   |
| 3615        | SCA remote communication port                                                                                             |
| 3799        | radiusControlAgent dynamic authorization port                                                                             |

| Port Number | Description                                              |
|-------------|----------------------------------------------------------|
| 3868        | diameterControlAgent and diameterBeClient listening port |
| 4099        | dapIF listening port                                     |
| 5060        | SCA TCP and UDP port                                     |
| 5096        | XMS TCP and UDP port                                     |
| 5556        | ccsBeOrb naming server port                              |
| 7654        | sigtran_monitor_daemon listening port                    |
| 7669        | smsCompareResyncServer                                   |
| 8888        | smsInterface port                                        |
| 9999        | xmlInterface port                                        |
| 12343       | smsMaster and updateLoader port                          |
| 12344       | smsCompareResyncClient port                              |
| 12696       | VWS node port                                            |
| 14875       | m3uaCdmaGateway test interface port                      |
| 14876       | m3uaCdmaGateway soak test interface port                 |

## Configuring Machines to Boot Automatically

On Solaris, set the `eeeprom 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

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

## Enabling SSH Root Login

Follow these steps to enable SSH root login.

| Step | Action                                                                                                                                                               |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | In the <code>/etc/ssh/sshd_config</code> file, set the <code>PermitRootLogin</code> parameter value to <code>yes</code> .                                            |
| 2    | Save and close the file.                                                                                                                                             |
| 3    | Run the following command:<br>For Solaris:<br><pre>\$ svcadm -v restart svc:/network/ssh:default</pre><br>For Linux:<br><pre>\$ systemctl restart sshd.service</pre> |

## Configuring the SSH SMF Service

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

For Solaris:

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

```
svcadm restart network/ssh
```

## Installing HTTPD

Follow these steps to install HTTPD.

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Login as root user.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 2    | Do one of the following: <ul style="list-style-type: none"> <li>• For Solaris, run the following commands:               <pre># pkg install web/server/apache-22</pre> <pre># svcadm enable /network/http:apache22</pre> </li> <li>• For Linux, do the following:               <ol style="list-style-type: none"> <li>a) Set SELinux to Permissive.</li> <li>b) Run the following commands:                   <pre># yum install httpd</pre> <pre># service httpd start</pre> </li> </ol> </li> </ul> |

## Preventing Buffer Overflow Attacks

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

```
set noexec_user_stack = 1
```

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

For Linux, no settings are required.

## Disabling Keyboard Abort Sequence

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

```
KEYBOARD_ABORT=disable
```

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

For Linux, no settings are required.

## Creating Users

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

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

### User profiles

If you plan to run the CCC application as a different CCC\_runtime\_user to the default, it is required to either set:

- 1 The home directory of the CCC\_runtime\_user to '/IN/service\_packages/SMS'
- 2 Add the following line entry to the .profile of the CCC\_runtime\_user so the correct environment is configured automatically at login following the installation.

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

```
. /IN/service_packages/SMS/.profile-??*;
fi
```

## Creating esg group for Each Node

Follow these steps to create esg group for each Convergent Charging Controller Node:

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

## Creating the /IN Directory

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

| Step | Action                                                                                                                                                    |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Log in as the root user.                                                                                                                                  |
| 2    | Run the following command:<br><code>\$ mkdir /IN</code>                                                                                                   |
| 3    | Run the following command to set the permissions for the /IN directory:<br><code>chmod 775 /IN</code><br><code>chown CCC_installation_user:esg /IN</code> |

## About Checking Prerequisite Requirements

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

- The system meets minimum software and hardware requirements
- The esg group exists
- The Oracle user, CCC\_runtime\_user and CCC\_installation\_user exists and belongs to the esg group and the group that owns the Oracle database (for example 'dba').
- The /IN directory exists and has readable, writable, and executable (775) file permissions
- JAVA\_HOME and JAVA\_HOME/bin should be set in PATH variable, so that java executable can be accessed from any location

Perform a prerequisite check by running the following command on each Convergent Charging Controller node:

```
touch oraInvFile
```

```
java -jar ./cccInstaller_platform.jar -invPtrLoc oraInvFile -prereqchecker -silent -entryPoint nodeType
```

where:

- *platform* is **Linux** or **SunOS**.
- *oraInvFile* is the name and location of the Oracle Inventory file (**/IN/oralnst.loc**). You can point to the default file created by the Oracle Database installer. If the Convergent Charging Controller installation user account cannot read the default file, create an **oralnst.loc** file in a writeable location.

- *nodeType* is the type of test to perform. Valid values are shown in the following table:

| nodeType Value | Tests Performed                                                                                                                                                                                                          |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| minimum        | <ul style="list-style-type: none"> <li>• Checks that all users and groups have been created.</li> <li>• Checks that the /IN directory exists.</li> </ul>                                                                 |
| sms            | <ul style="list-style-type: none"> <li>• Checks that all users and groups required by the SMS have been created.</li> <li>• Checks that the /IN directory exists.</li> </ul>                                             |
| slc            | <ul style="list-style-type: none"> <li>• Checks that all users and groups required by the SLC have been created.</li> <li>• Checks that the /IN directory exists.</li> <li>• Check SLC software dependencies.</li> </ul> |
| vws            | <ul style="list-style-type: none"> <li>• Checks that the users and groups required by the VWS have been created.</li> <li>• Checks that the /IN directory exists.</li> <li>• Check VWS software dependencies.</li> </ul> |

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

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

The following shows sample output from the `ccclnstaller_platform.jar` script when *nodeType* is set to `slc`:

```
Preparing to launch the Oracle Universal Installer from /tmp/OraInstall2018-07-27_10-32-44AM
Oracle Prerequisite Checker Version 13.9.1.0.0 Production
Copyright (C) 1999, 2016, Oracle. All rights reserved.
```

```
Starting execution of prerequisite checks
Total No of checks: 8
```

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

```
Check complete: Passed
```

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

```
Check complete: Passed
```

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

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

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

```
Check complete: Failed
Problem: The directory /IN must exist and have 775 permissions.
Recommendation: Create the /IN directory with 775 permissions.
```

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

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

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

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

The log(s) can be found here: /tmp/OraInstall2018-07-27\_10-32-44AM.

## 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 8u271                                                                     |
| Browser      | Any browser supporting the required Java version, such as IE 11 or Chrome 92.0 |

# Installing and Configuring Oracle Database

## About Installing and Configuring Oracle Database

You need to install Oracle Database Server on all nodes:

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

## Installing the Oracle Database Software

You can install Oracle database for Convergent Charging Controller in the following ways:

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

Install Oracle Enterprise Database Server 12c Release 2

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

## Oracle Database Software Installation Guidelines

Follow these guidelines when installing Oracle Enterprise Database software.

| Installation Entity                                                                           | Guideline Value                                                                                                                                            |
|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Oracle Software Owner User                                                                    | Username: <b>oracle</b><br>Home directory: <b>/home/oracle</b>                                                                                             |
| OSDBA Group                                                                                   | <b>dba</b>                                                                                                                                                 |
| Oracle Base Directory<br>(ORACLE_BASE)                                                        | <b>/u01/app/oracle</b>                                                                                                                                     |
| (Oracle 12c database or<br>Oracle 19c database)<br>Oracle 12c Home Directory<br>(ORACLE_HOME) | <b>/u01/app/oracle/product/12.2.0</b><br><b>Note:</b> If Oracle Database 19c is installed, then set ORACLE_HOME to <b>/u01/app/oracle/product/19.0.0</b> . |
| Oracle database datafile<br>directory                                                         | <b>/oracle/datafiles</b>                                                                                                                                   |

| Installation Entity                                                         | Guideline Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Oracle user <code>.profile</code><br>( <code>/home/oracle/.profile</code> ) | <p>Configure the <b>oracle</b> user's <b>.profile</b> file with the following variables consistent with your environment.</p> <pre># Set up terminal, non-interactive, default vt100 TERM=vt100 export TERM  if [ -t 0 ] ; then   # Set some options   set -o vi   stty erase "^H" kill "^U" intr "^C" eof "^D"   stty hupcl ixon ixoff   set -o vi fi  umask 022  MAIL=/usr/mail/\${LOGNAME:?} export MAIL  ORACLE_BASE=/u01/app/oracle export ORACLE_BASE  ORACLE_HOME=\$ORACLE_BASE/product/<i>release_version</i> export ORACLE_HOME  LD_LIBRARY_PATH_64=\$ORACLE_HOME/lib export LD_LIBRARY_PATH_64  LD_LIBRARY_PATH=\$ORACLE_HOME/lib export LD_LIBRARY_PATH  PATH=\$PATH:\$ORACLE_HOME/bin:/usr/bin:/etc:/usr/ccs/bin:/usr/openwin/bin:/usr/local/bin:/usr/sbin EDITOR=vi export EDITOR  ORACLE_SID=[SMF SCP E2BE]</pre> <p>where <i>release_version</i> is 12.2.0 or 19.3.0 as per the Oracle database version used.</p> <p><b>Note:</b> ORACLE_SID must be set to one of:</p> <ul style="list-style-type: none"> <li>• <b>SMF</b> for SMS node</li> <li>• <b>SCP</b> for SLC nodes</li> <li>• <b>E2BE</b> for VWS nodes</li> </ul> <pre>export ORACLE_SID (Solaris only)ulimit -s unlimited ulimit -n 4096 export PATH</pre> |

