Oracle® Enterprise Communications Broker

Administrator's Guide

PCZ3.1.0

F19866-02

February 2020

Oracle Enterprise Communications Broker Administrator's Guide, PCZ3.1.0

F19866-02

Contents

2 Appliance Installation and Start-Up

3 Initial Configuration

About This Guide

The *Oracle® Enterprise Communications Broker Administrator's Guide* provides the following information about the Oracle Enterprise Communications Broker (OECB) hardware and software.

- Supported platforms
- How to get the system operational
- Initial configuration
- Maintenance and troubleshooting

Oracle Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

Documentation Set

The following table describes the documentation set for the OECB.

Document Name	Document Description
Release Notes	Contains information about the current release, including specifications, requirements, new features, enhancements, inherited features, known issues, caveats, and limitations.
Administrator's Guide	Describes how to deploy the system.
User's Guide	Describes how to configure SIP signaling management and how to tailor the system to specific needs.
Embedded Help system	Contains task-oriented topics for configuring, administering, maintaining, and troubleshooting the ECB hardware and software.
SBC Family Security Guide	Provides information about security considerations and best practices from a network and application security perspective for the Enterprise family of products.

Related Documentation

The following table describes related documentation for the OECB.

Document Name	Document Description
Administrative Security Essentials Guide	Contains conceptual and procedural information for supporting the Admin Security and Admin Security with ACP feature sets.
ACLI Reference Guide	Contains explanations of how to use the ACLI, as well alphabetical listings and descriptions of all ACLI commands and configuration parameters.
Accounting Guide	Contains information about accounting support, including details about RADIUS and Diameter accounting and FTP push.

Revision History

The following table lists changes to this document and the corresponding dates of publication.

Date	Description
March 2018	• Initial Release
February 2020	• Removes information about read-write mode in SNMP.

1 Applicable Platforms

The Oracle Enterprise Communications Broker is available either as an appliance or as a application for operation on virtual machines. When running as an appliance, the Oracle Enterprise Communications Broker software is packaged with the Netra Server X3-2 for Acme Packet and delivered to the end customers. When running as a virtual application, the Oracle Enterprise Communications Broker software can be deployed on any third-party COTS hardware that meets the specified guidelines.

When delivered as an appliance, the application comes pre-installed on Oracle's Netra Server X3-2 for Acme Packet. Server cabling instructions, which also identifies key hardware elements, such as interfaces, are presented below. Instructions on installation and maintenance of the Netra Server X3-2 for Acme Packet are generic to SBC, Session Router and other appliance applications.

The generic Netra Server X3-2 for Acme Packet documentation herein identifies all hardware interfaces. With respect to cabling the Oracle Enterprise Communications Broker, the applicable interfaces, as named in the hardware documentation, include:

- s0p0—Service access
- wancom0—Management access
- wancom1—High Availability (HA) access
- SER MGT(COM1)—Serial management access

You run the application as a virtual machine over a VM system, such as Oracle VM Server. You use VM management software, such as Oracle VM Manager, to create and maintain your virtual machines.

Virtual machine installation instructions are available in the Platforms chapter of the *Oracle Enterprise Session Border Controller Configuration Guide*. Generic hardware information is provided in the applicable documentation provided by your hardware vendor.

Software Packaging

The Release P-Cz3.1.0 build image is labeled nnPCz310.bz. The image is compressed by the zlib software library and includes all software components needed to install and operate the Oracle Enterprise Communications Broker.

> **Note:**
>
> Note that you must obtain a license if you want to operate with TLS. The procedure to obtain this license is documented herein.

Oracle Enterprise Communications Broker software delivered for virtual machines includes the following packages:

Image Name	Description
nnPCz310.bz	Standalone compressed image - This .bz image package is primarily used to load and operate the Oracle Enterprise Communications Broker software as an appliance. You can also use the .bz image as a load image to existing virtual machines. Create your virtual machine according to specifications. Then copy this image to your machine (/code) and point your boot parameters to it.
nnPCz310-img-bin.ova	Virtual Machine Template - Import to virtual machine hypervisor to create the entire machine.

Oracle Server X7-2 Platform Preparation

Oracle Communications produces a variety of software products that run on the Oracle Server X7-2 platform, including Oracle session delivery applications.

Use your Hardware documentation to install and establish system management via ILOM. Then use the steps below to prepare the Oracle X7-2 for session delivery software installation.

Note:

The ILOM Cable Connection procedure also displays ILOM cabling.

1. Confirm applicable firmware on the server.
   - To check the firmware versions installed in the server, go to the Oracle Integrated Lights Out Manager (ILOM) web interface, and navigate to **System Information**, **Firmware**.
   - Software and firmware versions qualified for use with Oracle Session Delivery products include:
     - ILOM—v4.0.2.20.b
     - BIOS— 41.02.13.00
2. Upgrade or downgrade the firmware on the server as necessary. Go to https://docs.oracle.com/cd/E81115_01/index.html for ILOM upgrade instructions.
3. Configure the BIOS settings. (Settings navigation may differ based on the BIOS version.)
   a. Observe the boot procedure, logged to the console during bootup, and use the documented key sequence to interrupt the boot and display the BIOS configuration dialogs. For example, pressing the F2 key is a common way to enter BIOS configuration from a terminal application that supports function keys.

b. Navigate to the Boot menu and, depending on the software distribution you are using, set the USB or CD as the first device followed by the disk controller. (Navigation: Boot)

c. Disable Hyper-Threading. (Navigation: Advanced, Processor Configuration, Hyper-Threading)

d. Disable CPU power limit. (Navigation: Advanced / CPU Power Management Configuration)

e. Disable C6 Reporting. (Navigation: Advanced / CPU Power Management Configuration, CPU C6 report)

f. Change Energy Performance to Performance. For example, set "ENERY_PERF_BIAS_CFG" mode to "PERF". (Navigation: Advanced / CPU Power Management Configuration, Energy Performance)

g. To decrease boot up time, Oracle recommends disabling Intel PXE Boot Agent for both onboard and NIC ethernet ports. Press F2 and navigate to Advanced, Network Stack Configuration. Then disable IPv4 PXE support.

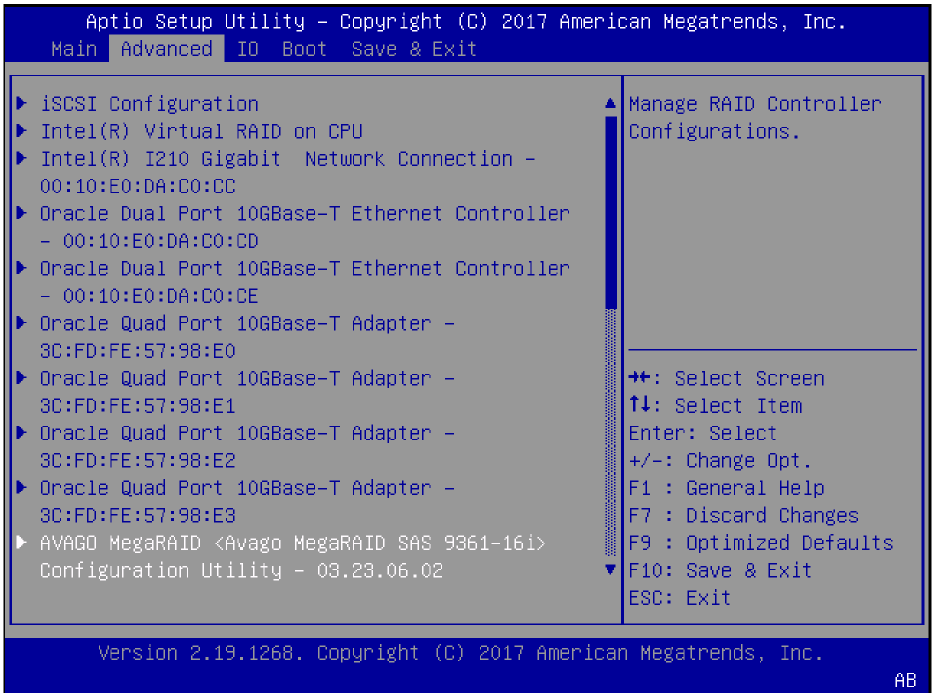
> **Note:**
>
> PXE boot is not supported in this release.

h. Reboot the server.

4. Initialize the HDD.

a. Open the ILOM remote system console to observe the system's boot cycle, and interrupt the boot cycle to enter the MegaRAID configuration utility.

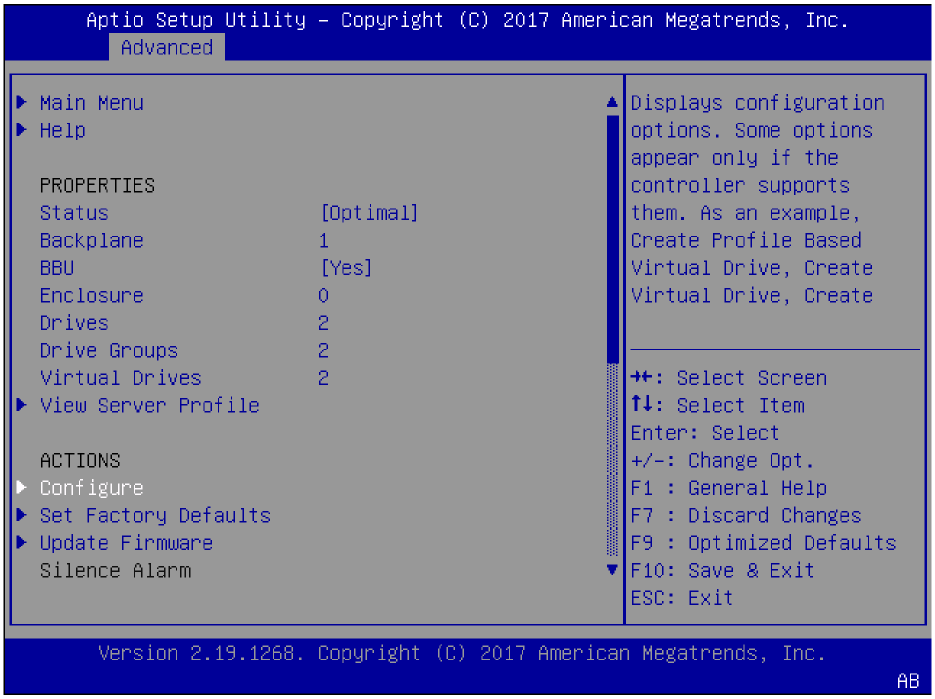
Figure 1-1 Selecting RAID Configuration



```
        Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
     Main  Advanced  IO  Boot  Save & Exit

 ▶ iSCSI Configuration                                  ▲ Manage RAID Controller
 ▶ Intel(R) Virtual RAID on CPU                           Configurations.
 ▶ Intel(R) I210 Gigabit  Network Connection –
   00:10:E0:DA:C0:CC
 ▶ Oracle Dual Port 10GBase-T Ethernet Controller
   – 00:10:E0:DA:C0:CD
 ▶ Oracle Dual Port 10GBase-T Ethernet Controller
   – 00:10:E0:DA:C0:CE
 ▶ Oracle Quad Port 10GBase-T Adapter –
   3C:FD:FE:57:98:E0
 ▶ Oracle Quad Port 10GBase-T Adapter –                   →←: Select Screen
   3C:FD:FE:57:98:E1                                      ↑↓: Select Item
 ▶ Oracle Quad Port 10GBase-T Adapter –                   Enter: Select
   3C:FD:FE:57:98:E2                                      +/-: Change Opt.
 ▶ Oracle Quad Port 10GBase-T Adapter –                   F1 : General Help
   3C:FD:FE:57:98:E3                                      F7 : Discard Changes
 ▶ AVAGO MegaRAID <Avago MegaRAID SAS 9361-16i>           F9 : Optimized Defaults
   Configuration Utility – 03.23.06.02                  ▼ F10: Save & Exit
                                                          ESC: Exit

        Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc.
                                                                            AB
```

b. Navigate the utility to establish your virtual drive's operation, initially including the **Configure** action.