| Installation Entity                           | Guideline Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Global profile<br>(/etc/profile)              | <p>Configure your system's global profile as required for your environment. For example,</p> <pre>PS1='\${LOGNAME}@\$(/usr/bin/hostname):\$([[ "\${LOGNAME}" == "root" ]] &amp;&amp; printf "%s" "\${PWD}# "    printf "%s" "\${PWD}\$ ")'</pre> <pre>ORACLE_BASE=/u01/app/oracle export ORACLE_BASE  ORACLE_HOME=\$ORACLE_BASE/product/release_version export ORACLE_HOME  ORACLE_CLIENT_HOME=\$ORACLE_HOME export ORACLE_CLIENT_HOME  LD_LIBRARY_PATH=\$ORACLE_CLIENT_HOME/lib:\$LD_LIBRARY_PATH export LD_LIBRARY_PATH  PATH=\$PATH:\$ORACLE_HOME/bin export PATH  ORACLE_SID=[SMF SCP E2BE]</pre> <p>Where <i>release_version</i> is 12.2.0 or 19.3.0 as per the Oracle database version used.</p> <p><b>Note:</b> ORACLE_SID must be set to one of:</p> <ul style="list-style-type: none"> <li>• <b>SMF</b> for SMS node</li> <li>• <b>SCP</b> for SLC nodes</li> <li>• <b>E2BE</b> for VWS nodes</li> </ul> <pre>export ORACLE_SID</pre> |
| System resources for Oracle<br>(Solaris only) | <p>Set the following parameters and create a project for the <b>oracle</b> user on your system:</p> <pre>max-shm-memory = 16G max-sem-ids = 100 max-sem-nsems = 256 max-shm-ids = 100</pre> <p>Create a project for this as follows:</p> <pre># 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</pre>                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Installation Entity                      | Guideline Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| System resources for Oracle (Linux only) | <ol style="list-style-type: none"> <li>1 Determine the sum of process parameters for all database instances on the system, the overhead for Oracle background processes, the system and other application requirements.</li> <li>2 Set semmns (total semaphores system-wide) to the larger of the value in 1 or 32000.</li> <li>3 Set semmsl (semaphores per set) to 250.</li> <li>4 Set semmni (total semaphore sets) to semmns/semmsl rounded up to the nearest multiple of 1024.</li> <li>5 For Linux and Oracle 10.2-12.2, set the maximum number of asynchronous I/O requests allowed in /etc/sysctl.conf as follows:<br/> <pre style="margin-left: 40px;">fs.aio-max-nr = 3145728</pre> </li> </ol> <p>After changing the /etc/sysctl.conf, run the following command as root to set the values in the system:</p> <pre style="margin-left: 40px;"># /sbin/sysctl -p /etc/sysctl.conf</pre> |

## Oracle Server Installation Guidelines

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

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

## Oracle 12c Client Installation Guidelines

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

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

If you are using Oracle 12cR2 database, create soft links for all the nodes before running the OUI Installer/Silent mode installation for 12.0.4. To create soft links:

1. Log in to the CCC node as the oracle user.
2. Navigate to the folder **/u01/app/oracle/product/12.2.0/lib**.
3. Create soft links as mentioned below:
 

```
ln -s libclntsh.so.12.1 libclntsh.so.19.1
ln -s libclntshcore.so.12.1 libclntshcore.so.19.1
```

## Configuring the Oracle Database to Start Automatically

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

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

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

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

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

For Linux:

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

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

## Oracle Database Instances

You can opt to automatically create Oracle database instances during the installation of the 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 | 20              |

To set the database parameters for SMS databases:

| Step | Action                                                                                                                             |
|------|------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Ensure that you have SYSDBA privileges.                                                                                            |
| 2    | Go to the computer on which the Oracle database is installed.                                                                      |
| 3    | Start SQL*Plus:<br><code>C:\&gt; sqlplus /NOLOG</code>                                                                             |
| 4    | Connect to the database as SYSDBA:<br><code>SQL&gt; CONNECT / AS SYSDBA</code>                                                     |
| 5    | Set the <b>JOB_QUEUE_PROCESSES</b> initialization parameter to:<br><code>ALTER SYSTEM SET JOB_QUEUE_PROCESSES=20 SCOPE=BOTH</code> |
| 6    | Shut down Oracle database:<br><code>SQL&gt; SHUTDOWN</code>                                                                        |
| 7    | Restart Oracle database:<br><code>SQL&gt; STARTUP</code>                                                                           |
| 8    | Exit SQL*Plus:<br><code>SQL&gt; EXIT</code>                                                                                        |

## Installing and Configuring BRM SDK

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

BRM SDK 7.5.0.21.0 must be installed for CCC 12.0.4 release. Further copy 64 bit libraries `libnzsdk64.so`, `libpcmext64.so` and `libportal64.so` into BRM SDK installed 'lib' directory with proper permissions.

# 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

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## 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 62).

**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 65).

**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 69).

**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 72).

## Installing Convergent Charging Controller on the SMS Node Using the GUI

Install Convergent Charging Controller on either an Oracle Solaris 11.3 (64-bit) server or an Oracle Linux 7.9 server.

To install Convergent Charging Controller on an SMS node:

| Step | Action                                                                                                                                                                                                                                                                                                                                  |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Log in as the root user.                                                                                                                                                                                                                                                                                                                |
| 2    | Create a CCC sub-directory in the <code>/var/spool/pkg</code> directory:<br><pre>cd /var/spool/pkg mkdir CCC</pre> <p><b>Note:</b> 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.</p> |
| 3    | Go to the Oracle software delivery Web site:<br><a href="http://edelivery.oracle.com/">http://edelivery.oracle.com/</a><br>and download the <code>CCC_v12_0_4_platform.zip</code> software pack to the <code>/var/spool/pkg/CCC</code> directory, where <code>platform</code> is <code>Linux</code> or <code>SunOS</code> .             |
| 4    | Go to the <code>/var/spool/pkg/CCC</code> directory and unzip the <code>CCC_v12_0_4_platform.zip</code> file:<br><pre>unzip CCC_v12_0_4_platform.zip</pre>                                                                                                                                                                              |
| 5    | Log in as the user (non-root) installing Convergent Charging Controller.<br><p><b>Note:</b> Ensure that the non-root user installing Convergent Charging Controller has access to the esg and Oracle database group (e.g. dba).</p>                                                                                                     |
| 6    | Run the following commands:<br><pre>export DISPLAY=IP_address:0 export JAVA_HOME=Java_home</pre> where: <ul style="list-style-type: none"> <li><code>IP_address</code> is the IP address of the computer on which you run the SMS GUI.</li> <li><code>Java_home</code> is the directory in which JDK 1.8 is installed.</li> </ul>       |
| 7    | Ensure that the SMS node meets all prerequisites by running the following commands:<br><pre>touch /IN/oraInst.loc  java -jar ./cccInstaller_platform.jar -invPtrLoc /IN/oraInst.loc - prereqchecker -silent -entryPoint sms</pre>                                                                                                       |

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8    | <p>Do one of the following:</p> <ul style="list-style-type: none"> <li>To start the Installer:<br/> <pre>java -jar ./cccInstaller_platform.jar -invPtrLoc /IN/oraInst.loc</pre> </li> <li>To start the Installer and create a silent installer response file during the installation:<br/> <pre>java -jar ./cccInstaller_platform.jar -logLevel finest -record -destinationFile path</pre>           where <i>path</i> is the response file location.         </li> </ul> <p>The installer screen appears.</p>                                                                                                                                                   |
| 9    | <p>Click <b>Next</b>.</p> <p>The Installation Inventory screen appears.</p> <p>In the <b>Inventory Directory</b> field, enter the path to the OralInventory directory, or click <b>Browse</b> to select the directory.</p> <p>In the <b>Operating System Group</b> field, select group (esg) from the drop-down list.</p> <p>Click <b>Next</b>.</p> <p>The Installation Location screen appears.</p>                                                                                                                                                                                                                                                             |
| 10   | <p>In the <b>Name</b> field, enter <b>/IN</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 11   | <p>Click <b>Next</b>.</p> <p>The Installation Type screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|      | <p><b>Note:</b> The Convergent Charging Controller installer creates an <b>oralInventory</b> directory if it does not detect any installed Oracle products on the system. The <b>oralInventory</b> directory contains information about all Oracle products installed on your system. You can find the default location of the <b>oralInventory</b> directory by opening the <b>/etc/oralnst.loc</b> (Linux) file or the <b>/var/opt/oracle/oralnst.loc</b> (Solaris) file.</p>                                                                                                                                                                                  |
| 12   | <p>Select <b>SMS</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 13   | <p>Click <b>Next</b>.</p> <p>The Oracle User screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 14   | <p>In the <b>Oracle DB Owner</b> field, retain the default <b>oracle</b>, which is the user name with permissions to create the Oracle database instance.</p> <p>Verify the <b>Oracle DB Group</b> field.</p> <p>Specify the CCC runtime user in the <b>Application Owner</b> field.</p> <p>Click <b>Next</b>.</p> <p>The Database Server Paths screen appears.</p>                                                                                                                                                                                                                                                                                              |
| 15   | <p>Confirm one of the following:</p> <p><b>The database, schema, and application will be installed.</b> Select this option to install all items on the same node.</p> <p><b>The database already exists and both the schema and application will be installed.</b> Select this option if you have already created the database including datafiles on this or a remote node but not the database schema or application.</p> <p><b>The database and schema already exists and only the application will be installed.</b> Select this option if the database and schema already exists on this or a remote node and you want to only install the application.</p> |

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16   | <p>If you are installing all items on the same node:</p> <p>In the <b>Base directory</b> field, retain the default, <code>/u01/app/oracle</code>.</p> <p>In the <b>Oracle home directory</b> field, enter <code>/u01/app/oracle/product/12.2.0</code> if the database used is 12.2.0, or <code>/u01/app/oracle/product/19.0.0</code> if the database used is 19c.</p> <p>In the <b>Datafile directory</b> field, enter the path to the <b>datafiles</b> directory in which to create CCC database instance data files.</p> <p>In the <b>Redolog directory</b> field, enter the path to the <b>redolog</b> directory in which to create CCC database redo log files.</p> <p>Click <b>Next</b>.</p> <p>In the <b>Oracle database password</b> field, enter the password for the Oracle database administrative accounts.</p> <p>In the <b>Confirm password</b> field, enter the password again to confirm.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|      | <p><b>Note:</b> If the password is less than 8 characters, a warning appears. You can click <b>OK</b> to proceed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 17   | <p>If items already exist on the same or remote node:</p> <p>Select one of the below options:</p> <ol style="list-style-type: none"> <li data-bbox="297 835 1317 1077"> <p>If you select <b>Standard Database</b> option, configure the following:</p> <p>In the <b>Oracle client home</b> directory field, enter <code>/u01/app/oracle/product/12.2.0</code> if the client used is 12.2.0, or <code>/u01/app/oracle/product/19.0.0</code> if the client used is 19c.</p> <p>In the <b>Oracle SID</b> field, enter <code>SMF</code>.</p> <p>In the <b>Database hostname</b> field, enter the host where the database is located.</p> <p>In the <b>Oracle database password</b> field, enter the password for the Oracle database administrative accounts on associated with the <b>Database hostname</b>.</p> </li> <li data-bbox="297 1094 1317 1440"> <p>If you select <b>RAC Database</b> option, configure the following:</p> <p>In the <b>Oracle client home</b> directory field, enter <code>/u01/app/oracle/product/12.2.0</code> if the client used is 12.2.0, or <code>/u01/app/oracle/product/19.0.0</code> if the client used is 19c.</p> <p>In the <b>Oracle SID</b> field, enter <code>SMF</code>.</p> <p>In the <b>Database hostname</b> field, enter the host where the database is located.</p> <p>In the <b>Oracle database password</b> field, enter the password for the Oracle database administrative accounts on associated with the <b>Database hostname</b>.</p> <p>In the <b>Database Port</b> field, enter the port that is required to connect to the database host.</p> <p>In the <b>Service database hostname</b> field, enter the fully qualified service DB hostname.</p> </li> </ol> |
| 18   | <p>In the <b>Screen superuser password</b> field, enter the password for the SMS GUI administrator account.</p> <p><b>Note:</b> The password must match the password for the Oracle database installed on the SMS node.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 19   | <p>In the <b>Confirm password</b> field, enter the password again to confirm.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 20   | <p>Click <b>Next</b>.</p> <p>The PI Admin screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 21   | <p>In the <b>PI admin password</b> field, enter the password for the PI administrator user account.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 22   | <p>In the <b>Confirm password</b> field, enter the password again to confirm.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 23   | <p>Click <b>Next</b>.</p> <p>The SMS EDR Paths screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                      |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 24   | In the <b>CDR Loader Input directory</b> field, retain the default path to the directory of a single system to store CDR input files.                                                                                                                                                                                                                                                       |
| 25   | In the <b>CDR Loader Output directory</b> field, retain the default path to the directory of a single system to store CDR output files.                                                                                                                                                                                                                                                     |
| 26   | Click <b>Next</b> .<br>The Default Template Screen appears.<br>If you want the default templates to be installed, check the Install PCST checkbox, else uncheck the Install PCST checkbox.                                                                                                                                                                                                  |
| 27   | Click <b>Next</b> .<br>The System Currency Details screen appears.                                                                                                                                                                                                                                                                                                                          |
| 28   | Set the following fields:<br>Base Value - default is 100<br>Big Symbol - default is \$<br>Little Symbol - default is c<br>Separator - default is .                                                                                                                                                                                                                                          |
| 29   | Click <b>Next</b> .<br>Prerequisite check screen appears.                                                                                                                                                                                                                                                                                                                                   |
| 30   | Based on the OS, few prerequisite checks are performed on clicking <b>Next</b> .<br>The Installation Summary screen appears.                                                                                                                                                                                                                                                                |
| 31   | Review the selections you have made in the preceding screens, and click <b>Install</b> .<br>The Installation Progress screen appears.                                                                                                                                                                                                                                                       |
| 32   | Click <b>Next</b> .<br>The Installation Complete screen appears.                                                                                                                                                                                                                                                                                                                            |
| 33   | Click <b>Finish</b> .                                                                                                                                                                                                                                                                                                                                                                       |
| 34   | Log onto the SMS as the root user.<br><code>cd /IN/bin</code><br><code>./postinstallRoot.sh [-n]</code><br>where -n is an optional flag. It is used to indicate if CCC will be installed without a VWS node.<br><b>Note:</b> You can reuse the script at any time to complete or retry failures occurring on previous invocations.                                                          |
| 35   | Log onto the SMS as the CCC_runtime user (the user that was given in step 15 for application owner field).<br><code>cd /IN/bin</code><br><code>./postinstallUser.sh</code><br>The script will prompt for information to be used as part of the runtime configuration.<br><b>Note:</b> You can reuse the script at any time to complete or retry failures occurring on previous invocations. |

## Installing Convergent Charging Controller on the SLC Node Using the GUI

Install Convergent Charging Controller on either an Oracle Solaris 11.3 (64-bit) server or Oracle Linux 7.9 server.

**Note:** Ensure that SMS is installed before installing SLC.

To install Convergent Charging Controller on the SLC node:

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Log in as the root user.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 2    | <p>Create a CCC sub-directory in the <code>/var/spool/pkg</code> directory:</p> <pre>cd /var/spool/pkg mkdir CCC</pre> <p><b>Note:</b> 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.</p>                                                                                                                                                    |
| 3    | <p>Go to the Oracle software delivery Web site:</p> <p><a href="http://edelivery.oracle.com/">http://edelivery.oracle.com/</a></p> <p>and download the <code>CCC_v12_0_4_0_0_platform.zip</code> software pack to the <code>/var/spool/pkg/CCC</code> directory, where <i>platform</i> is <b>Linux</b> or <b>SunOS</b>.</p>                                                                                                                                                                    |
| 4    | <p>Go to the <code>/var/spool/pkg/CCC</code> directory and unzip the <code>CCC_v12_0_4_0_0_platform.zip</code> file:</p> <pre>unzip CCC_v12_0_4_0_0_platform.zip</pre>                                                                                                                                                                                                                                                                                                                         |
| 5    | <p>Log in as the user (non-root) installing Convergent Charging Controller, and go to the <code>/var/spool/pkg/CCC</code> directory.</p> <p><b>Note:</b> Ensure that the non-root user installing Convergent Charging Controller has access to the <code>esg</code> and Oracle database group (e.g. <code>dba</code>).</p>                                                                                                                                                                     |
| 6    | <p>Run the following commands:</p> <pre>export DISPLAY=IP_address:0 export JAVA_HOME=Java_home</pre> <p>where:</p> <ul style="list-style-type: none"> <li>• <i>IP_address</i> is the IP address of the computer on which the Convergent Charging Controller GUI installer appears.</li> <li>• <i>Java_home</i> is the directory in which JDK 1.8 is installed.</li> </ul>                                                                                                                      |
| 7    | <p>Ensure that the SLC node meets all prerequisites by running the following command:</p> <pre>touch /IN/oraInst.loc</pre> <pre>java -jar ./cccInstaller_platform.jar -invPtrLoc /IN/oraInst.loc -prereqchecker -silent -entryPoint slc</pre>                                                                                                                                                                                                                                                  |
| 8    | <p>Do one of the following:</p> <ul style="list-style-type: none"> <li>• To access the Installer: <pre>java -jar ./cccInstaller_platform.jar -invPtrLoc /IN/oraInst.loc</pre> </li> <li>• To start the Installer and create a silent installer response file during the installation: <pre>java -jar ./cccInstaller_platform.jar -logLevel finest -record -destinationFile path</pre> <p>where <i>path</i> is the response file location.</p> </li> </ul> <p>The Installer screen appears.</p> |

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9    | <p>Click <b>Next</b>.</p> <p>The Installation Inventory screen appears.</p> <p>In the <b>Inventory Directory</b> field, enter the path to the <code>OralInventory</code> directory, or click <b>Browse</b> to select the directory.</p> <p>In the <b>Operating System Group</b> field, select group (esg) from the drop-down list.</p> <p>Click <b>Next</b>.</p> <p>The Installation Location screen appears.</p>                                                                                                                                                                                                                                                |
| 10   | <p>In the <b>Name</b> field, enter <code>/IN</code>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 11   | <p>Click <b>Next</b>.</p> <p>The Installation Type screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|      | <p><b>Note:</b> The Convergent Charging Controller installer creates an <code>oralInventory</code> directory if it does not detect any installed Oracle products on the system. The <code>oralInventory</code> directory contains information about all Oracle products installed on your system. You can find the default location of the <code>oralInventory</code> directory by opening the <code>/etc/oralnst.loc</code> (Linux) file or the <code>/var/opt/oracle/oralnst.loc</code> (Solaris) file.</p>                                                                                                                                                    |
| 12   | <p>Select <b>SLC</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 13   | <p>Click <b>Next</b>.</p> <p>The Oracle User screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 14   | <p>In the <b>Oracle DB Owner</b> field, retain the default <code>oracle</code>, which is the user name with permissions to create the Oracle database instance.</p> <p>Verify the <b>Oracle DB Group</b> field.</p> <p>Specify the CCC runtime user in the <b>Application Owner</b> field.</p> <p>Click <b>Next</b>.</p> <p>The Database Server Paths screen appears.</p>                                                                                                                                                                                                                                                                                        |
| 15   | <p>Confirm one of the following:</p> <p><b>The database, schema, and application will be installed.</b> Select this option to install all items on the same node.</p> <p><b>The database already exists and both the schema and application will be installed.</b> Select this option if you have already created the database including datafiles on this or a remote node but not the database schema or application.</p> <p><b>The database and schema already exists and only the application will be installed.</b> Select this option if the database and schema already exists on this or a remote node and you want to only install the application.</p> |