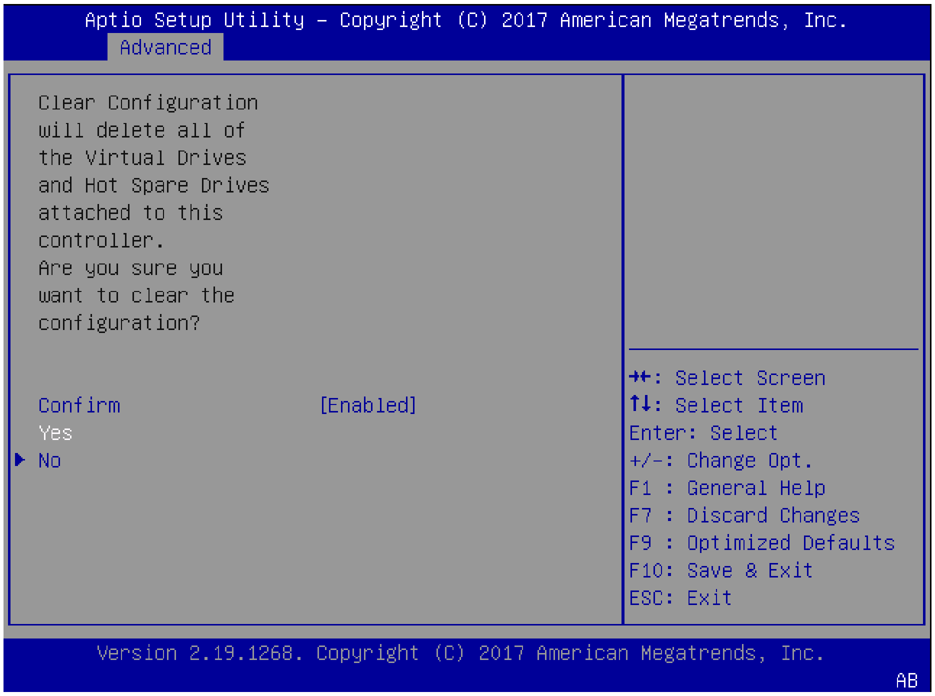
Figure 1-2 Begin RAID Configuration



```
        Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
           Advanced

▶ Main Menu                                    ▲ Displays configuration
▶ Help                                           options. Some options
                                                 appear only if the
  PROPERTIES                                     controller supports
  Status                  [Optimal]              them. As an example,
  Backplane               1                      Create Profile Based
  BBU                     [Yes]                  Virtual Drive, Create
  Enclosure               0                      Virtual Drive, Create
  Drives                  2
  Drive Groups            2
  Virtual Drives          2                      →←: Select Screen
▶ View Server Profile                            ↑↓: Select Item
                                                 Enter: Select
  ACTIONS                                        +/-: Change Opt.
▶ Configure                                      F1 : General Help
▶ Set Factory Defaults                           F7 : Discard Changes
▶ Update Firmware                                F9 : Optimized Defaults
  Silence Alarm                                ▼ F10: Save & Exit
                                                 ESC: Exit

        Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc.
                                                                     AB
```

c. Clear the configuration, regardless of the initial state.

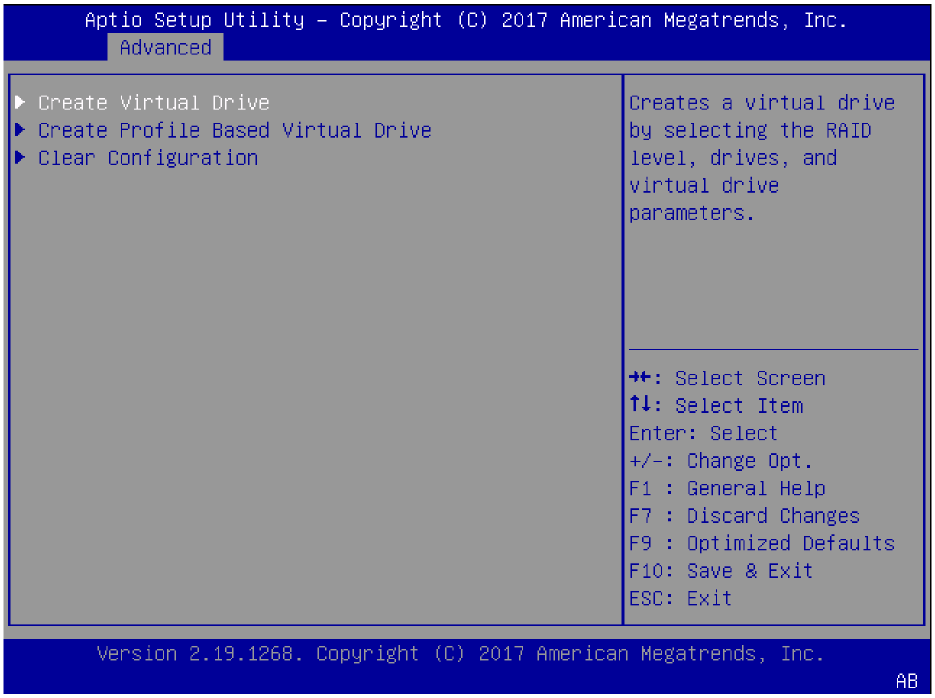
Figure 1-3 Clear Any Existing RAID Configuration



```
        Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
           Advanced

  Clear Configuration
  will delete all of
  the Virtual Drives
  and Hot Spare Drives
  attached to this
  controller.
  Are you sure you
  want to clear the
  configuration?

                                                 →←: Select Screen
  Confirm                 [Enabled]              ↑↓: Select Item
  Yes                                            Enter: Select
▶ No                                             +/-: Change Opt.
                                                 F1 : General Help
                                                 F7 : Discard Changes
                                                 F9 : Optimized Defaults
                                                 F10: Save & Exit
                                                 ESC: Exit

        Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc.
                                                                     AB
```

d. Access the menu from which you create a virtual drive.

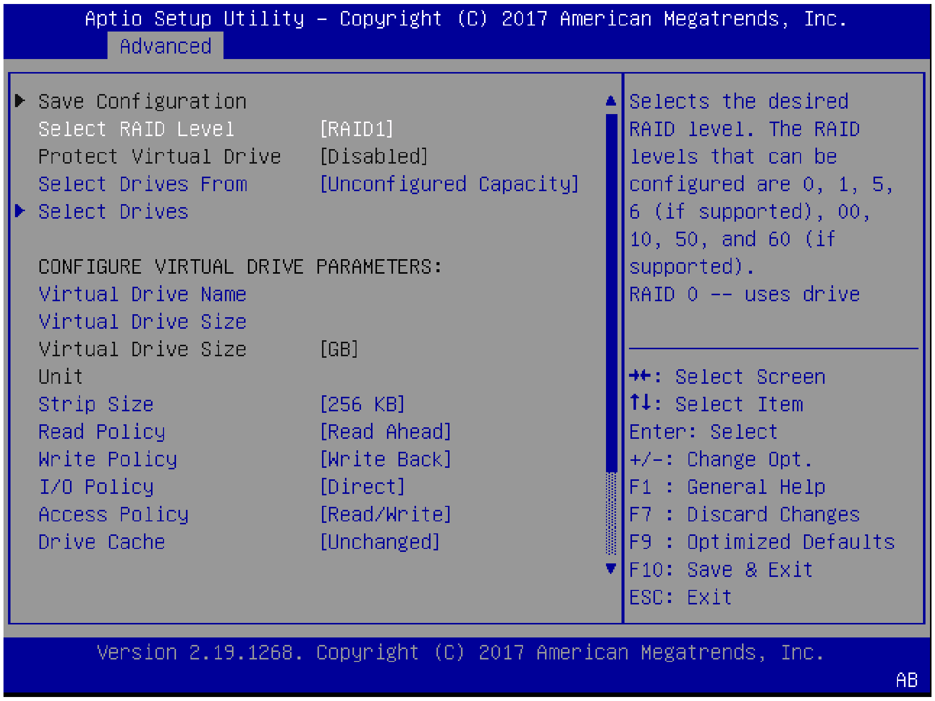
Figure 1-4 RAID - Create Virtual Drive



```
     Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
             Advanced
▶ Create Virtual Drive                                Creates a virtual drive
▶ Create Profile Based Virtual Drive                  by selecting the RAID
▶ Clear Configuration                                 level, drives, and
                                                      virtual drive
                                                      parameters.

                                                      →←: Select Screen
                                                      ↑↓: Select Item
                                                      Enter: Select
                                                      +/-: Change Opt.
                                                      F1 : General Help
                                                      F7 : Discard Changes
                                                      F9 : Optimized Defaults
                                                      F10: Save & Exit
                                                      ESC: Exit
        Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc.
                                                                          AB
```

e. Set the RAID level to RAID-1.

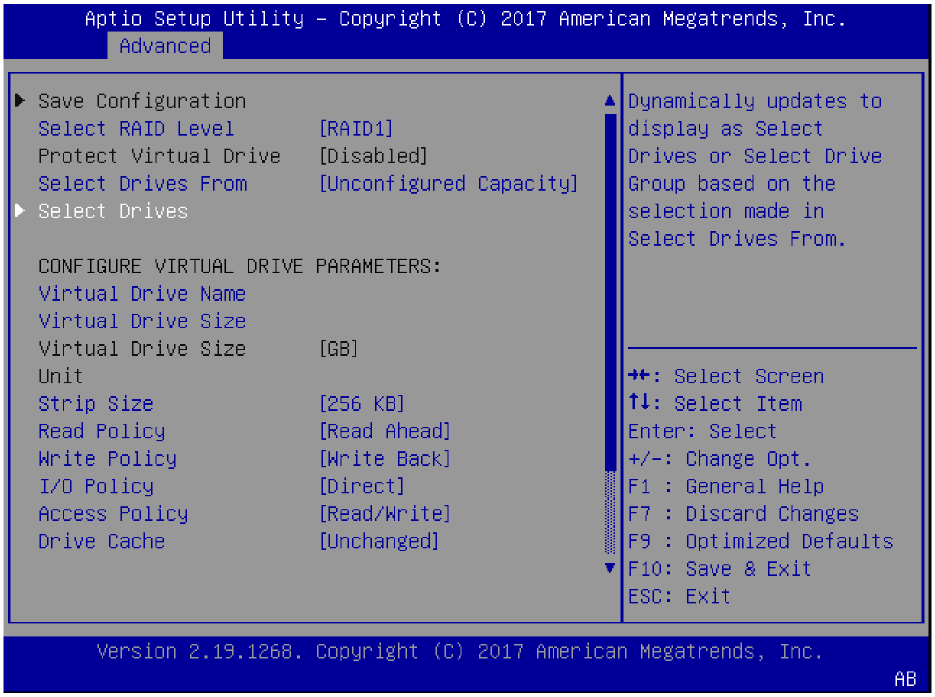
Figure 1-5 Set Drive to RAID1



```
     Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
             Advanced
▶ Save Configuration                                 ▲ Selects the desired
  Select RAID Level         [RAID1]                    RAID level. The RAID
  Protect Virtual Drive     [Disabled]                 levels that can be
  Select Drives From        [Unconfigured Capacity]    configured are 0, 1, 5,
▶ Select Drives                                        6 (if supported), 00,
                                                       10, 50, and 60 (if
  CONFIGURE VIRTUAL DRIVE PARAMETERS:                  supported).
  Virtual Drive Name                                   RAID 0 -- uses drive
  Virtual Drive Size
  Virtual Drive Size        [GB]
  Unit                                                 →←: Select Screen
  Strip Size                [256 KB]                   ↑↓: Select Item
  Read Policy               [Read Ahead]               Enter: Select
  Write Policy              [Write Back]               +/-: Change Opt.
  I/O Policy                [Direct]                   F1 : General Help
  Access Policy             [Read/Write]               F7 : Discard Changes
  Drive Cache               [Unchanged]                F9 : Optimized Defaults
                                                     ▼ F10: Save & Exit
                                                       ESC: Exit
        Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc.
                                                                          AB
```

f. Select your drives.

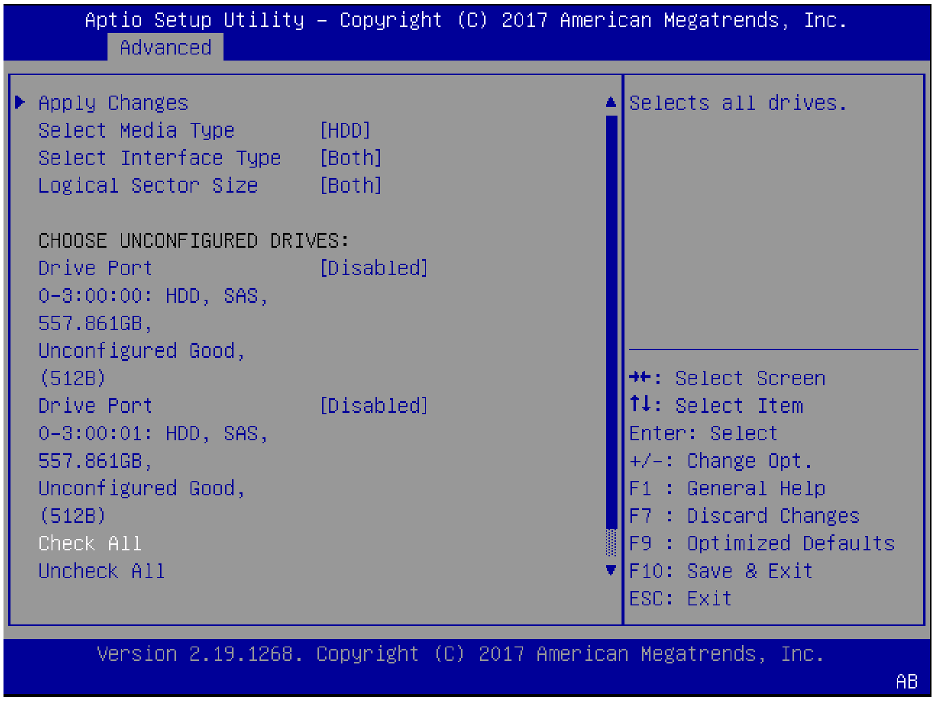
Figure 1-6   RAID - Select Drives



```
      Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
         Advanced

▶ Save Configuration                                  Dynamically updates to
  Select RAID Level        [RAID1]                    display as Select
  Protect Virtual Drive    [Disabled]                 Drives or Select Drive
  Select Drives From       [Unconfigured Capacity]    Group based on the
▶ Select Drives                                       selection made in
                                                      Select Drives From.
  CONFIGURE VIRTUAL DRIVE PARAMETERS:
  Virtual Drive Name
  Virtual Drive Size
  Virtual Drive Size       [GB]
  Unit                                                →←: Select Screen
  Strip Size               [256 KB]                   ↑↓: Select Item
  Read Policy              [Read Ahead]               Enter: Select
  Write Policy             [Write Back]               +/-: Change Opt.
  I/O Policy               [Direct]                   F1 : General Help
  Access Policy            [Read/Write]               F7 : Discard Changes
  Drive Cache              [Unchanged]                F9 : Optimized Defaults
                                                      F10: Save & Exit
                                                      ESC: Exit

        Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc.
                                                                       AB
```

g. It is common to select all drives at this point.

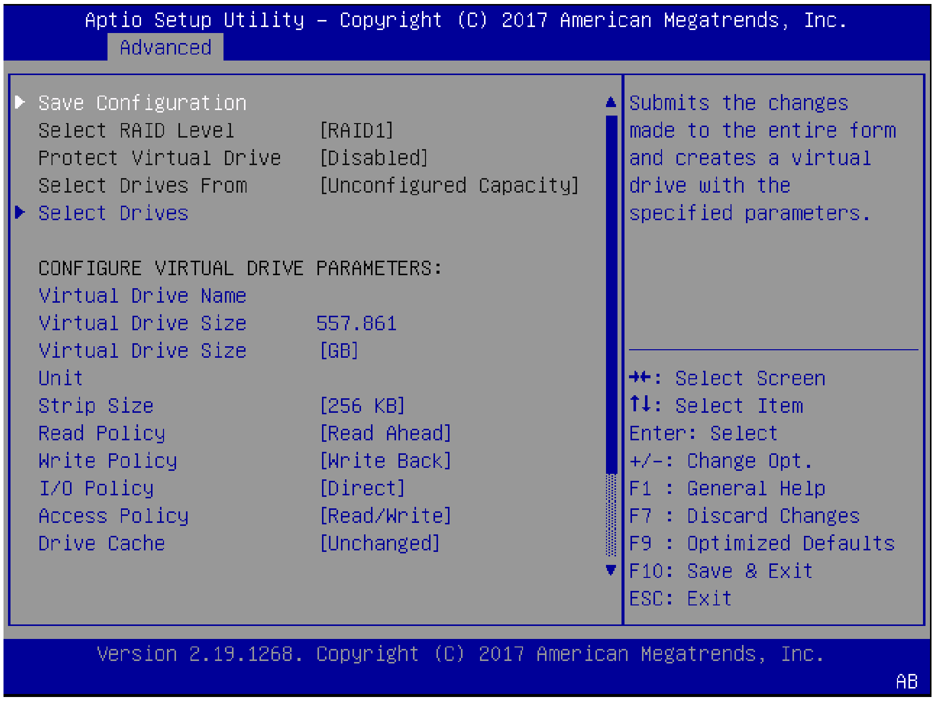
Figure 1-7   Select All Drives



```
      Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
         Advanced

▶ Apply Changes                                       Selects all drives.
  Select Media Type        [HDD]
  Select Interface Type    [Both]
  Logical Sector Size      [Both]

  CHOOSE UNCONFIGURED DRIVES:
  Drive Port               [Disabled]
  0-3:00:00: HDD, SAS,
  557.861GB,
  Unconfigured Good,
  (512B)                                              →←: Select Screen
  Drive Port               [Disabled]                 ↑↓: Select Item
  0-3:00:01: HDD, SAS,                                Enter: Select
  557.861GB,                                          +/-: Change Opt.
  Unconfigured Good,                                  F1 : General Help
  (512B)                                              F7 : Discard Changes
  Check All                                           F9 : Optimized Defaults
  Uncheck All                                         F10: Save & Exit
                                                      ESC: Exit

        Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc.
                                                                       AB
```

h. Save your RAID configuration.

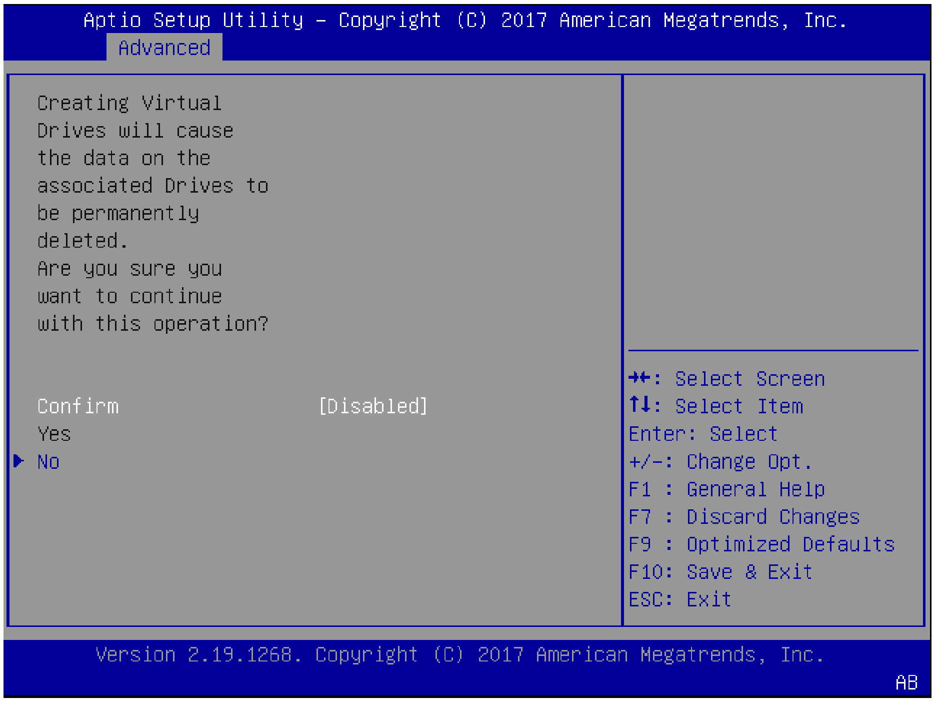
Figure 1-8 Save RAID Configuration



```
Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
        Advanced

▶ Save Configuration                                   Submits the changes
  Select RAID Level            [RAID1]                 made to the entire form
  Protect Virtual Drive        [Disabled]              and creates a virtual
  Select Drives From           [Unconfigured Capacity] drive with the
▶ Select Drives                                        specified parameters.

  CONFIGURE VIRTUAL DRIVE PARAMETERS:
  Virtual Drive Name
  Virtual Drive Size           557.861
  Virtual Drive Size           [GB]
  Unit                                                 →←: Select Screen
  Strip Size                   [256 KB]                ↑↓: Select Item
  Read Policy                  [Read Ahead]            Enter: Select
  Write Policy                 [Write Back]            +/-: Change Opt.
  I/O Policy                   [Direct]                F1 : General Help
  Access Policy                [Read/Write]            F7 : Discard Changes
  Drive Cache                  [Unchanged]             F9 : Optimized Defaults
                                                       F10: Save & Exit
                                                       ESC: Exit

      Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc.
                                                                      AB
```

i. The system allows you to Confirm your configuration and continue with initialization.

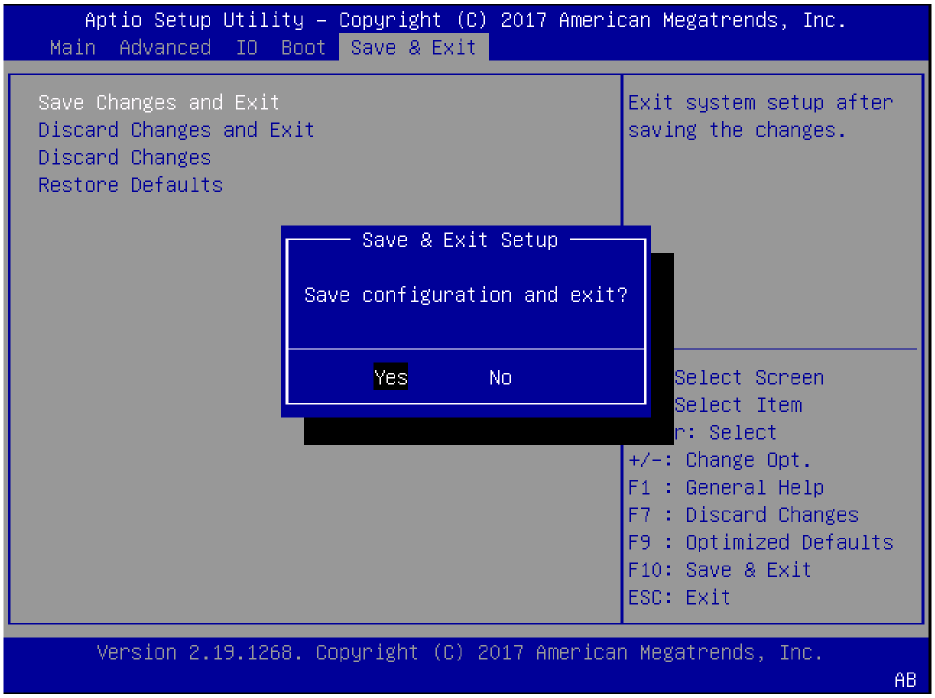
Figure 1-9 Initialize RAID Configuration



```
Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
        Advanced

  Creating Virtual
  Drives will cause
  the data on the
  associated Drives to
  be permanently
  deleted.
  Are you sure you
  want to continue
  with this operation?


  Confirm                      [Disabled]              →←: Select Screen
  Yes                                                  ↑↓: Select Item
▶ No                                                   Enter: Select
                                                       +/-: Change Opt.
                                                       F1 : General Help
                                                       F7 : Discard Changes
                                                       F9 : Optimized Defaults
                                                       F10: Save & Exit
                                                       ESC: Exit

      Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc.
                                                                      AB
```

j. After initialization is complete, return to the Main Menu to Save and Exit.

Figure 1-10 Exit RAID Configuration



```
       Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
    Main  Advanced  IO  Boot  Save & Exit

  Save Changes and Exit                             Exit system setup after
  Discard Changes and Exit                          saving the changes.
  Discard Changes
  Restore Defaults

                      ———— Save & Exit Setup ————

                       Save configuration and exit?

                           Yes         No
                                                       Select Screen
                                                       Select Item
                                                      r: Select
                                                    +/-: Change Opt.
                                                    F1 : General Help
                                                    F7 : Discard Changes
                                                    F9 : Optimized Defaults
                                                    F10: Save & Exit
                                                    ESC: Exit

       Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc.
                                                                        AB
```

5. Perform a cold shutdown by removing all system power.

Cable the Oracle X7-2

After mounting the Oracle X7-2 in an equipment rack and installing all components, use the following instructions to connect all appropriate data cables to the ports before powering the system up and beginning the configuration.

Oracle has qualified the following configurations of the Oracle X7-2:

- Configuration A: One Four-port 10 GigE NIC
- Configuration B: Two Four-port 10 GigE NICs (each of the three slots are qualified)
- Configuration C: One QSFP NIC (in quad port mode only) and ONE Four-port 10 GigE NIC

> **Note:**
>
> The 40G interface speed is not supported.

On board interfaces for all configurations include:

- One RJ-45 serial management (SER MGT) port
- One 10/100/1000BASE-T RJ-45 Oracle Integrated Lights Out Manager (ILOM) service processor (SP) network management (NET MGT) port

- One 1000BASE-T RJ-45 Gigabit Ethernet (GbE) port, labeled NET 0
- Two 10/25GbE SFP+ Ethernet ports, labeled NET 1 and NET 2
- Two 10GBASE-T RJ-45 Gigabit Ethernet (GbE) ports, labeled NET 1 and NET 2

> **Note:**
>
> The 10/25GbE SFP+ Ethernet ports (NET 1 and NET 2) are the dedicated HA ports for the server. When using an SFP+ port, network connectivity is disabled on the 10GBASE-T RJ-45 GbE (NET 1 and NET 2) Ethernet ports.

Figure 1-11 Oracle X7-2 Configuration A (4x10 GigE NIC)

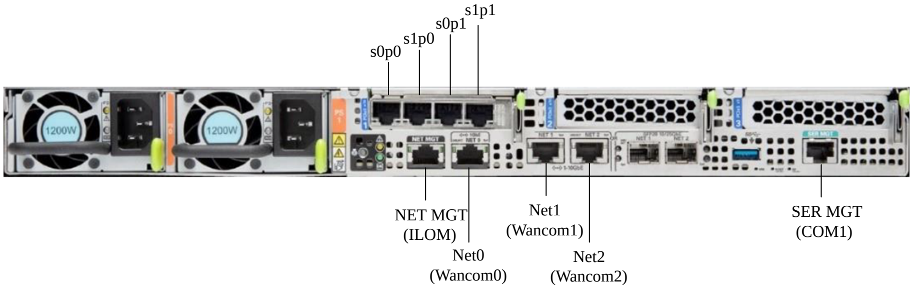


Figure 1-12 Oracle X7-2 Configuration B (Two 4x10 GigE NICs)

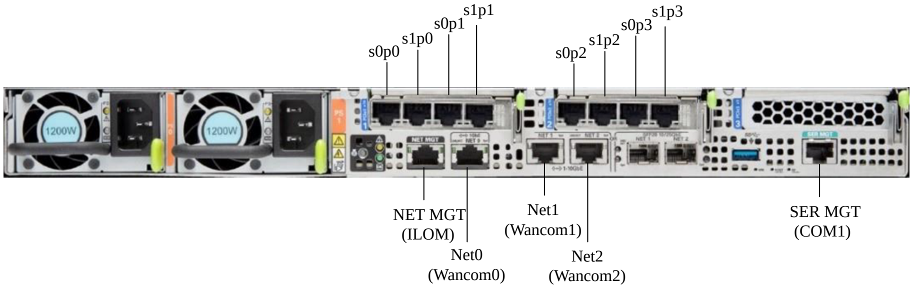
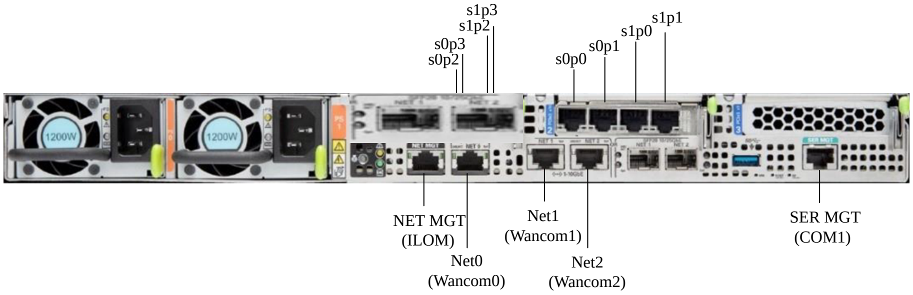


Figure 1-13 Oracle X7-2 Configuration B (One QSFP and One 4x10 GigE NICs)



> **Caution:**
>
> Please review your Oracle X7-2 Product Notes. Notes for release 1.1.2 describes physical issues with some optical transceivers installed into an SFP28 port.