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16   | <p>If you are installing all items on the same node:</p> <p>In the <b>Base directory</b> field, retain the default, <code>/u01/app/oracle</code>.</p> <p>In the <b>Oracle home directory</b> field, retain the default, <code>/u01/app/oracle/product/12.2.0</code> if the database used is 12.2.0, or <code>/u01/app/oracle/product/19.0.0</code> if the database used is 19c.</p> <p>In the <b>Datafile directory</b> field, enter the path to the <b>datafiles</b> directory in which to create CCC database instance data files.</p> <p>In the <b>Redolog directory</b> field, enter the path to the <b>redolog</b> directory in which to create CCC database redo log files.</p> <p>Click <b>Next</b>.</p> <p>In the <b>Oracle database password</b> field, enter the password for the Oracle database administrative accounts.</p> <p>In the <b>Confirm password</b> field, enter the password again to confirm.</p> <p><b>Note:</b> If the password is less than 8 characters, a warning appears. You can click <b>OK</b> to proceed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 17   | <p>If items already exist on the same or remote node:</p> <p>Select one of the below options:</p> <ol style="list-style-type: none"> <li data-bbox="284 829 1351 1081"> <p>If you select <b>Standard Database</b> option, configure the following:</p> <p>In the <b>Oracle client home</b> directory field, enter <code>/u01/app/oracle/product/12.2.0</code> if the client used is 12.2.0, or <code>/u01/app/oracle/product/19.0.0</code> if the client used is 19c.</p> <p>In the <b>Oracle SID</b> field, enter <b>SCP</b>.</p> <p>In the <b>Database hostname</b> field, enter the host where the database is located.</p> <p>In the <b>Oracle database password</b> field, enter the password for the Oracle database administrative accounts on associated with the <b>Database hostname</b>.</p> </li> <li data-bbox="284 1081 1351 1438"> <p>If you select <b>RAC Database</b> option, configure the following:</p> <p>In the <b>Oracle client home</b> directory field, enter <code>/u01/app/oracle/product/12.2.0</code> if the client used is 12.2.0, or <code>/u01/app/oracle/product/19.0.0</code> if the client used is 19c.</p> <p>In the <b>Oracle SID</b> field, enter <b>SCP</b>.</p> <p>In the <b>Database hostname</b> field, enter the host where the database is located.</p> <p>In the <b>Oracle database password</b> field, enter the password for the Oracle database administrative accounts on associated with the <b>Database hostname</b>.</p> <p>In the <b>Database Port</b> field, enter the port that is required to connect to the database host.</p> <p>In the <b>Service database hostname</b> field, enter the fully qualified service DB hostname.</p> </li> </ol> |
| 18   | <p>In the <b>SMS Host name</b> field, enter the qualified hostname for the SMS server used to configure the clients that will connect to the SMS server.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 19   | <p>Click <b>Next</b>.</p> <p>The Installation Summary screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 20   | <p>Review the selections you have made in the preceding screens, and click <b>Install</b>.</p> <p>The Installation Progress screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 21   | <p>Click <b>Next</b>.</p> <p>The Installation Complete screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 22   | <p>Click <b>Finish</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Step | Action                                                                                                                                                                                                         |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 23   | <p>Log onto the SLC as the root user.</p> <pre>cd /IN/bin ./postinstallRoot.sh</pre> <p><b>Note:</b> You can reuse the script at any time to complete or retry failures occurring on previous invocations.</p> |

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

Install Convergent Charging Controller on either an Oracle Solaris 11.3 (64-bit) server or an Oracle Linux 7.9 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    | Log in as the root user.                                                                                                                                                                                                                                                                                                                                                          |
| 2    | <p>Create a <b>CCC</b> sub-directory in the <code>/var/spool/pkg</code> directory:</p> <pre>cd /var/spool/pkg mkdir CCC</pre> <p><b>Note:</b> 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.</p>                                |
| 3    | <p>Go to the Oracle software delivery Web site:</p> <p><a href="http://edelivery.oracle.com/">http://edelivery.oracle.com/</a></p> <p>and download the <code>CCC_v12_0_4_0_0_platform.zip</code> software pack to the <code>/var/spool/pkg/CCC</code> directory, where <i>platform</i> is <b>Linux</b> or <b>SunOS</b>.</p>                                                       |
| 4    | <p>Go to the <code>/var/spool/pkg/CCC</code> directory and unzip the <code>CCC_v12_0_4_0_0_platform.zip</code> file:</p> <pre>unzip CCC_v12_0_4_0_0_platform.zip</pre>                                                                                                                                                                                                            |
| 5    | <p>Log in as the user (non-root) installing Convergent Charging Controller, and go to the <code>/var/spool/pkg/CCC</code> directory.</p> <p><b>Note:</b> Ensure that the non-root user installing Convergent Charging Controller has access to the <code>esg</code> and Oracle database group (e.g. <code>dba</code>).</p>                                                        |
| 6    | <p>Run the following commands:</p> <pre>export DISPLAY=IP_address:0 export JAVA_HOME=Java_home</pre> <p>where:</p> <ul style="list-style-type: none"> <li><code>IP_address</code> is the IP address of the computer on which the Convergent Charging Controller GUI Installer appears.</li> <li><code>Java_home</code> is the directory in which JDK 1.8 is installed.</li> </ul> |
| 7    | <p>Ensure that the SLC node meets all prerequisites by running the following command:</p> <pre>touch /IN/oraInst.loc java -jar ./cccInstaller_platform.jar -invPtrLoc /IN/oraInst.loc - prereqchecker -silent -entryPoint slc</pre>                                                                                                                                               |

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8    | <p>Do one of the following:</p> <ul style="list-style-type: none"> <li>To access the Installer:<br/> <pre>java -jar ./cccInstaller_platform.jar -invPtrLoc /IN/oraInst.loc</pre> </li> <li>To start the Installer and create a silent installer response file during the installation:<br/> <pre>java -jar ./cccInstaller_platform.jar -logLevel finest -record -destinationFile path</pre>           where <i>path</i> is the response file location.         </li> </ul> <p>The Installer screen appears.</p>                                                                                                                                                  |
| 9    | <p>Click <b>Next</b>.</p> <p>The Installation Inventory screen appears.</p> <p>In the <b>Inventory Directory</b> field, enter the path to the <code>Orainventory</code> directory, or click <b>Browse</b> to select the directory.</p> <p>In the <b>Operating System Group</b> field, select group (esg) from the drop-down list.</p> <p>Click <b>Next</b>.</p> <p>The Installation Location screen appears.</p>                                                                                                                                                                                                                                                 |
| 10   | <p>In the <b>Name</b> field, enter <code>/IN</code>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 11   | <p>Click <b>Next</b>.</p> <p>The Installation Type screen appears.</p> <p><b>Note:</b> The Convergent Charging Controller installer creates an <code>oralnventory</code> directory if it does not detect any installed Oracle products on the system. The <code>oralnventory</code> directory contains information about all Oracle products installed on your system. You can find the default location of the <code>oralnventory</code> directory by opening the <code>/etc/orainst.loc</code> (Linux) file or the <code>/var/opt/oracle/orainst.loc</code> (Solaris) file.</p>                                                                                |
| 12   | <p>Select <b>SLC With Test Tools</b> to install the SLC application, the SLC With Testing Tools, and the SLC database.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 13   | <p>Click <b>Next</b>.</p> <p>The Oracle User screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 14   | <p>In the <b>Oracle DB Owner</b> field, retain the default <code>oracle</code>, which is the user name with permissions to create the Oracle database instance.</p> <p>Verify the <b>Oracle DB Group</b> field.</p> <p>Specify the CCC runtime user in the <b>Application Owner</b> field.</p> <p>Click <b>Next</b>.</p> <p>The Database Server Paths screen appears.</p>                                                                                                                                                                                                                                                                                        |
| 15   | <p>Confirm one of the following:</p> <p><b>The database, schema, and application will be installed.</b> Select this option to install all items on the same node.</p> <p><b>The database already exists and both the schema and application will be installed.</b> Select this option if you have already created the database including datafiles on this or a remote node but not the database schema or application.</p> <p><b>The database and schema already exists and only the application will be installed.</b> Select this option if the database and schema already exists on this or a remote node and you want to only install the application.</p> |

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16   | <p>If you are installing all items on the same node:</p> <p>In the <b>Base directory</b> field, retain the default, <code>/u01/app/oracle</code>.</p> <p>In the <b>Oracle home directory</b> field, enter <code>/u01/app/oracle/product/12.2.0</code> if the database used is 12.2.0, or <code>/u01/app/oracle/product/19.0.0</code> if the database used is 19c.</p> <p>In the <b>Datafile directory</b> field, enter the path to the <b>datafiles</b> directory in which to create CCC database instance data files.</p> <p>In the <b>Redolog directory</b> field, enter the path to the <b>redolog</b> directory in which to create CCC database redo log files.</p> <p>Click <b>Next</b>.</p> <p>In the <b>Oracle database password</b> field, enter the password for the Oracle database administrative accounts.</p> <p>In the <b>Confirm password</b> field, enter the password again to confirm.</p> <p><b>Note:</b> If the password is less than 8 characters, a warning appears. You can click <b>OK</b> to proceed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 17   | <p>If items already exist on the same or remote node:</p> <p>Select one of the below options:</p> <p>a. If you select <b>Standard Database</b> option, configure the following:</p> <p style="padding-left: 20px;">In the <b>Oracle client home</b> directory field, enter <code>/u01/app/oracle/product/12.2.0</code> if the client used is 12.2.0, or <code>/u01/app/oracle/product/19.0.0</code> if the client used is 19c.</p> <p style="padding-left: 20px;">In the <b>Oracle SID</b> field, enter <b>SCP</b>.</p> <p style="padding-left: 20px;">In the <b>Database hostname</b> field, enter the host where the database is located.</p> <p style="padding-left: 20px;">In the <b>Oracle database password</b> field, enter the password for the Oracle database administrative accounts on associated with the <b>Database hostname</b>.</p> <p>b. If you select <b>RAC Database</b> option, configure the following:</p> <p style="padding-left: 20px;">In the <b>Oracle client home</b> directory field, enter <code>/u01/app/oracle/product/12.2.0</code> if the client used is 12.2.0, or <code>/u01/app/oracle/product/19.0.0</code> if the client used is 19c.</p> <p style="padding-left: 20px;">In the <b>Oracle SID</b> field, enter <b>SCP</b>.</p> <p style="padding-left: 20px;">In the <b>Database hostname</b> field, enter the host where the database is located.</p> <p style="padding-left: 20px;">In the <b>Oracle database password</b> field, enter the password for the Oracle database administrative accounts on associated with the <b>Database hostname</b>.</p> <p style="padding-left: 20px;">In the <b>Database Port</b> field, enter the port that is required to connect to the database host.</p> <p style="padding-left: 20px;">In the <b>Service database hostname</b> field, enter the fully qualified service DB hostname.</p> |
| 18   | <p>In the <b>SMS Host name</b> field, enter the qualified hostname for the SMS server used to configure the clients that will connect to the SMS server.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 19   | <p>Click <b>Next</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|      | <p>The Installation Summary screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 20   | <p>Review the selections you have made in the preceding screens, and click <b>Install</b>.</p> <p>The Installation Progress screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 21   | <p>Click <b>Next</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|      | <p>The Installation Complete screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 22   | <p>Click <b>Finish</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Step | Action                                                                                                                                                                                                         |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 23   | <p>Log onto the SLC as the root user.</p> <pre>cd /IN/bin ./postinstallRoot.sh</pre> <p><b>Note:</b> You can reuse the script at any time to complete or retry failures occurring on previous invocations.</p> |

## Installing Convergent Charging Controller on the VWS Node Using the GUI

Install Convergent Charging Controller on either an Oracle Solaris 11.3 (64-bit) server or an Oracle Linux 7.9 server.

**Note:** Ensure that SMS is installed before installing VWS.

To install Convergent Charging Controller on a VWS node:

| Step | Action                                                                                                                                                                                                                                                                                                                                        |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Log in as the root user.                                                                                                                                                                                                                                                                                                                      |
| 2    | <p>Create a CCC sub-directory in the <code>/var/spool/pkg</code> directory:</p> <pre>cd /var/spool/pkg mkdir CCC</pre> <p><b>Note:</b> 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.</p>   |
| 3    | <p>Go to the Oracle software delivery Web site:</p> <p><a href="http://edelivery.oracle.com/">http://edelivery.oracle.com/</a></p> <p>and download the <code>CCC_v12_0_4_0_0_platform.zip</code> software pack to the <code>/var/spool/pkg/CCC</code> directory, where <code>platform</code> is <code>Linux</code> or <code>SunOS</code>.</p> |
| 4    | <p>Go to the <code>/var/spool/pkg/CCC</code> directory and unzip the <code>CCC_v12_0_4_0_0_platform.zip</code> file:</p> <pre>unzip CCC_v12_0_4_0_0_platform.zip</pre>                                                                                                                                                                        |
| 5    | <p>Log in as the user (non-root) installing Convergent Charging Controller, and go to the <code>/var/spool/pkg/CCC</code> directory.</p> <p><b>Note:</b> Ensure that the non-root user installing Convergent Charging Controller has access to the <code>esg</code> and Oracle database group (e.g. <code>dba</code>).</p>                    |
| 6    | <p>Run the following commands:</p> <pre>export DISPLAY=IP_address:0 export JAVA_HOME=Java_home</pre> <p>where:</p> <ul style="list-style-type: none"> <li><code>IP_address</code> is the IP address of the computer on which the CCC GUI appears.</li> <li><code>Java_home</code> is the directory in which JDK 1.8 is installed.</li> </ul>  |
| 7    | <p>Ensure that the VWS node meets all prerequisites by running the following command:</p> <pre>touch /IN/oraInst.loc java -jar ./cccInstaller_platform.jar -invPtrLoc /IN/oraInst.loc -prereqchecker -silent -entryPoint vws</pre>                                                                                                            |

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8    | <p>Do one of the following:</p> <ul style="list-style-type: none"> <li>To access the Installer:<br/> <pre>java -jar ./cccInstaller_platform.jar -invPtrLoc /IN/oraInst.loc</pre> </li> <li>To start the Installer and create a silent installer response file during the installation:<br/> <pre>java -jar ./cccInstaller_platform.jar -logLevel finest -record -destinationFile path</pre>           where <i>path</i> is the response file location.         </li> </ul> <p>The Installer screen appears.</p>                                                                                                                                                  |
| 9    | <p>Click <b>Next</b>.</p> <p>The Installation Inventory screen appears.</p> <p>In the <b>Inventory Directory</b> field, enter the path to the <code>OralInventory</code> directory, or click <b>Browse</b> to select the directory.</p> <p>In the <b>Operating System Group</b> field, select group (esg) from the drop-down list.</p> <p>Click <b>Next</b>.</p> <p>The Installation Location screen appears.</p>                                                                                                                                                                                                                                                |
| 10   | <p>In the <b>Name</b> field, enter <code>/IN</code>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 11   | <p>Click <b>Next</b>.</p> <p>The Installation Type screen appears.</p> <p><b>Note:</b> The Convergent Charging Controller installer creates an <code>oralInventory</code> directory if it does not detect any installed Oracle products on the system. The <code>oralInventory</code> directory contains information about all Oracle products installed on your system. You can find the default location of the <code>oralInventory</code> directory by opening the <code>/etc/oralnst.loc</code> (Linux) file or the <code>/var/opt/oracle/oralnst.loc</code> (Solaris) file.</p>                                                                             |
| 12   | <p>Select <b>VWS</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 13   | <p>Click <b>Next</b>.</p> <p>The Oracle User screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 14   | <p>In the <b>Oracle DB Owner</b> field, retain the default <code>oracle</code>, which is the user name with permissions to create the Oracle database instance.</p> <p>Verify the <b>Oracle DB Group</b> field.</p> <p>Specify the CCC runtime user in the <b>Application Owner</b> field.</p> <p>Click <b>Next</b>.</p> <p>The Database Server Paths screen appears.</p>                                                                                                                                                                                                                                                                                        |
| 15   | <p>Confirm one of the following:</p> <p><b>The database, schema, and application will be installed.</b> Select this option to install all items on the same node.</p> <p><b>The database already exists and both the schema and application will be installed.</b> Select this option if you have already created the database including datafiles on this or a remote node but not the database schema or application.</p> <p><b>The database and schema already exists and only the application will be installed.</b> Select this option if the database and schema already exists on this or a remote node and you want to only install the application.</p> |

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16   | <p>If you are installing all items on the same node:</p> <p>In the <b>Base directory</b> field, retain the default, <code>/u01/app/oracle</code>.</p> <p>In the <b>Oracle home directory</b> field, enter <code>/u01/app/oracle/product/12.2.0</code> if the database used is 12.2.0, or <code>/u01/app/oracle/product/19.0.0</code> if the database used is 19c.</p> <p>In the <b>Datafile directory</b> field, enter the path to the <b>datafiles</b> directory in which to create CCC database instance data files.</p> <p>In the <b>Redolog directory</b> field, enter the path to the <b>redolog</b> directory in which to create CCC database redo log files.</p> <p>Click <b>Next</b>.</p> <p>In the <b>Oracle database password</b> field, enter the password for the Oracle database administrative accounts.</p> <p>In the <b>Confirm password</b> field, enter the password again to confirm.</p> <p><b>Note:</b> If the password is less than 8 characters, a warning appears. You can click <b>OK</b> to proceed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 17   | <p>If items already exist on the same or remote node:</p> <p>Select one of the below options:</p> <ol style="list-style-type: none"> <li data-bbox="284 829 1351 1081"> <p>If you select <b>Standard Database</b> option, configure the following:</p> <p>In the <b>Oracle client home</b> directory field, enter <code>/u01/app/oracle/product/12.2.0</code> if the client used is 12.2.0, or <code>/u01/app/oracle/product/19.0.0</code> if the client used is 19c.</p> <p>In the <b>Oracle SID</b> field, enter <code>E2BE</code>.</p> <p>In the <b>Database hostname</b> field, enter the host where the database is located.</p> <p>In the <b>Oracle database password</b> field, enter the password for the Oracle database administrative accounts on associated with the <b>Database hostname</b>.</p> </li> <li data-bbox="284 1081 1351 1438"> <p>If you select <b>RAC Database</b> option, configure the following:</p> <p>In the <b>Oracle client home</b> directory field, enter <code>/u01/app/oracle/product/12.2.0</code> if the client used is 12.2.0, or <code>/u01/app/oracle/product/19.0.0</code> if the client used is 19c.</p> <p>In the <b>Oracle SID</b> field, enter <code>E2BE</code>.</p> <p>In the <b>Database hostname</b> field, enter the host where the database is located.</p> <p>In the <b>Oracle database password</b> field, enter the password for the Oracle database administrative accounts on associated with the <b>Database hostname</b>.</p> <p>In the <b>Database Port</b> field, enter the port that is required to connect to the database host.</p> <p>In the <b>Service database hostname</b> field, enter the fully qualified service DB hostname.</p> </li> </ol> |
| 18   | <p>In the <b>SMS Host name</b> field, enter the qualified hostname for the SMS server used to configure the clients that will connect to the SMS server.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 19   | <p>Click <b>Next</b>.</p> <p>The VWS Config screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 20   | <p>Enter the information for VWS configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 21   | <p>In the <b>SMS EDR Input directory</b> field, enter the full name and path to the directory to store SMS EDR input files.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 22   | <p>Select the <b>Primary VWS node</b> check box to install the primary node of a VWS pair.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 23   | <p>Click <b>Next</b>.</p> <p>The Installation Summary screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 24   | <p>Review the selections you have made in the preceding screens, and click <b>Install</b>.</p> <p>The Installation Progress screen appears.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Step | Action                                                                                                                                                                                                                                                                                                                    |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 25   | Click <b>Next</b> .<br>The Installation Complete screen appears.                                                                                                                                                                                                                                                          |
| 26   | Click <b>Finish</b> .                                                                                                                                                                                                                                                                                                     |
| 27   | Log onto the VWS as the root user.<br><code>cd /IN/bin</code><br><code>./postinstallRoot.sh</code><br><b>Note:</b> You can reuse the script at any time to complete or retry failures occurring on previous invocations.                                                                                                  |
| 28   | Log onto the VWS as the CCC_runtime user.<br><code>cd /IN/bin</code><br><code>./postinstallUser.sh</code><br>The script will prompt for information to be used as part of the runtime configuration.<br><b>Not:</b> You can reuse the script at any time to complete or retry failures occurring on previous invocations. |