Oracle recommends using Category 6 (or better) for all Ethernet connections.

You do not need to use every port for proper operation.

Available Connections

Please read all of the information for each of the available connections prior to cabling the Oracle X7-2.

Port	Description	You Need:
NET (0-2)	From left to right: • 1 GigE ports - Net 0 • 10 GigE ports - Net 1, Net 2 Enables you to connect the Netra X7-2 to your network.	A Category 6 (or better) Ethernet cable to connect to the NET 0 port to your network Network parameters such as an IP address (can be provided by DHCP services or assigned a static address in the OS) Additional Category 6 (or better) Ethernet cables and Ethernet addresses as needed for additional connections to NET 0, 1 and 2.
NET MGT	Provides a 10/100/1000 BASE-T Ethernet connection to the Service Processor (SP) through an RJ-45 connector. The NET MGT port provides support connections to the SP using the Oracle Integrated Lights Out Manager (ILOM) CLI and Web interface. By default, the NET MGT port is configured to use DHCP to automatically obtain an IP address. Alternatively, you can assign a static IP address to the NET MGT port. To use the NET MGT port, you must configure its network settings. Once configured, use the NET MGT port IP address to log on to the device using a browser or secure shell.	Category 6 (or better) Ethernet cable to connect the NET MGT port to your network IP address for this port (required from DHCP or a static address)

Port	Description	You Need:
SER MGT (COM1)	Provides a TIA/EIA-232 serial Oracle/Cisco standard connection to the SP through an RJ-45 connector. This interface connects to either Service Processor by default, but can be redirected to the host. Default settings: • 8N1: eight data bits, no parity, one stop bit • 9600 baud (change to 115200 baud) • Disable hardware flow control (CTS/RTS) • Disable software flow control (XON/XOFF)	A terminal device (e.g., terminal, connection to a terminal server, or computer such as a laptop running terminal emulation software) A cable to connect the terminal device to the SER MGT (COM1) port
USB	Provides USB3.0 connection to the computer. The USB port is hot pluggable, so you can connect and disconnect USB cables without affecting server operations.	Installation media Note: Maximum USB cable length: 5 meters

Cable the Local Console

You can connect the Administration console to the local SER MGT (COM1) serial console port.

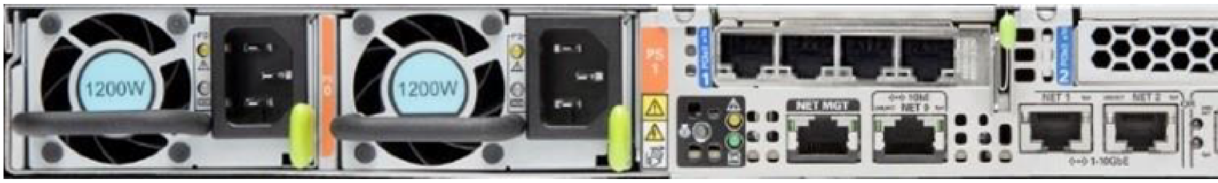
- To cable a serial console connection:
  - Serial console cable with an RJ-45 connector

> **Note:**
>
> Do not configure COM2 in the bootparams menu.

When configuring boot loader parameters, set the console to COM1 when you use SER MGT. The boot loader is accessible on all console ports, but only input from the active console port can be recognized by the Oracle X7-2.

1. Locate the appropriate cables to connect to the Oracle X7-2.
2. To cable a serial connection, insert the serial console cable into the SER MGT (COM1) port.

Figure 1-14 Connecting to USB and SER MGT (COM1) Ports



> **Note:**
>
> Refer to the Oracle X7-2 hardware documentation for information on how to configure the terminal application to connect to the console, and how to establish communications with the Oracle X7-2.

3. For installation procedures, insert the USB stick in the USB port.
4. Lead the cables neatly away from the rear panel.
5. Plug in the cables to their respective destination components.

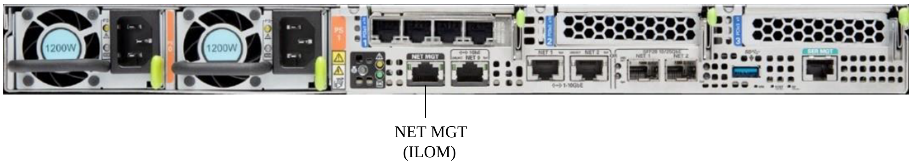
Connect ILOM to the Oracle X7-2

Use the following procedure to make a connection to the Oracle X7-2 Oracle Integrated Lights Out Manager (ILOM) port. For a remote permanent connection to the Service Processor over the ILOM connection, use the rear panel NET MGT port.

> **Note:**
>
> Keep Ethernet cables separated from power cables by at least 60mm where possible and never run them in the same channel of the rack without segregation.
>
> - Category 6 (or better) Ethernet

1. Locate the cable to connect to the Oracle X7-2 for Communications.
2. Plug the RJ-45 connector into the ILOM port.

Figure 1-15 Connecting to ILOM over the Network



3. Lead the cable neatly away from the rear panel.
4. Connect the other end of the cable to the LAN.

- Refer to the Oracle X7-2 hardware documentation (https://docs.oracle.com/cd/E72435_01/html/E72440/index.html) for information on how to configure the Web browser application to connect to the console, and how to establish communications with the Oracle X7-2.

Software Installation - Oracle X7-2 Platforms

The Oracle Communications Session Router (OCSR) requires software installation when deployed on the Oracle X7-2.

Software Installation Process

Software installation to Oracle X7-2 includes the following high-level steps:

1. Insert your installation media into the USB slot. Alternatively, connect the ISO image by way of ILOM virtual media.

   > **Note:**
   >
   > Please review the Oracle X7-2 Product Notes. Notes for release 1.1.3 describe the requirement to maintain the default of SSL enabled for any OS installation.

2. Power on the Oracle X7-2 .
3. Observe the startup process and press F8 to enter the boot menu when it becomes available.
4. Select the bootable USB or ISO setting.

   > **Note:**
   >
   > You may need to scroll through the list to reach the ISO setting.

5. Save and exit the boot menu. The Oracle X7-2 starts the OCSR installation.
6. Remove the USB media when prompted by the Oracle X7-2.
7. Allow the Oracle X7-2 complete its installation process and boot to the newly installed OCSR software.

The OCSR boots by default to VGA during the installation. You can change this to serial "temporarily" during installation. Within the boot parameters and after installation, you can set the boot option to VGA or serial. This setting is “permanent”, meaning that any device set to boot to VGA appears “unresponsive” at serial (and vice-versa).

> **Note:**
>
> There is no physical VGA on the Oracle X7-2, but VGA emulation is available through the ILOM remote console.

Log On to the System

The Oracle Enterprise Communications Broker (OECB) requires you to set passwords for the Admin and User accounts the first time you power up a new or factory reset system by way of local access. You cannot access the Admin and User accounts until you set the corresponding passwords. Use either an SSH connection or console connection when setting passwords. You log on to the system after setting passwords.

Before you begin, plan your passwords to meet the following requirements:

- 8-64 characters
- Include three of the following:
  - Lower case letters
  - Uppercase letters
  - Numerals
  - Punctuation

The system leads you through the process for setting the Admin and User passwords, as follows:

1. Power up the OCSR. The system prompts you to set the User account password.
2. At the prompt, type **acme**, and press ENTER. The system prompts you to enter the password that you want for the User account.
3. Set your User account password, and press ENTER.
4. Type **enable**, and press ENTER. The system prompts you to set the Admin account password.
5. Type **packet**, and press ENTER. The system prompts you to enter the password that you want for the Admin account.
6. Set your admin account password, and press ENTER. The system logs you in as Admin.

> **Note:**
>
> Setting passwords is also covered in the *ACLI Configuration Guide*.

Next Steps After Software Installation

Oracle recommends the following steps after installation on the Oracle X7-2 platform.

1. Execute the OECB **format hard-disk** command, per your requirements. See the "Formatting the Disk Volume" section for reference and instructions.
2. Turn off the OECB using the **Halt** command. This provides a graceful software shutdown, after which the hardware is still powered on.

3. Power cycle the hardware using the power switch, a power controller, or by physically disconnecting and reconnecting the power cable.

To configure the OECB, refer to the *ACLI Configuration Guide*.

Boot parameter changes to consider prior to service configuration include:

- Set your “Target Name” to your preferred OECB name.
- Verify your “Console Device”, for example, com1 (serial).
- Set the "IP Address" to your preferred management port IP address.
- Set the "Netmask" for your management port IP address.
- Set the "Gateway" address for your management port IP address.

> **Note:**
>
> Note at the boot parameters that the default Boot File is “/boot/bzImage”. Be aware that upgrading code includes obtaining images with, for example, an SCz prefix and the .bz file extension.

Known Issues

Oracle X7-2 for Communications

The **interface-mapping locate** command does not work with the Oracle X7-2 for Communications onboard interfaces. The command does work with PCI interfaces installed on the platform.

The Onboard Ethernet ports of the Oracle X-series servers (X3-2, X5-2, X7-2 and so on.) run natively at 1GBASE- T or 10GBASE- T, which requires the use of Category 6a cabling. These ports negotiate down to 1000BASE-T or 100BASE-T, but the negotiation might not succeed when you use incompatible cables.

Netra Server X5-2 Platform Preparation

Oracle Communications produces a variety of software products that run on the Netra X5-2 for Communications platform, including Oracle session delivery applications.

Use your Hardware documentation to install and establish system management by way of ILOM. Then use the steps below to prepare the Netra X5-2 for session delivery software installation.

> **Note:**
>
> The Connect ILOM to the Netra X5 for Communications also displays ILOM cabling.

1. Confirm applicable firmware on the server.

- To check the firmware versions installed in the server, go to the Oracle Integrated Lights Out Manager (ILOM) web interface, and navigate to **System Information**, **Firmware**.
- Review your session delivery product Release Notes for qualified software and firmware versions.

2. Upgrade or downgrade the firmware on the server as necessary. Go to https://docs.oracle.com/cd/E37444_01/index.html for ILOM upgrade instructions.
3. Configure the BIOS settings. (Settings navigation may differ based on the BIOS version.)
   a. Observe the boot procedure and use the documented key sequence to interrupt the boot and display the BIOS configuration dialogs. For example, pressing the F2 key is a common way to enter BIOS configuration from a terminal application that supports function keys.
   b. Navigate to the Boot menu and, depending on the software distribution you are using, set the USB or CD as the first device followed by the disk controller.
   c. Disable Hyper-Threading.
   d. Disable CPU power limit.
   e. Disable C6 Reporting.
   f. Disable the UEFI Stack.
   g. Change Energy Performance to Performance. (For example, set "ENERY_PERF_BIAS_CFG" mode to "PERF".)
   h. To decrease boot up time, Oracle recommends disabling Intel PXE Boot Agent for both onboard and NIC ethernet ports. To disable the Boot Agent for the onboard ethernet ports, navigate to the OpROM option for NET0, NET1, NET2, and NET3 interfaces (for example, IO, Internal Devices) and set it to disabled.
   i. To disable Boot Agent for NIC ethernet ports, note the blue PCIe slot number label at the back of the Netra server where the NICs are installed, then disable the OpROM option for those slots. (Note that you may be able to identify slot number through the ILOM System Information, PCI Devices menu.)
   j. Reboot the server.
4. Initialize the HDD.
   a. Open the ILOM remote system console to observe the system's boot cycle, and interrupt the boot cycle to enter the LSI MegaRAID status display. For example, pressing the Ctrl-R key is a common way to enter LSI MegaRAID BIOS Configuration Utility.
   b. Navigate the utility to establish the elements of your virtual drive, typically consisting of a New Configuration with two entire HDDs.
   c. Access the menu from which you create a virtual drive.
   d. Set the RAID level to RAID-1.
   e. Select all of the drives that you want.
   f. From the Virtual Drive Management dialog, select the new drive and initialize it. For example, pressing F2 and selecting Fast Init from the command menu is a common way to execute initialization.

  g. After initialization is complete, Escape from the LSI MegaRAID Configuration Utility and reboot the system.

5. Perform a cold shutdown by removing all system power.

Cable the Netra X5-2 for Communications

After mounting the Netra X5-2 for Communications in an equipment rack and installing all components, use the following instructions to connect all appropriate data cables to the ports before powering the system up and beginning the configuration.

Oracle has qualified the following configurations of the Netra X5-2 for Communications (the onboard 10 GigE ports are configured for 1G operation):

- Configuration A: Four onboard 10 GigE ports and no Quad GigE NIC
- Configuration B: Four onboard 10 GigE ports and 1 Quad GigE NIC
- Configuration C: Four onboard 10 GigE ports and 2 Quad GigE NICs

Figure 1-16 Netra X5-2 for Communications Configuration A (4 Onboard 10 GigE Ports)

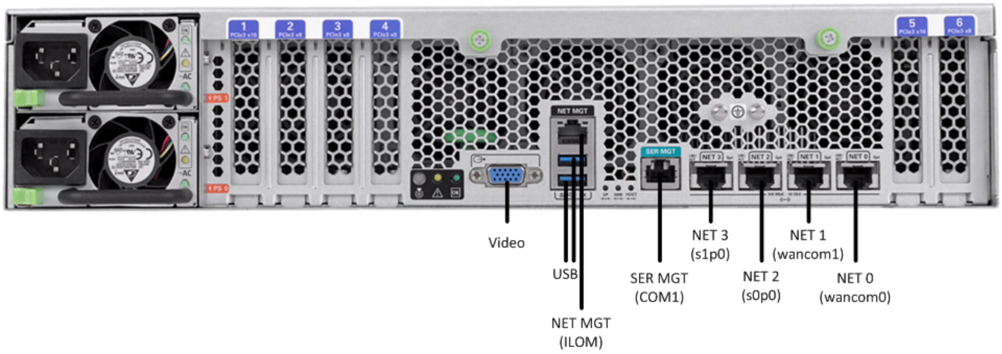


Figure 1-17 Netra X5-2 for Communications Configuration B (4 Onboard 10 GigE Ports & 1 Quad GigE NIC)

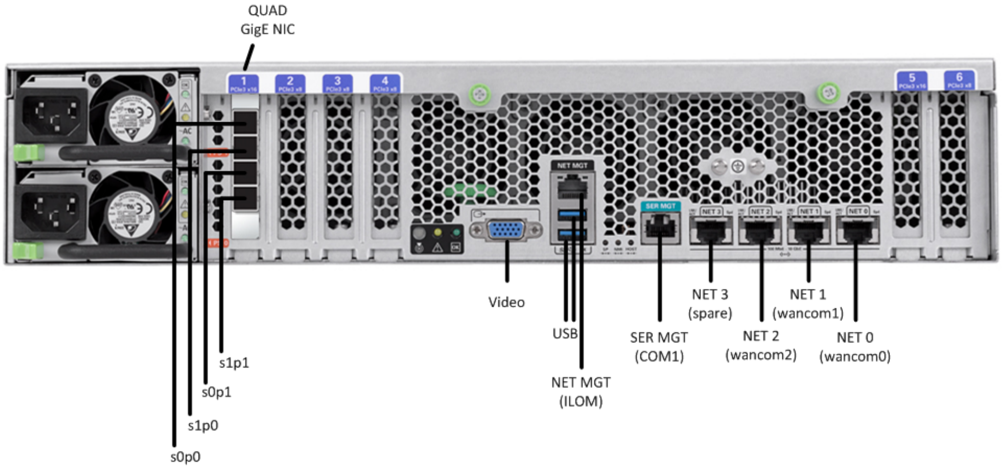
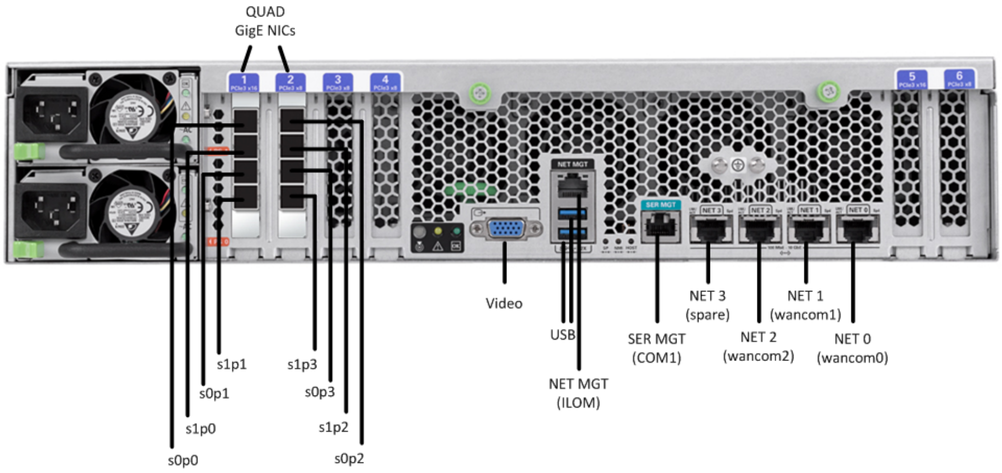


Figure 1-18 Netra 5-2 for Communications Configuration C (4 Onboard 10 GigE Ports & 2 Quad GigE NICs)



Oracle recommends using Category 6 (or better) for all Ethernet connections.

You do not need to use every port for proper operation.

You can install and remove Ethernet and 1000BASE-T cables while the Netra X5-2 for Communication runs, but when you disconnect a cable the link is lost and the system generates an alarm.

Available Connections

Please read all of the information for each of the available connections prior to cabling the Netra X5-2 for Communications.

Port	Description	You Need
NET (0-3)	10 GigE ports - labeled Net 3, Net 2, Net 1 and Net 0 (left to right). Enables you to connect the Netra X5-2 to your network.	A Category 6 (or better) Ethernet cable to connect to the NET 0 port to your network Network parameters such as an IP address (can be provided by DHCP services or assigned a static address in the OS) Additional Category 6 (or better) Ethernet cables and Ethernet addresses as needed for additional connections to NET 1 - 3

Port	Description	You Need
NET MGT	Provides a 10/100BASE-T Ethernet connection to the Service Processor (SP) through an RJ-45 connector. The NET MGT port provides support connections to the SP using the Oracle Integrated Lights Out Manager (ILOM) CLI and Web interface. By default, the NET MGT port is configured to use DHCP to automatically obtain an IP address. Alternatively, you can assign a static IP address to the NET MGT port. To use the NET MGT port, you must configure its network settings. Once configured, use the NET MGT port IP address to log on to the device using a browser or secure shell.	Category 6 (or better) Ethernet cable to connect the NET MGT port to your network IP address for this port (required from DHCP or a static address)
SER MGT (COM1)	Provides a TIA/EIA-232 serial Oracle/Cisco standard connection to the SP through an RJ-45 connector. Default settings: 8N1: eight data bits, no parity, one stop bit 115200 baud Disable hardware flow control (CTS/RTS) Disable software flow control (XON/XOFF)	A terminal device (e.g., terminal, connection to a terminal server, or computer such as a laptop running terminal emulation software) A cable to connect the terminal device to the SER MGT (COM1) port
USB	Provides USB connections to the SP. The USB ports are hot pluggable, so you can connect and disconnect USB cables from these ports and peripheral devices without affecting server operations.	USB keyboard USB mouse Note: Maximum USB cable length: 5 meters
VIDEO	Provides a temporary video connection to the SP.	VGA monitor HDB-15 video cable with a maximum cable length of 6 meters (19.7 feet)

Cable the Local Console

You can connect the Administration console to either the Oracle Integrated Lights Out Manager (ILOM) (NET MGT), the local VGA+USB console ports, or the local SER MGT (COM1) serial console port.

- To cable a serial console connection:
  - Serial console cable with an RJ-45 connector

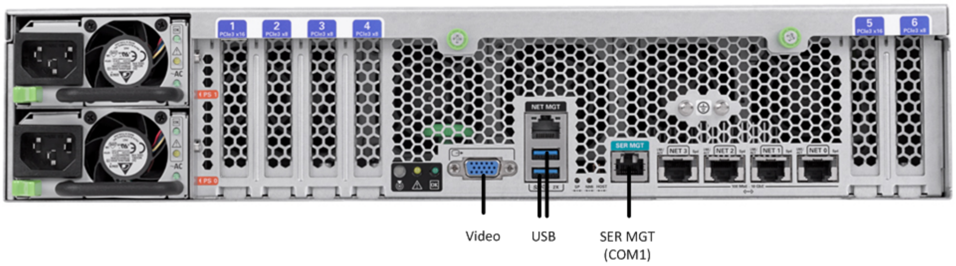
- To cable a USB and Video Connection:
  - DB-15 video cable with a maximum cable length of 6 meters (19.7 feet)
  - USB cable with a maximum cable length of 6 meters (19.7 feet)
  - USB keyboard
    In the following procedure, you have the option to either cable a serial connection or to cable a USB/Video connection.

> **Note:**
>
> Do not configure COM2 in the bootparams menu.

When configuring boot loader parameters, set the console to VGA when you use ILOM or VGA+USB, or to COM1 when you use SER MGT. The boot loader is accessible on all console ports, but only input from the active console port can be recognized by the Netra X5-2 for Communications.

1. Locate the appropriate cables to connect to the Netra X5-2 for Communications.
2. To cable a serial connection, insert the serial console cable into the SER MGT (COM1) port.

Figure 1-19 Connecting to USB, VGA and SER MGT (COM1) Ports



> **Note:**
>
> Refer to the Netra X5-2 for Communications hardware documentation for information on how to configure the terminal application to connect to the console, and how to establish communications with the Netra X5-2 for Communications.

3. To cable a USB/Video connection, do the following:
   a. Insert the 15-pin connector end of the video cable into the Video port.
   b. Insert the USB cable from the mouse and keyboard into the USB ports.
4. Lead the cables neatly away from the rear panel.
5. Plug in the cables to their respective destination components.

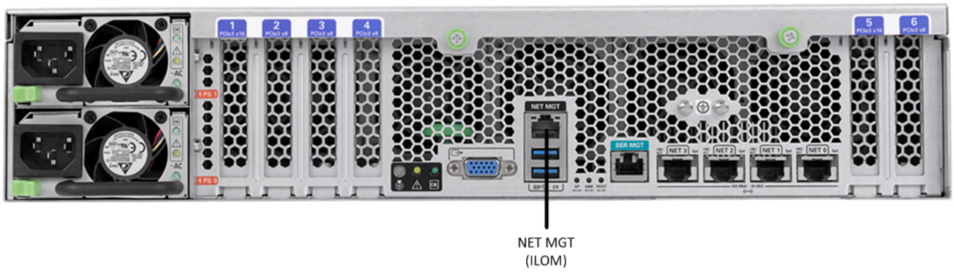
Connect ILOM to the Netra X5 for Communications

Use the following procedure to make a connection to the Netra X5-2 for Communications Oracle Integrated Lights Out Manager (ILOM) port. For a remote permanent connection to the Service Processor over the ILOM connection, use the rear panel NET MGT port.

> **Note:**
>
> Keep Ethernet cables separated from power cables by at least 60mm where possible and never run them in the same channel of the rack without segregation.
>
> - Category 6 (or better) Ethernet cable with RJ-45 jacks

1. Locate the cable to connect to the Netra X5-2 for Communications.
2. Plug the RJ-45 connector into the ILOM port.

Figure 1-20 Connecting to ILOM Port



3. Lead the cable neatly away from the rear panel.
4. Connect the other end of the cable to the LAN.

- Refer to the Netra X5-2 for Communications hardware documentation for information on how to configure the Web browser application to connect to the console, and how to establish communications with the Netra X5-2 for Communications.

Software Installation - Netra and Server-based Platforms

Oracle Communications Session Delivery software requires software installation when deployed on Netra and Server-based platforms.

Installation Procedure

Software installation to Netra and server-based platforms includes the following high-level steps:

1. Ensure your device is set to boot from your boot media. This may be by way of USB or CD.

2. Insert your installation media in any USB slot or CD drive.
3. Power up the device, observing the boot cycle.
4. When power-up is complete, the device loads the Oracle Enterprise Communications Broker (OECB) software. Wait for this to complete.
5. When notified, remove the boot media and allow the device to boot to the newly installed OECB software.
   (This step may not be required as some platforms support a boot priority mechanism that knows to boot from your hard drive after the installation is complete.)

> **Note:**
>
> Note that the OECB boots by default to VGA (or as configured by BMC) during the installation. You can change this to serial temporarily during installation. After installation you can set the boot option to VGA or serial in the boot parameters. This setting is “permanent,” meaning that any device set to boot to VGA appears “dead” at serial (and vice-versa).

Logging Into the System

The Oracle Enterprise Communications Broker (OECB) requires you to set passwords for the Admin and User accounts the first time you power up a new or factory reset system by way of local access. You cannot access the Admin and User accounts until you set the corresponding passwords. Use either an SSH or console connection when setting passwords. You log into your system after setting passwords.

Before you begin, plan your passwords to meet the following requirements:

- 8-64 characters
- Include three of the following:
  - Lower case letters
  - Uppercase letters
  - Numerals
  - Punctuation

The system leads you through the process for setting the Admin and User passwords, as follows:

1. Power up the SBC. The system prompts you to set the User account password.
2. At the prompt, type **acme**, and press ENTER. The system prompts you to enter the password that you want for the User account.
3. Type the User account password, and press ENTER.
4. Type **enable**, and press ENTER. The system prompts you to set the Admin account password.
5. Type **packet**, and press ENTER. The system prompts you to enter the password that you want for the Admin account.
6. Type the Admin account password, and press ENTER. The system logs you in as Admin.