## 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 a user password for security reasons. You must add the following parameters manually to the response file:

```
ORACLE_DATABASE_PASSWORD
ORACLE_DATABASE_PASSWORD_CONFIRM

NCC_SCREENINGS_SU_PASSWORD
NCC_SCREENINGS_SU_PASSWORD_CONFIRM

PI_ADMIN_PASSWORD
PI_ADMIN_PASSWORD_CONFIRM
```

where:

- *password* is the password for the Oracle database, Convergent Charging Controller screens, and PI Admin.

- `password_confirm` is the same password entered for the 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 <code>response</code> 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.<br><b>Note:</b> 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 4    | Go to the <code>/IN</code> directory and run the following command:<br><pre> \${JAVA_HOME}/bin/java -jar./cccInstaller_Platform.jar -logLevel finest -silent -responseFile path, where path is the Convergent Charging Controller response file name and location. </pre> For example:<br><pre> \${JAVA_HOME}/bin/java -jar./cccInstaller_Linux.jar -logLevel finest -silent -responseFile /tmp/smsinstallresponse.rsp </pre> The installation runs silently in the background. |

## Following install on the SMS

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

## Following install on the SLC

| Step | Action                                                                                                                                                                                                     |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Log onto the SLC as the root user.<br><pre>cd /IN/bin ./postinstallRoot.sh</pre> <p><b>Note:</b> You can reuse the script at any time to complete or retry failures occurring on previous invocations.</p> |

## Following install on the VWS

Follow these steps to

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

## About Installation Logs

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

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

- **installActionTimeStamp.log**
- **oralInstallTimeStamp.err**
- **oralInstallTimeStamp.out**
- **silentInstallTimeStamp.log** (for the silent mode installation)

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

The database schema installation log files for Convergent Charging Controller are available in **/IN/logs** directory.

## Removing Files After a Failed Installation

If **ccinstaller\_platform.jar** fails during the installation process, some Convergent Charging Controller files may remain on your system.

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

| Step | Action                                                                                                                                                                                                                                                                                           |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | As root remove any remaining CCC files by running the following command:<br>Go to the /IN/bin directory.<br><code>./removeDatabase.sh</code><br><code>./removeApplication.sh</code><br>Remove the <code>inventory.lock</code> file from the <code>/u01/app/oralInventory/locks</code> directory. |

# 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.

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| Setting Up Voucher Storage.....                | 86 |
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## 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 80) 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 85).

**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 connections to the database are enabled on your system by setting the `jnlp.sms.EncryptedSSLConnection` Java application property in JNLP files. At installation, this property is set to true, and SSL connections to the database are enabled by default. To disable SSL connections to the database, set `jnlp.sms.EncryptedSSLConnection` to false. See *Disabling SSL Connections to the SMS Database* (on page 80) for more information.

If you plan to use SSL connections to the database, you must perform a number of additional configuration tasks. See *Enabling SSL Connections to the Database* (on page 86) for more information.

## Disabling SSL Connections to the SMS Database

Follow these steps to disable SSL connections to the database.

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

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

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

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

## Post-Installation Initial Configuration

### About Initial Configuration Tasks

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

- Set up IP addresses and hostnames to servers. See *Setting IP Addresses and Hostnames* (on page 81).
- 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 82).
- Update Oracle SGA parameters on each node. See *Update Oracle SGA Parameters* (on page 82).
- Update the Oracle `cpu_count` parameter. See *Update Oracle cpu\_count Parameter* (on page 82).
- Update the Oracle Database default profile password for life time. See *Update Oracle Database Default Profile Password Life Time* (on page 82).
- Set shared memory limits for the Convergent Charging Controller system. See *Setting Shared Memory Limits* (on page 83).
- Set the number of database connections. See *Setting the Number of Connections to the Database* (on page 83).
- If you want to use Internet Protocol version 6 (IPv6) addresses, update the `eserv.config` file with the configuration for CORBA services. See *About CORBA Services Configuration for IPv6* (on page 84).

## 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 <code>smf_oper</code> user.                                                  |
| 2    | Using a text editor, create the <code>/IN/service_packages/SMS/.ssh/config</code> file.               |
| 3    | Include these lines:<br><pre>Host *     StrictHostKeyChecking no</pre>                                |
| 4    | Save the <b>config</b> file.                                                                          |
| 5    | Repeat these steps for the SLC and VWS nodes, logging on as the <code>smf_oper</code> user each time. |

## Setting IP Addresses and Hostnames

Ensure that the `/etc/hosts` file on all nodes includes entries for all hosts and their aliases. Some host aliases are automatically defined when you install 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 <code>/etc/hosts</code> file. Refer to your network plan for configuration values. See <i>Network Planning</i> (on page 6) for more information.<br><b>Example <code>/etc/hosts</code> file</b><br><pre>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</pre> |

| Step | Action                                                                                                                                                                                                                                                                                                                                                                        |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3    | <p>For platforms that are built on a zone server, modify the loop-back interface (lo0) and localhost entries to remove any association with the server hostname.</p> <p>For example, change the following entry from:</p> <pre>:::1 pte69-zone1 localhost 127.0.0.1 pte69-zone1 localhost loghost</pre> <p>to this:</p> <pre>:::1 localhost 127.0.0.1 localhost loghost</pre> |
| 4    | On the SMS node, restart the smsMaster process.                                                                                                                                                                                                                                                                                                                               |

## Update Oracle Tablespace Storage

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

## Update Oracle SGA Parameters

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

Update Oracle `cpu_count` Parameter

`cpu_count` specifies the number of CPUs available for Oracle Database to use. This parameter greatly affects the size of **Startup Overhead In Shared Pool** and is therefore set to 4 in the default `init.ora` files installed by 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 12c databases.

When using Oracle 12c 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 <code>esg</code> project group and set the shared memory limits for it by running the following commands: <pre>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</pre> |

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

- 1 Determine the sum of process parameters for all database instances on the system, the overhead for Oracle background processes, the system and other application requirements.
- 2 Set `semms` (total semaphores system-wide) to the larger of the value in 1 or 32000.
- 3 Set `semmsl` (semaphores per set) to 250.
- 4 Set `semmsi` (total semaphore sets) to `semms/semmsl` rounded up to the nearest multiple of 1024.
- 5 For Linux and Oracle 10.2-12.1, set the maximum number of asynchronous I/O requests allowed in `/etc/sysctl.conf` as follows:

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

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

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

## Setting the Number of Connections to the Database

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

The `processes` parameter in the Static Parameters section of `initSMF.ora` defines the maximum number of connections allowed to the Oracle database. For a 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

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

`beServiceTrigger` sends BPL requests to the 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 <code>smf_oper</code> user.                                                                                                            |
| 2    | Go to the following directory, where the <code>beServiceTriggerUser</code> utility is located:<br><code>/IN/service_packages/E2BE/bin</code>                |
| 3    | Run the following command to set the username and password for <code>beServiceTrigger</code> :<br><code>beServiceTriggerUser -d/@SMF</code>                 |
| 4    | Restart the SLEE on the VWS by running the following command as <code>ebe_oper</code> user:<br><code>/IN/service_packages/SLEE/bin/slee-ctrl restart</code> |

## 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 (`CCS_BE_CDR`) partitioning to define how CDRs will be stored.

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

### Setting Up CDR Table Partitioning

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

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | As the root user on the SMS node, edit the <code>/IN/service_packages/CCSPART/etc/ccspart.cfg</code> file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 2    | Specify appropriate values for these parameters: <ul style="list-style-type: none"> <li>• <b>WEEKLY_DATAFILE_COUNT:</b> 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.</li> <li>• <b>WEEKS_TO_KEEP_PARTITION:</b> Specify the number of weeks CDR data should remain available on the SMS node before being purged from the database.</li> <li>• <b>DATAFILE_PATH:</b> Specify the location on the disk where CDR data files will be created.</li> </ul> |

## Setting Up Voucher Storage

### About Voucher Storage Configuration

If you installed Convergent Charging Controller in a production environment, configure voucher table (CCS\_VOUCHER\_REFERENCE) partitioning to define how vouchers will be stored.