First Steps after Software Installation

Oracle recommends the following steps after installation on the Oracle X7-2 platform.

1. Execute the OECB **format hard-disk** command, per your requirements. See the "Formatting the Disk Volume" section for reference and instructions.
2. Turn off the OECB using the **Halt** command. This provides you with a graceful software shutdown, after which the hardware is still powered on.
3. Power cycle the hardware using the power switch.

To configure the OECB, refer to the *ACLI Configuration Guide*.

Boot parameter changes to consider prior to service configuration include:

- Set your “Target Name” to your preferred OECB name.
- Verify your “Console Device”, eg, com1 (serial).
- Set the "IP Address" to your preferred management port IP address.

> **Note:**
>
> Note at the boot parameters that the default system is named “/boot/bzImage”. Be aware that upgrading code includes obtaining images with, for example, an SCz prefix and the .bz file extension.

Known Issues

Netra X5-2 for Communications

The **interface-mapping locate** command does not work with the Netra X5-2 for Communications onboard interfaces. The command does work with PCI interfaces installed on the platform.

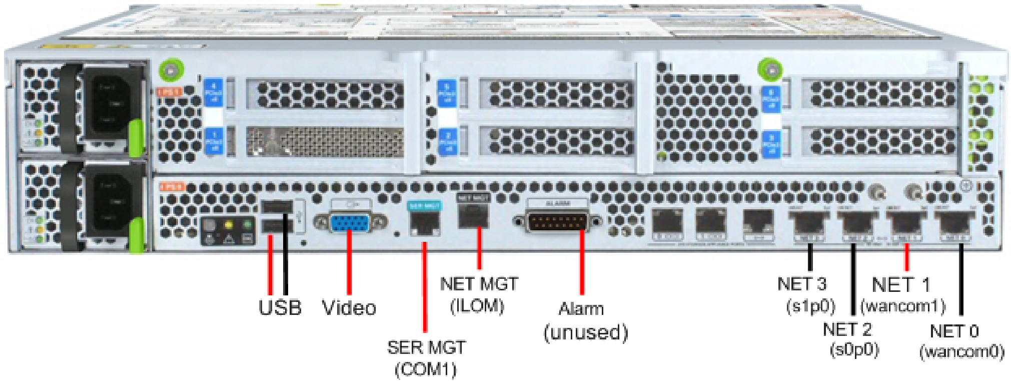
The Onboard Ethernet ports of the Oracle X-series servers (X3-2, X5-2, and so on.) run natively at 10GBASE- T, which requires the use of Category 6a cabling. These ports negotiate down to 1000BASE-T or 100BASE-T, but the negotiation might not succeed when you use incompatible cables. For example, do not use Cat5/5e cables or Cat6 cables not rated for 500MHz operation.

Cabling the Netra Server X3-2 for Acme Packet

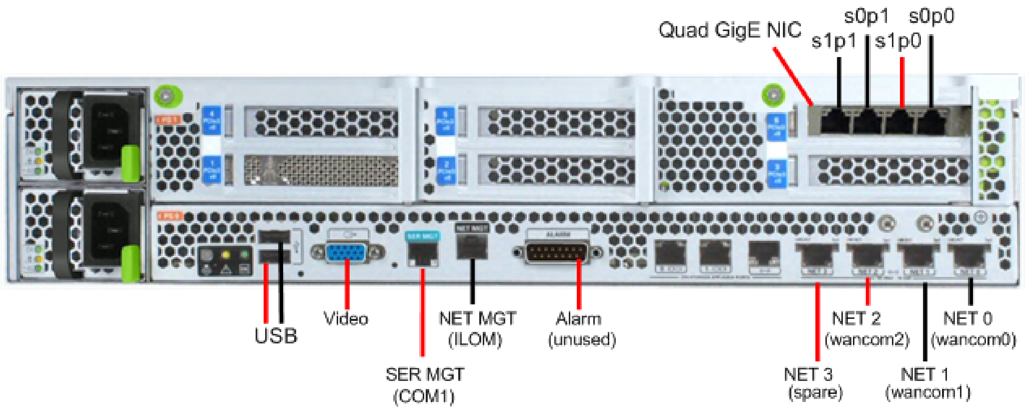
After you mount the Netra Server X3-2 for Acme Packet in an equipment rack and install all components into it, connect all appropriate data cables to the ports before powering the system up and performing the configuration.

Oracle supports the following configurations of the Netra Server X3-2 for Acme Packet (the onboard 10 GigE ports are configured for 1G operation):

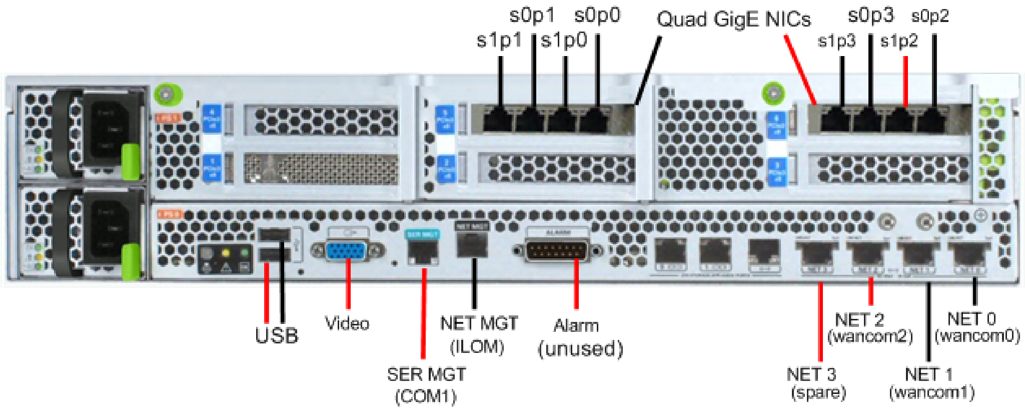
- Configuration A: Four onboard 10 GigE ports and no Quad GigE NIC
- Configuration B: Four onboard 10 GigE ports and 1 Quad GigE NIC
- Configuration C: Four onboard 10 GigE ports and 2 Quad GigE NICs



Netra Server X3-2 for Acme Packet Configuration A (4 Onboard 10 GigE Ports)



Netra Server X3-2 for Acme Packet Configuration B (4 Onboard 10 GigE Ports & 1 Quad GigE NIC)



Netra Server X3-2 for Acme Packet Configuration C (4 Onboard 10 GigE Ports & 2 Quad GigE NICs)

Oracle recommends using Category 6 (or better) for all Ethernet connections.

- You can install and remove Ethernet and 1000BASE-T cables while the Netra Server X3-2 for Acme Packet is operational.
- The system does not require the use of every port for proper operation.
- When a cable gets disconnected and the link is lost, the system generates an alarm.

Available Connections

Please read all of the information for each of the available connections prior to cabling the Netra X5-2 for Communications.

Port	Description	You Need
NET (0-3)	10 GigE ports - labeled Net 3, Net 2, Net 1 and Net 0 (left to right). Enables you to connect the Netra X5-2 to your network.	A Category 6 (or better) Ethernet cable to connect to the NET 0 port to your network Network parameters such as an IP address (can be provided by DHCP services or assigned a static address in the OS) Additional Category 6 (or better) Ethernet cables and Ethernet addresses as needed for additional connections to NET 1 - 3
NET MGT	Provides a 10/100BASE-T Ethernet connection to the Service Processor (SP) through an RJ-45 connector. The NET MGT port provides support connections to the SP using the Oracle Integrated Lights Out Manager (ILOM) CLI and Web interface. By default, the NET MGT port is configured to use DHCP to automatically obtain an IP address. Alternatively, you can assign a static IP address to the NET MGT port. To use the NET MGT port, you must configure its network settings. Once configured, use the NET MGT port IP address to log on to the device using a browser or secure shell.	Category 6 (or better) Ethernet cable to connect the NET MGT port to your network IP address for this port (required from DHCP or a static address)
SER MGT (COM1)	Provides a TIA/EIA-232 serial Oracle/Cisco standard connection to the SP through an RJ-45 connector. Default settings: 8N1: eight data bits, no parity, one stop bit 115200 baud Disable hardware flow control (CTS/RTS) Disable software flow control (XON/XOFF)	A terminal device (e.g., terminal, connection to a terminal server, or computer such as a laptop running terminal emulation software) A cable to connect the terminal device to the SER MGT (COM1) port

Port	Description	You Need
USB	Provides USB connections to the SP. The USB ports are hot pluggable, so you can connect and disconnect USB cables from these ports and peripheral devices without affecting server operations.	USB keyboard USB mouse Note: Maximum USB cable length: 5 meters
VIDEO	Provides a temporary video connection to the SP.	VGA monitor HDB-15 video cable with a maximum cable length of 6 meters (19.7 feet)

Cable the Local Console

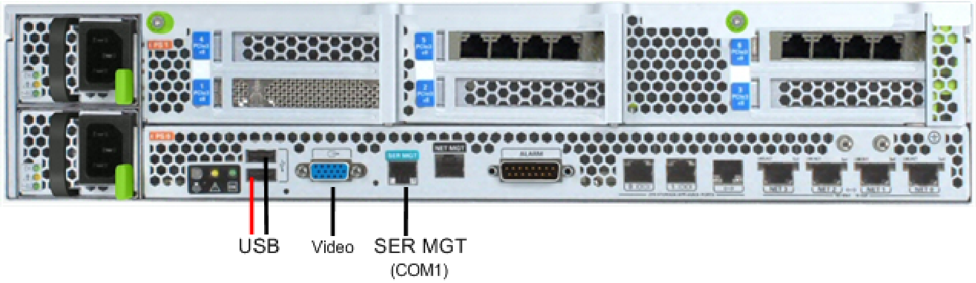
The following procedure explains how to make a physical connection to the Netra Server X3-2 for Acme Packet console.

You can connect the Administration console to either the ILOM (NET MGT), the local VGA+USB console ports, or the local SER MGT (COM1) serial console port. When configuring boot loader parameters, set the console to VGA if you use ILOM or to VGA +USB or COM1 if you use SER MGT. The boot loader is accessible on all console ports, but the Netra Server X3-2 for Acme Packet only recognizes input from the active console port.

> **Caution:**
>
> Do not configure COM2 in the bootparams menu.
>
> - To cable a serial console connection:
>   - Serial console cable with an RJ-45 connector
> - To cable a USB and Video Connection:
>   - DB-15 video cable with a maximum cable length of 6 meters (19.7 feet)
>   - USB cable with a maximum cable length of 6 meters (19.7 feet)
>   - USB keyboard
>   In the following procedure, you have the option to either cable a serial connection or to cable a USB/Video connection.

1. Locate the appropriate cables to connect to the Netra Server X3-2 for Acme Packet.

2. To cable a serial connection, insert the serial console cable into the SER MGT (COM1) port.



Connecting to USB, VGA and SER MGT (COM1) Ports

> **Note:**
>
> Refer to the Netra Server X3-2 hardware documentation for information on how to configure your terminal application to connect to the console, and how to establish communications with the Netra Server X3-2 for Acme Packet.

3. To cable a USB Video connection:
   a. Insert the 15-pin connector on the end of the video cable into the Video port.
   b. Insert the USB cable from the mouse and keyboard into the USB ports.
4. Lead the cables away from the rear panel and connect the cables to their respective destination components.

Cable ILOM

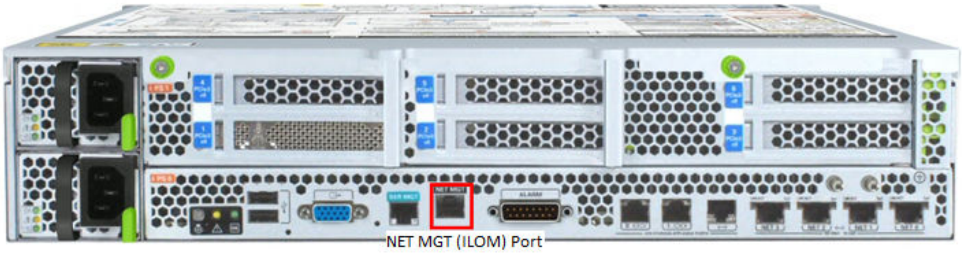
The following procedure explains how to make a connection to the Netra Server X3-2 for Acme Packet Integrated Lights Out Management (ILOM)port. For a remote permanent connection to the SP over the ILOM connection, use the rear panel NET MGT port.

Refer to the Netra Server X3-2 for Acme Packet hardware documentation for information on how to configure your Web browser application to connect to the console, and how to establish communications with the Netra Server X3-2 for Acme Packet.

> **Caution:**
>
> Keep Ethernet cables separated from power cables by at least 60mm where possible and never run them in the same channel of the rack without segregation.
> Prerequisites:
>
> - Category 6 (or better) Ethernet cable with RJ-45 jacks

1. Locate the cable to connect to the Netra Server X3-2 for Acme Packet.

2. Plug the RJ-45 connector into the ILOM port.



3. Lead the cable away from the rear panel, and connect the other end of the cable to the LAN.

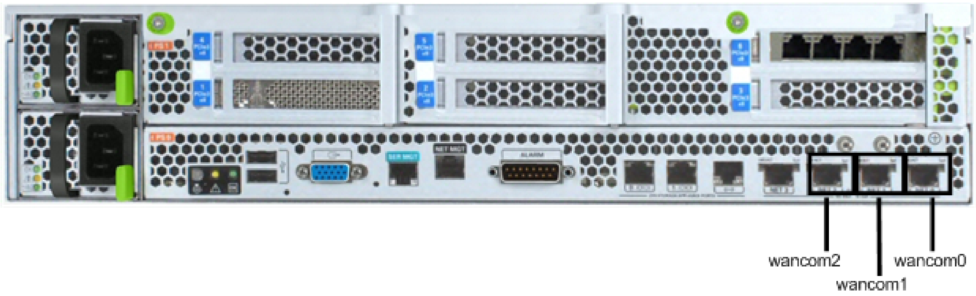
Cable the Network Management Ports

The following procedure describes how to connect cables to the network management ports. These ports support 10/100/1G/10G Mbps speeds.

> **Caution:**
>
> Keep Ethernet cables separated from power cables by at least 60mm where possible and never run them in the same channel of the rack without segregation.
> Prerequisites:
>
> - Category 6 (or better) Ethernet cable with RJ-45 jacks

1. Locate the Ethernet cables you plan to connect to the Netra Server X3-2 for Acme Packet.
2. Insert the RJ-45 connector on the end of the Ethernet cable into the NET0 Ethernet port (**wancom0**). The release tab on the RJ-45 jack clicks into place when you insert it properly.

> **Note:**
>
> The wancom0 and wancom1 ports are common to all supported Netra Server X3-2 for Acme Packet configurations. The wancom2 port is not used on the Oracle ECB.



Network Management Ports

3. Route the cable away from the Netra Server X3-2 for Acme Packet, ensuring that the Ethernet cables are not stretched tightly or subjected to extreme stress.

Cable the Media and Signaling Network Interfaces

The following procedure explains how to cable the media and signaling ports. These ports accept copper GigE connectors.

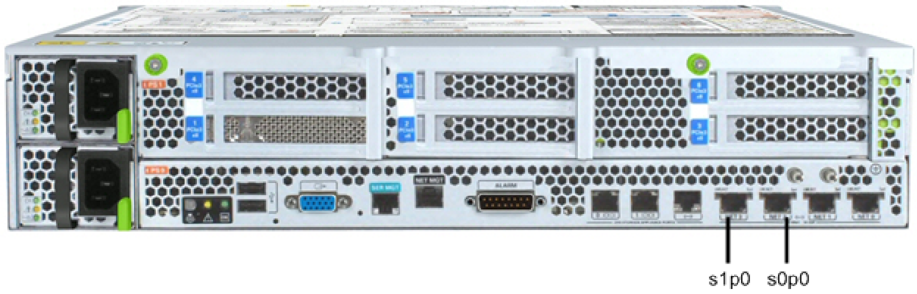
Regardless of configuration, media ports support 10/100/1000BASE-T only. Do not attempt to connect 10GBASE-T equipment to the signaling and media ports.

> **Note:**
>
> Perform all cabling procedures according to the established standards for your organization.

Prerequisites:

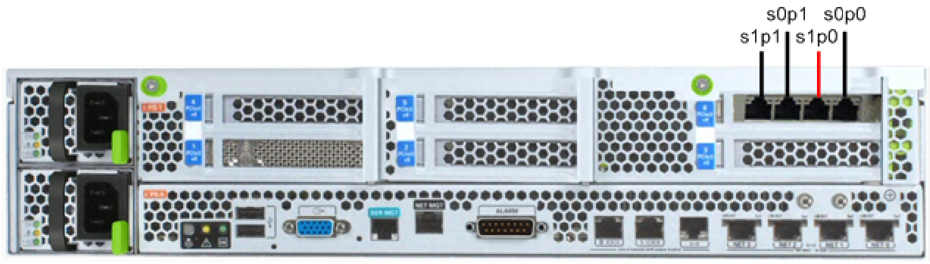
- Category 6 (or better) Ethernet cables with RJ-45 jacks

1. Locate the Ethernet cables you plan to connect to the media and signaling ports of the Netra Server X3-2 for Acme Packet.
2. Insert the RJ-45 connector on the end of the Ethernet cable into one of the 1000BASE-T copper media and signaling ports. The available signaling and media ports depend on the chosen configuration:
   - For configurations with no Quad GigE NICs, two onboard Ethernet ports are available for use as signaling and media ports as shown in the following illustration.



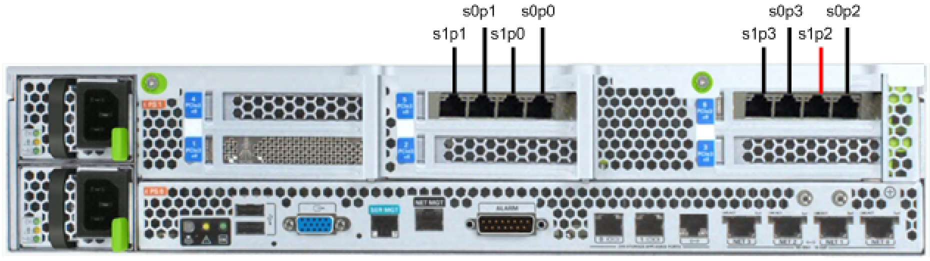
Supported Signaling and Media Ports (4 10 GigE Ports)

   - For configurations with four onboard 10 GigE ports and one Quad GigE NIC, the signaling and media ports include **s1p1, s0p1, s1p0,** and **s0p0** as shown in the following illustration. The release tab on the RJ-45 jack clicks into place when you insert it properly.



Supported Signaling andMedia Ports (4 OB 10 GigE Ports & 1 Quad GigE NIC)

- For configurations with four onboard 10 GigE ports and two Quad GigE NICs, the signaling and media ports include **s1p1, s0p1, s1p0, s0p0, s1p3, s0p3, s1p2** and **s0p2** as shown in the following illustration. The release tab on the RJ-45 jack clicks into place when you insert it properly.



Supported Signaling and Media Ports (4 OB 10 GigE Ports & 2 Quad GigE NICs)

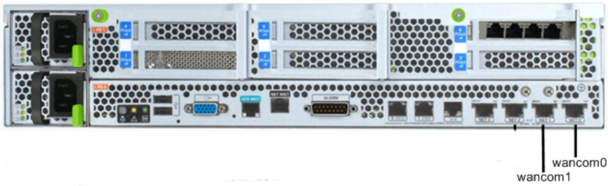
3. Route the cable away from the Netra Server X3-2 for Acme Packet. Make sure that the Ethernet cables are not stretched tightly or subjected to extreme stress.
4. Repeat Steps 1 through 2 for each additional Ethernet cable you connect to the Netra Server X3-2 for Acme Packet.

HA Cabling

Category 6 Ethernet cables are required for cabling two HA nodes together.

Rear Panel Cabling for HA

You can use one connection for High Availability (HA) redundancy support between the two members of an HA node. Oracle recommends reserving **wancom0** as the boot and maintenance interface. You can use **wancom1** for sharing HA information.



4 Onboard 10 GigE Ports & 1 Quad GigE NIC

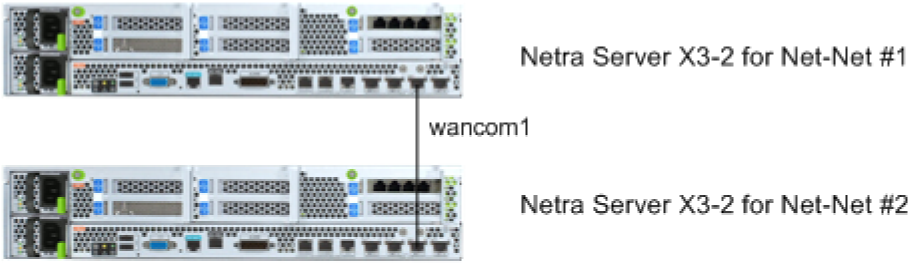
Prerequisites:

- Category 6 (or better) Ethernet cables with RJ-45 jacks

Cable a Single Rear Interface for HA

The following procedure explains how to cable a Netra Server X3-2 for Acme Packet High Availability (HA) node using single rear interface support.

1. Insert one end of an Ethernet cable into **wancom**1 on the rear panel of Netra Server X3-2 for Acme Packet #1. The release tab on the RJ-45 jack clicks into place when you insert it properly.
2. Insert the other end of the Ethernet cable into the corresponding management interface on the rear panel of the Netra Server X3-2 for Acme Packet #2 as shown in the following illustration. For example, If you use **wancom1** on Netra Server X3-2 for Acme Packet #1, then you connect it to **wancom1** on Netra Server X3-2 for Acme Packet #2.


Netra Server X3-2 for Net-Net #1
wancom1
Netra Server X3-2 for Net-Net #2

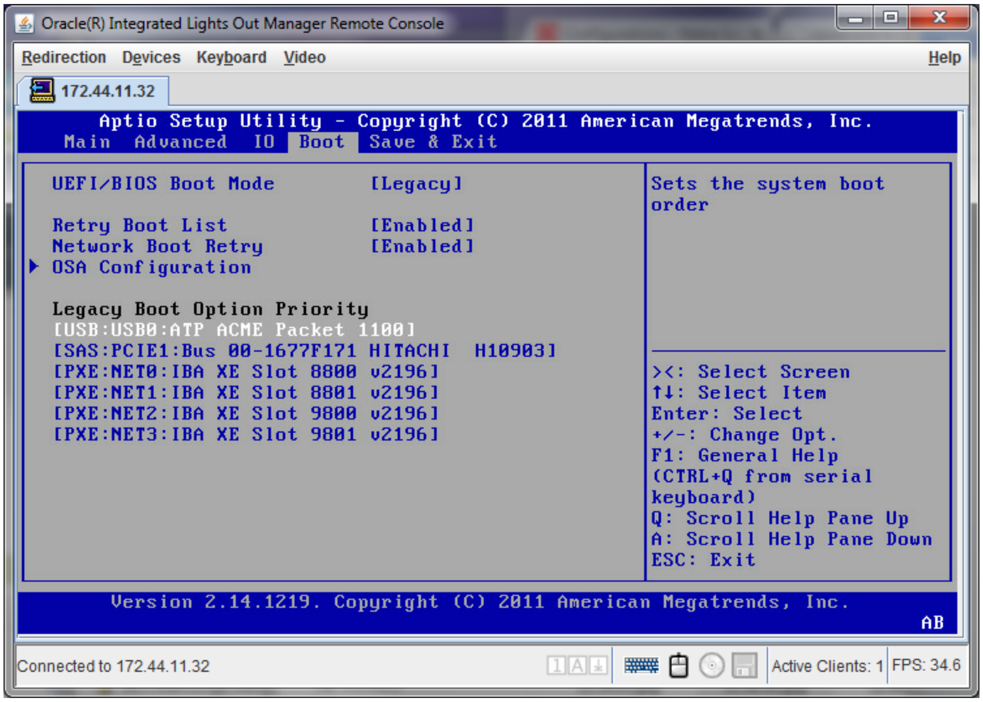
HA Node Using Single Rear Interface Support (No Quad GigE NIC)

Refer to the configuration procedures located in the HA Nodes information in the Configuration Guide.

Configure the BIOS Setting

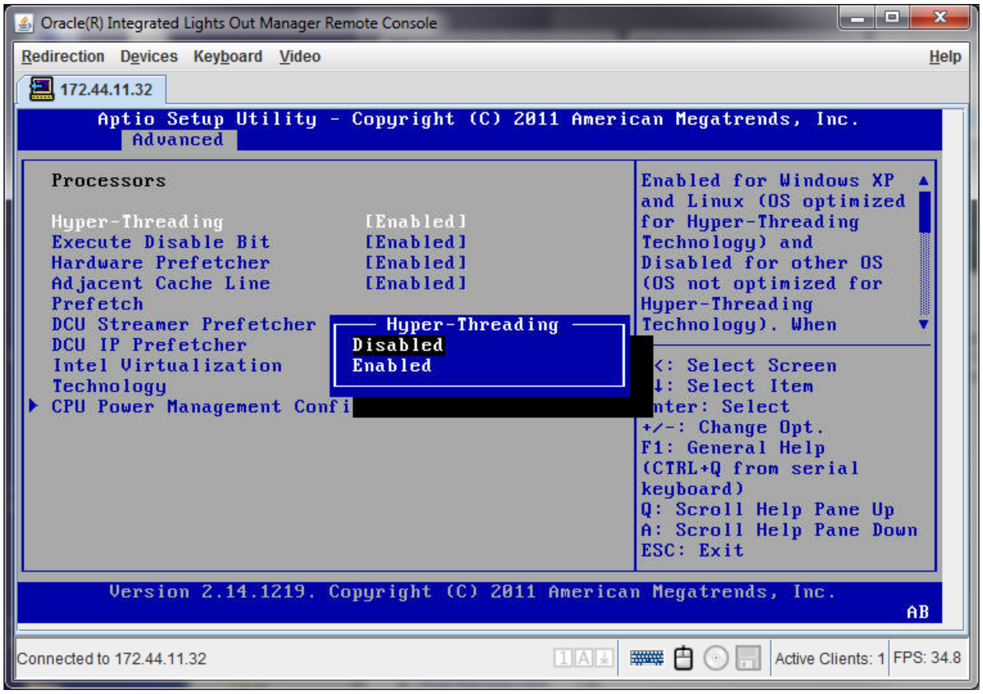
The Netra Server X3-2 requires the following changes to run Oracle Enterprise Communications Broker. This procedure shows where to make changes in the BIOS setup utility.