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

### Setting Up Voucher Table Partitioning

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

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | As the root user on the SMS node, edit the <code>/IN/service_packages/CCSVCHRPART/etc/ccs_voucher_reference_part.cfg</code> file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 2    | Specify appropriate values for these parameters: <ul style="list-style-type: none"> <li>• <b>WEEKLY_DATAFILE_COUNT:</b> Specify the number of 200 MB data files required per week to hold voucher data. Note: Voucher data files may contain multiple voucher records, potentially of different types.</li> <li>• <b>WEEKS_TO_KEEP_PARTITION:</b> Specify the number of weeks voucher data should remain available on the SMS node before being purged from the database.</li> <li>• <b>DATAFILE_PATH:</b> Specify the location on the disk where voucher data files will be created.</li> </ul> |

## 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 <i>About Creating the Oracle Wallet</i> .                                                                                                                                                                                            |
| 2    | Update the <code>listener.ora</code> file to define the location of the Oracle wallet and the listen port for SSL connections to the database. See <i>Updating the listener.ora file</i> (on page 89).                                                                                                 |
| 3    | Update the <code>sqlnet.ora</code> file to define the location of the Oracle wallet. See <i>Updating the sqlnet.ora file</i> (on page 91).                                                                                                                                                             |
| 4    | The Convergent Charging Controller installation automatically sets the Java application properties to enable SSL connections to the database. Check the configuration in your JNLP files to ensure that configuration has been set correctly. See <i>About Java Applet Configuration</i> (on page 95). |
| 5    | Clear the temporary Internet files from the Java cache.                                                                                                                                                                                                                                                |

## Setting Up the Oracle Wallet to Use Self-Signed Certificates

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

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Log in to the SMS as oracle user.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 2    | Run the following command:<br><code>/IN/service_packages/SMS/bin/setupOracleWallet.sh</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 3    | Answer <code>y</code> to the following prompt:<br>Do you wish to proceed with the configuration (y/n):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 4    | When requested, enter the following information: <ul style="list-style-type: none"> <li>• The base directory for the Oracle wallet</li> <li>• The two-letter international country (ISO) code for your country</li> <li>• 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.</li> </ul> <p><b>Note:</b> 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.</p> |
| 5    | Answer <code>y</code> to the following prompt:<br>Would you like to use a self-signed root certificate to sign the SMS server certificate?<br><br>When processing completes, the self-signed root certificate is exported to the following file:<br><br><code>./root/b64certificate.txt</code><br><br><code>./root</code> is a sub-directory of the base directory for the Oracle wallet. You must import this certificate into the Java <code>lib\security\cacerts</code> 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 <code>./root/b64certificate.txt</code> to the client PC.                                                                                                                                                                                                                                                                                                                                                |
| 2    | As an Administrator user on the client PC, open the command tool window and run the following command:<br><code>keytool -importcert -keystore<br/>"\cacerts_path\java\lib\security\cacerts" -alias SMS -file<br/>"\path\b64certificate.txt"</code><br>where <code>cacerts_path</code> is the path to the <code>java\lib\security\cacerts</code> file and <code>path</code> is the location of the certificate file on the client PC. |

| Step | Action                                                                                                                                                                                                                      |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3    | When prompted, enter the password for the keystore.<br><b>Note:</b> The Java installation sets the keystore password to <code>changeit</code> by default.                                                                   |
| 4    | Answer yes to the following prompt:<br><code>Trust this certificate? [no]:</code><br>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:<br><code>./IN/service_packages/SMS/bin/setupOracleWallet.sh</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 3    | Answer <code>y</code> to the following prompt:<br><code>Do you wish to proceed with the configuration (y/n):</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 4    | When requested, enter the following information: <ul style="list-style-type: none"> <li>• The base directory for the Oracle wallet</li> <li>• The two-letter international country (ISO) code for your country</li> <li>• The password to use for the server wallet. You will be prompted for the password each time the wallet is accessed.</li> </ul> <p><b>Note:</b> 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.</p> |
| 5    | Answer <code>n</code> to the following prompt:<br><code>Would you like to use a self-signed root certificate to sign the SMS server certificate?</code><br>The script creates the server auto login wallet and exports the certificate-signing request to the following file:<br><code>./server/creq.txt</code><br><code>./server</code> 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:<br><code>./server/cert.txt</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8    | Place the root certificate from the commercial CA in the following file:<br><code>./root/b64certificate.txt</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 9    | Log in as the oracle user on the SMS and run the following command:<br><br><pre>/IN/service_packages/SMS/bin/setupOracleWallet.sh -s ./server/cert.txt -t ./root/b64certificate.txt -w wallet_base_directory</pre> <ul style="list-style-type: none"> <li>• <code>./server/cert.txt</code> specifies the location of the signed server certificate</li> <li>• <code>./root/b64certificate.txt</code> specifies the location of the root certificate from the commercial CA</li> <li>• <code>wallet_base_directory</code> specifies the Oracle wallet base directory</li> </ul> <p>The <code>setupOracleWallet.sh</code> script completes by adding the trusted CA certificate and the CA-signed certificate to the server wallet.</p> |

## Updating the listener.ora file

Follow these steps to configure the Oracle listener.

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Log in to SMS as the <code>oracle</code> user, or run the following command from a root login to become the user <code>oracle</code> :<br><br><pre>su - oracle</pre> <p><b>Note:</b> Logging in as the <code>oracle</code> user ensures that the path to all of the Oracle binaries is correct and that file ownership for Oracle files is preserved.</p>                                                                                     |
| 2    | Go to the directory containing the <code>listener.ora</code> file. The location of the <code>listener.ora</code> 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:<br><pre>ORACLE_HOME/network/admin /var/opt/oracle/</pre> <p>where <code>ORACLE_HOME</code> is the directory in which your Oracle Database is installed.</p> |
| 3    | Edit the <code>listener.ora</code> file by using a text editor such as <code>vi</code> ; for example:<br><br><pre>vi listener.ora</pre>                                                                                                                                                                                                                                                                                                       |

| 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 set <code>PROTOCOL</code> to <b>TCPS</b> and <code>PORT</code> to <b>2484</b> for secure SSL connections.<br>Use the following syntax: |

```

LISTENER=
  (DESCRIPTION_LIST =
    (DESCRIPTION= (ADDRESS_LIST=
      (ADDRESS=
        (PROTOCOL=TCPS)
        (HOST=hostname)
        (PORT=2484)
      )))
  )

```

where *hostname* is the hostname of the SMS node.

**Note:** The standard Oracle listener TCP port is 1521. However, SSL connections use the standard port for the TCPS protocol, port 2484, instead. The TCPS protocol entry in the `listener.ora` file must appear *after* the TCP protocol entry.

**Note:** If there is a firewall between screen clients and the SMS, you must open port 2484 in the firewall.

**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    | <p>Add a new <code>WALLET_LOCATION</code> entry that specifies the directory that contains the server wallet that was created by <code>setupOracleWallet.sh</code>.</p> <p>Use the following syntax:</p> <pre> WALLET_LOCATION =   (SOURCE =     (METHOD = FILE)     (METHOD_DATA = (DIRECTORY = <i>directory_name</i>))   ) </pre> <p>where <i>directory_name</i> is the Oracle server directory.</p> <p><b>Example</b></p> <p>The following example shows a <code>WALLET_LOCATION</code> configuration for the Oracle server wallet created in the directory named <code>/u01/app/wallets/oracle/server</code></p> <pre> WALLET_LOCATION =   (SOURCE =     (METHOD = FILE)     (METHOD_DATA = (DIRECTORY = /u01/app/wallets/oracle/server))   ) </pre> |
| 6    | <p>Add the following entries:</p> <pre> SSL_CLIENT_AUTHENTICATION=FALSE SSL_CIPHER_SUITES=(TLS_RSA_WITH_AES_128_CBC_SHA) </pre> <p><b>Notes:</b> You must also:</p> <ul style="list-style-type: none"> <li>• Configure the same entries for <code>WALLET_LOCATION</code>, <code>SSL_CLIENT_AUTHENTICATION</code>, and <code>SSL_CIPHER_SUITES</code> in the <code>sqlnet.ora</code> file.</li> <li>• Set the <code>jnlp.sms.sslCipherSuites</code> Java application property in your JNLP files and the <code>SSL_CIPHER_SUITES</code> parameter to the same value.</li> </ul>                                                                                                                                                                           |
| 7    | Save and close the file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 8    | <p>Stop and restart the listener using the updated configuration by running the following commands:</p> <pre> lsnrctl stop lsnrctl start </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## 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    | <p>Log in to the SMS as the <code>oracle</code> user, or run the following command from a root login to become the <code>oracle</code> user:</p> <pre>su - oracle</pre> <p><b>Note:</b> Logging in as the <code>oracle</code> user ensures that the path to all Oracle binaries is correct and that file ownership for Oracle files is preserved.</p>                                                                                                                                                                                                                                                                                                                                                                                           |
| 2    | <p>Go to the directory containing the <code>sqlnet.ora</code> file. The location of the <code>sqlnet.ora</code> 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:</p> <pre>ORACLE_HOME/network/admin</pre> <pre>/var/opt/oracle/</pre> <p>where <code>ORACLE_HOME</code> is the directory in which the Oracle database is installed.</p>                                                                                                                                                                                                                                                                                         |
| 3    | <p>Edit the <code>sqlnet.ora</code> file by using a text editor such as <code>vi</code>; for example:</p> <pre>vi sqlnet.ora</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 4    | <p>Add a new <code>WALLET_LOCATION</code> entry that specifies the directory of the server wallet that was created by <code>setupOracleWallet.sh</code>.</p> <p>Use the following syntax:</p> <pre>WALLET_LOCATION =   (SOURCE =     (METHOD = FILE)     (METHOD_DATA = (DIRECTORY = <i>directory_name</i>))   )</pre> <p>where <code>directory_name</code> is the Oracle server directory.</p> <p><b>Example</b></p> <p>The following example shows a <code>WALLET_LOCATION</code> configuration for the Oracle server wallet created in the directory named <code>/u01/app/wallets/oracle/server</code></p> <pre>WALLET_LOCATION =   (SOURCE =     (METHOD = FILE)     (METHOD_DATA = (DIRECTORY = /u01/app/wallets/oracle/server))   )</pre> |
| 5    | <p>Add the following new entries:</p> <pre>SSL_CLIENT_AUTHENTICATION=FALSE SSL_CIPHER_SUITES=(TLS_RSA_WITH_AES_128_CBC_SHA)</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 6    | <p>Save and close the file.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## Updating the `eserv.config` File

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

| Parameter                        | Usage                                                                                                                                                        |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>#{OUI_BE_SERVER_ID}</code> | <p>The VWS billing engine domain number this node belongs to.</p> <p><b>Note:</b> Creating a domain is a manual activity following the CCC installation.</p> |

| Parameter                    | Usage                                                                                                                                                     |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>#{OUI_SLC_HOST}</code> | The SLC hostname of the node running OSD services. This enables notifications to be generated from the VWS to be sent by the SLC to the external network. |

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

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

## Configure SEI in the SLC Node

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

## Configuring Replication and Table Nodes

One way to configure replication is through the SMS screens.

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

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

The CCC installer also provides a command line utility script to create a replication node on a fully operational SMS node. This avoids using the SMS screens. Run the script as the `CCC_runtime_user`:

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

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

**Note:**

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

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

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

`-n <node_number>` mandatory. Node number.

## Creating an ACS Customer

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

## Creating a Domain

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

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

The CCC installer also provides a command line utility script to create a domain on a fully operational SMS node. This avoids using the SMS screens. Run the script as the `CCC_runtime_user`:

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

`-n <name>` mandatory. Domain name.  
`-m <max_accounts>` mandatory. Maximum number of accounts allowed.  
`-c` optional. Defines a charging domain.  
`-v` optional. Defines a voucher domain.  
`-t` optional. Defines a tracking domain.  
`-a` optional. Sets all the `-c -v -t` parameters.

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

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

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

`-d <domain_name>` mandatory. Domain name.  
`-m <node_name>` mandatory. Node name.  
`-n <node_number>` mandatory. The replication node id. Must be between 350 and 399.  
`-a <address>` optional. The hostname or ip address of the node, derived from the node number if not supplied.  
`-r <remote_db>` optional. Hostname of the remote database, only supply if database node is not on target node.  
`-s <oracle_sid>` optional. Oracle SID on remote database, default E2BE.  
`-c <client_port>` optional. Client port, default 1500.  
`-i <internal_port>` optional. Internal port, default 1600.

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

To finalize the domain configuration and establish replication to each node in the domain, run the script as the CCC\_runtime\_user:

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

**-d <domain\_name>** mandatory. Domain name.  
**-p <primary\_node\_id>** mandatory. Primary node replication id.  
**-s <secondary\_node\_id>** optional. Secondary node replication id.

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

Changes by the addUbeDomainReplication.sh script can be undone. Run the script as the CCC\_runtime\_user:

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

**<domain\_name>** mandatory. Domain name.

## Creating a MFILE

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

## About Java Applet Configuration

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

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

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Log in as the root user.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 2    | Edit the <b>acs.jnlp</b> , <b>ccp.jnlp</b> , <b>sms.jnlp</b> , and <b>vpn.jnlp</b> files by using a text editor such as vi; for example:<br><pre><b>vi /IN/html/sms.jnlp</b></pre> <p>The <b>acs.jnlp</b>, <b>sms.jnlp</b>, and <b>vpn.jnlp</b> files are located in the <b>/IN/html/</b> directory. The <b>ccp.jnlp</b> file is located in the <b>/IN/html/ccp</b> directory.</p>                                                                                                                                                         |
| 3    | Configure the <code>secureConnectionDatabaseHost</code> Java property value in the resources section of the <b>.jnlp</b> file. Set <b>PROTOCOL</b> to <b>TCPS</b> and set <b>PORT</b> to <b>2484</b> . The property values must be all on one line in the <b>.jnlp</b> file:<br><pre><b>&lt;property name="jnlp.sms.secureConnectionDatabaseHost"</b><br/><b>value="(DESCRIPTION= (ADDRESS_LIST= (ADDRESS=(PROTOCOL=TCPS)</b><br/><b>(HOST=host_ip_addr) (PORT=2484))) (CONNECT_DATA= (SERVICE_NAME=db_sid )))"</b><br/><b>/&gt;</b></pre> |

where:

- `host_ip_addr` is the host name or IP address of the SMS node
- `db_sid` is the database SID

| Step | Action                                                                                                                                                                                                                                                               |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4    | Set the <code>EncryptedSSLConnection</code> property in the resources section of the <code>.jnlp</code> file to <i>true</i> :<br><code>&lt;property name="jnlp.sms.EncryptedSSLConnection" value="true" /&gt;</code>                                                 |
| 5    | Set the <code>sslCipherSuites</code> property in the resources section of the <code>.jnlp</code> file to <code>TLS_RSA_WITH_AES_128_CBC_SHA</code> :<br><code>&lt;property name = "jnlp.sms.sslCipherSuites"<br/>value="(TLS_RSA_WITH_AES_128_CBC_SHA)" /&gt;</code> |
| 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.

|                                                     |    |
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| About Verifying the Installation .....              | 97 |
| About Collecting Diagnostic Data with RDA HCVE..... | 98 |

## 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 running 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 <b>Operators</b> tab and select <b>Node Management</b> .                                                            |
| 3    | In the <b>All Nodes</b> screen, enter the node details in the <b>Node Name</b> field. The node name can be either SLC or VWS. |
| 4    | In the <b>Replication Nodes</b> screen, enter the node number in the <b>Node Number</b> field.                                |
| 5    | Click <b>Find</b> .<br>The <b>Find Replication Node</b> dialogue box appears.                                                 |
| 6    | Click <b>Search</b> .<br><b>Result:</b> 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 beGrovellier
```

# 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.



# 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 61)" for installation procedures.

## Convergent Charging Controller OUI Installer Screens

### Installation Inventory

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

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

### Installation Location

Specify the name and location of the directory in which to install 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.<br>You use the SMS GUI to configure and manage Convergent Charging Controller. |

| Field               | Description                                                                                                                                                                                                                                                                                     |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SLC                 | Installs the Convergent Charging Controller Service Logic Controller (SLC) application and the SLC database.<br>You use SLC to provide the logic to manage the calls, sessions, messages in Convergent Charging Controller.<br><b>Note:</b> 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.<br><b>Note:</b> Ensure that SMS is installed before installing SLC With Test Tools.                                                                           |
| VWS                 | Installs the Convergent Charging Controller Voucher and Wallet Server (VWS) application and VWS database.<br>The Voucher and Wallet Server manages charging, vouchers, balances, and subscribers.<br><b>Note:</b> Ensure that SMS is installed before installing VWS.                           |

## Oracle User

Enter the Oracle database user details.

| Field           | Description                                                                                                         |
|-----------------|---------------------------------------------------------------------------------------------------------------------|
| Oracle DB owner | Retain the default, <b>oracle</b> , which is the user name with permissions to create the Oracle database instance. |
| Oracle DB group | The OS group which owns the Oracle database. For example 'dba'.                                                     |

## Application User

Enter the CCC runtime user details.

| Field             | Description                                                          |
|-------------------|----------------------------------------------------------------------|
| Application owner | The CCC_runtime_user i.e. the OS user that will run the application. |
| Application group | The CCC OS group. Fixed to 'esg'.                                    |

## Database Paths

Select one from the provided options.

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

## Database Datafiles

### Database Server Paths

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

| Field          | Description                                                                                                                                                                                                             |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Base directory | Enter the name and the full path to the <b>oracle</b> base directory in which the database creation scripts are installed. The <b>oracle</b> 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 12c/19c database is installed.                                                                                                       |

### Datafile and Redolog Paths

Specify the location of the datafile and redo log directories.

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

## Existing Database

### Database User Password

Enter the previously existing Oracle database password administrative account.

| Field                            | Description                                                         |
|----------------------------------|---------------------------------------------------------------------|
| Oracle SID                       | Enter the Oracle SID.                                               |
| Database hostname                | Enter the hostname where the database is located.                   |
| Database user (smf, scp or e2be) | Enter the database user name.                                       |
| Oracle database password         | Enter the password for the Oracle database administrative accounts. |
| Database Port                    | Enter the port that is required to connect to the database host.    |
| Service database hostname        | Enter the fully qualified service DB hostname.                      |

## SMS GUI

Enter the information for SMS GUI.

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

## PI Admin

Enter the information for Provisioning Interface (PI) configuration.

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

## SMS EDR Paths

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

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

## Default Template

Select the option to install default template.

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

## Default Currency

Enter the details of default system currency.

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

## Replication

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

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

## VWS Config

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

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



# Maintaining a Remote Database

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

- smsAddArchiveLog.sh
- hotbackup.sh
- archbackup.sh
- oraLockMonitor.sh
- fragmentation\_install\_oui.sh
- CCSPART\_uninstall.sh
- CCSPART\_create\_schema.sh
- CCSPART\_maintenance.sh
- CCSPART\_statistics.sh
- CCSPART\_capacity\_monitor.sh
- CCSCPART\_check\_oracle.sh
- CCSCPART\_statistics.sh
- CCSCPART\_add\_week.sh
- CCSCPART\_capacity\_monitor.sh
- CCSCPART\_restart\_job\_processes.sh
- CCSCPART\_install.sh
- CCSCPART\_rman\_exclude.sh
- CCSCPART\_maintenance.sh
- CCSCPART\_uninstall.sh
- CCSCPART\_drop\_week.sh
- CCSCPART\_list\_partitions.sh
- CCSVCHRPART\_uninstall.sh
- CCSVCHRPART\_statistics.sh
- CCSVCHRPART\_capacity\_monitor.sh
- CCSVCHRPART\_maintenance.sh
- CCSVCHRPART\_create\_schema.sh