1. Set the USB slot as the first boot device, making the disk controller the second boot device.


Oracle(R) Integrated Lights Out Manager Remote Console
Redirection Devices Keyboard Video
Help
172.44.11.32

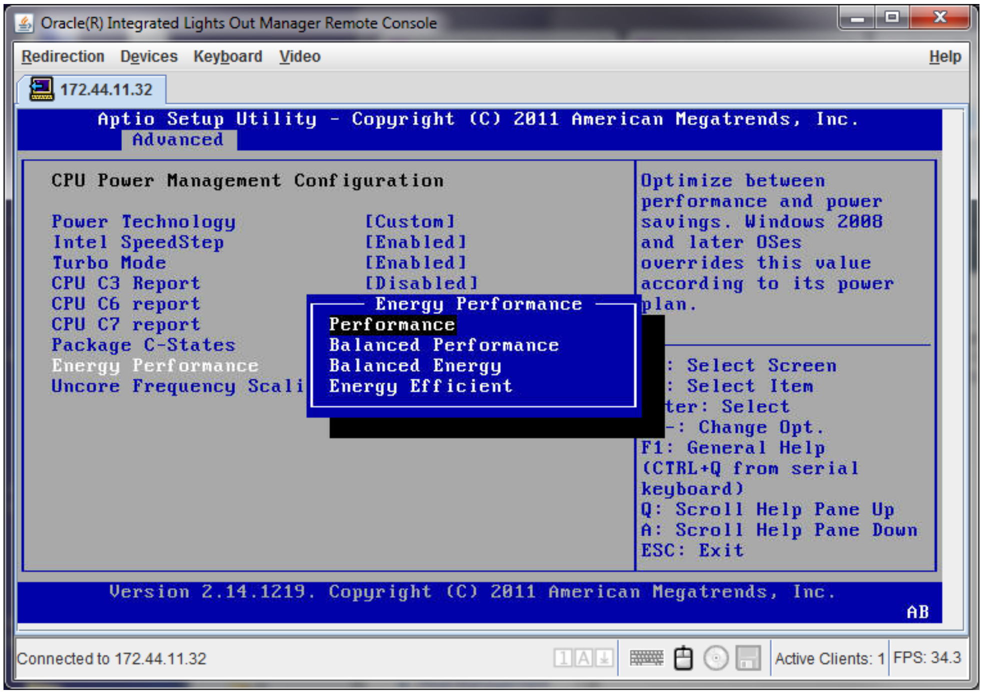
```
      Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
    Main  Advanced  IO  Boot  Save & Exit

  UEFI/BIOS Boot Mode          [Legacy]           Sets the system boot
                                                  order
  Retry Boot List              [Enabled]
  Network Boot Retry           [Enabled]
▶ OSA Configuration

  Legacy Boot Option Priority
  [USB:USB0:ATP ACME Packet 1100]
  [SAS:PCIE1:Bus 00-1677F171 HITACHI  H10903]
  [PXE:NET0:IBA XE Slot 8800 v2196]              ><: Select Screen
  [PXE:NET1:IBA XE Slot 8801 v2196]              ↑↓: Select Item
  [PXE:NET2:IBA XE Slot 9800 v2196]              Enter: Select
  [PXE:NET3:IBA XE Slot 9801 v2196]              +/-: Change Opt.
                                                  F1: General Help
                                                  (CTRL+Q from serial
                                                  keyboard)
                                                  Q: Scroll Help Pane Up
                                                  A: Scroll Help Pane Down
                                                  ESC: Exit

      Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
                                                                      AB
```

2. Set Hyper-Threading to **Disabled**.


Oracle(R) Integrated Lights Out Manager Remote Console
Redirection Devices Keyboard Video
Help
172.44.11.32

```
      Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
         Advanced

  Processors                                     Enabled for Windows XP
                                                 and Linux (OS optimized
  Hyper-Threading             [Enabled]          for Hyper-Threading
  Execute Disable Bit         [Enabled]          Technology) and
  Hardware Prefetcher         [Enabled]          Disabled for other OS
  Adjacent Cache Line         [Enabled]          (OS not optimized for
  Prefetch                                       Hyper-Threading
  DCU Streamer Prefetcher  ┌── Hyper-Threading ──┐ Technology). When
  DCU IP Prefetcher        │ Disabled            │
  Intel Virtualization     │ Enabled             │ <: Select Screen
  Technology               └─────────────────────┘ ↓: Select Item
▶ CPU Power Management Confi                       nter: Select
                                                 +/-: Change Opt.
                                                 F1: General Help
                                                 (CTRL+Q from serial
                                                 keyboard)
                                                 Q: Scroll Help Pane Up
                                                 A: Scroll Help Pane Down
                                                 ESC: Exit

      Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
                                                                      AB
```

3. Change Energy Performance to **Performance**.



```
        Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
           Advanced

  CPU Power Management Configuration                    Optimize between
                                                        performance and power
  Power Technology                [Custom]              savings. Windows 2008
  Intel SpeedStep                 [Enabled]             and later OSes
  Turbo Mode                      [Enabled]             overrides this value
  CPU C3 Report                   [Disabled]            according to its power
  CPU C6 report               ── Energy Performance ──  plan.
  CPU C7 report               Performance
  Package C-States            Balanced Performance
  Energy Performance          Balanced Energy           : Select Screen
  Uncore Frequency Scali      Energy Efficient          : Select Item
                                                        ter: Select
                                                        -: Change Opt.
                                                        F1: General Help
                                                        (CTRL+Q from serial
                                                        keyboard)
                                                        Q: Scroll Help Pane Up
                                                        A: Scroll Help Pane Down
                                                        ESC: Exit

          Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
                                                                       AB
```

Connected to 172.44.11.32   Active Clients: 1   FPS: 34.3

4. After setting Performance, press **Escape** to return to the main menu.
5. Select **Save and Exit** to apply the changes.

   The system reboots using the newly configured settings.

Virtual Systems

The Oracle Enterprise Communications Broker (OECB) Software Only distribution is designed to operate on virtual machines running on generic, off-the-shelf servers. Oracle recommends using the Oracle Virtual Machine (OVM) hypervisor for running the OECB virtual application.

You can install the virtual machine software on the hardware of your choice. The number of VMs supported by a server is constrained only by the resources on your system.

Minimum VM Resources

Each VM instance requires the following minimum allocation or network resources.

- CPU cores: 5
- Memory: 8GB RAM
- Hard drive storage: 40GB
- Interfaces: 4 recommended

> **Note:**
>
> These resources support up to 120,000 users in the database.

If your deployment requires supporting more than 120,000 entries in the user database (up to one million), use the following resources.

- CPU cores: 8
- Memory: 16GB RAM
- Hard drive storage: 40GB
- Interfaces: 4 recommended

Format Hard Drive

Run the command **format-hard-drive**, as described in the *Oracle® Enterprise Session Director Configuration Guide* immediately after successful installation.

2 Appliance Installation and Start-Up

This section outlines hardware installation at a very high level and describes system power-on. It bridges hardware installation and application start-up, presenting information about what to expect from Oracle Enterprise Communications Broker software as the hardware powers up. Administrators need to know how to access the software while it boots, and what successful software startup looks like.

If running the Oracle Enterprise Communications Broker as a virtual application, refer to the hardware vendor's installation instructions for hardware to learn how to access the software while it boots. From a console connection, there is little difference to the way successful startup appears as an appliance versus a virtual machine.

Hardware Installation Summary

Installing your Oracle Enterprise Communications Broker in your rack requires the steps summarized here. This checklist is only an overview. It is not designed to substitute for following the detailed procedures in the hardware installation guides.

1. Unpacking the Oracle Enterprise Communications Broker
2. Installing the Oracle Enterprise Communications Broker into your rack
3. Installing power supplies
4. Installing fan modules
5. Installing physical interface cards
6. Cabling the Oracle Enterprise Communications Broker

   Make sure you complete installation procedures fully and note the safety warnings to prevent physical harm to yourself and/or damage to your Oracle Enterprise Communications Broker.

   After you have completed the hardware installation procedures, you are ready to establish a connection to your Oracle Enterprise Communications Broker. Then you can load the Oracle Enterprise Communications Broker software image you want to use and establish basic operating parameters.

Connecting to The Oracle Enterprise Communications Broker

By default, Oracle delivers the Oracle Enterprise Communications Broker (OECB) with no management IP address. You must set this address the first time you start the system. See the System Boot section.

You can connect to the OECB through a direct console connection or by creating a remote SSH session. Both methods provide a wide range of configuration, monitoring, and management options. IP-based management access, including SSH and the web

GUI, requires an IP address for your management port. This address is specified in the **ip address** boot parameter.

> **Note:**
>
> The system displays the **ip address** parameter with different names, depending on the context:

- The boot parameters wizard field name is also **ip address**.
- The initial configuration wizard field name is **Management interface ip address**.
- The ACLI **show interfaces** command field name is **wancom0**.

By default, SSH, SFTP, and web GUI connections to the OECB are enabled, but are only accessible by way of the **ip address**. You cannot use SSH, SFTP, or the web GUI until you set this address.

Depending on the platform, you may need to install the software installation upon first startup. You perform and monitor software installation by way of the console connection. The OECB requires most configuration by way of the web GUI. Procedures requiring the ACLI include:

- Change default management interface IP address
- Format hard drive
- Set and change password
- Set and change SIP Monitor and Trace filters

Local Connections and Time-outs

The ACLI is available through serial and SSH connections. Prior to software installation, you reach the ACLI through a local, serial connection.

When deploying the Oracle Enterprise Communications Broker (OECB) on a virtual machine, the virtual machine manager provides console access through a virtual serial connection. See documentation on your virtual machine to learn how to access the console. Working with the virtual machine console is the same as working on dedicated hardware.

When deploying on dedicated hardware, refer to the hardware documentation "Applicable Platforms" for instructions on connecting to the OECB console.

Plug one end of the cable into your terminal and the other end into the RJ-45 port, normally located on the back of your server.

To set up a console connection to the OECB:

1. Set the connection parameters for your terminal to the default boot settings:
   - Baud rate: 115,200 bits/second
   - Data bits: 8
   - Parity: No
   - Stop bit: 1

- Flow control: None

2. Use a serial cable to connect your PC to the OECB. Refer to your hardware documentation for the location of your server's serial port.
3. Power on the OECB.

   The system boots. Upon successful boot, the system prompts you to log on.

   ```
   Password:
   ```

4. Enter the appropriate password information when prompted to log into User mode of the ACLI. The default user mode password is **acme**.

   The system displays the ACLI's user mode prompt :

   ```
   ORACLE>
   ```

5. If necessary, enter Superuser mode by entering **enable** at the ACLI and pressing Enter.

   The system ACLI prompts you for the superuser password:

   ```
   ORACLE>enable
   Password:
   ```

6. Enter the appropriate password information to log into Superuser mode of the ACLI. The default Superuser mode password is **packet**.

   The system changes the ACLI prompt to:

   ```
   ORACLE#
   ```

7. Proceed with system configuration or setup.

You can control the amount of time it takes for your console connection to time out by setting the **console-timeout** parameter in the system configuration. When your connection times out, the OECB displays the login sequence again and prompts you for your passwords. The default for this field is 0, which means that no time-out is being enforced.

SSH Connections and Time-outs

You can use SSH to connect to the Oracle Enterprise Communications Broker (OECB) and provision the OECB remotely through the management interface over IP. You configure the management interface IP during system setup, or by way of the OECB boot parameters.

The Oracle Enterprise Communications Broker can support up to five concurrent SSH and SFTP sessions. Note that only one user can carry out configuration tasks at a time.

To connect to the OECB, you need to know the IP address of its administrative interface (wancom0). You can find the OECB wancom0 IP address by using the ACLI to display the boot parameter value named **IP Address**.

You can manage the SSH connections to the OECB by setting certain ACLI parameters and by using certain commands:

- To view the users who are currently logged into the system, use the **show users** command. You can see the ID, timestamp, connection source, and privilege level for active connections.
- From Superuser mode in the ACLI, you can terminate the connections of other users to free up connections. Use the **kill user** command, with the corresponding connection ID.
- When you reboot the OECB from an SSH session, you lose IP access and the connection.

Initiate SSH without Username and Password

Many SSH clients allow you to initiate an SSH connection without specifying a username. To initiate an SSH connection to the Oracle Enterprise Communications Broker (OECB) without specifying usernames and SSH user passwords:

1. Open your SSH client.
2. At the prompt in the SSH client, type the **ssh** command, a space, the IPv4 address of your Oracle Enterprise Communications Broker, and press Enter.

   The SSH client prompts you for a password before connecting to the OECB. Enter the OECB User mode password. After authentication, an SSH session is initiated and you can continue with tasks in User mode or enable Superuser mode.

   Note that some clients interpret SSH session initiation without a Username as a means of logging in with your system login name. The preceding procedure does not work for such clients.

   > **Note:**
   >
   > You can also create connections to the OECB using additional Username and password options.

SSH with Username and Password

To initiate an SSH connection to the Oracle Enterprise Communications Broker with an SSH username and password:

1. In the ACLI at the Superuser prompt, type the **ssh-password** and press Enter. Enter the name of the user you want to establish. Then enter a password for that user when prompted. Passwords do not appear on your screen.

   ```
   SYSTEM# ssh-password
   SSH username [saved]: MJones
   Enter new password: 95X-SD
   Enter new password again: 95X-SD
   ```

> **Note:**
>
> After you configure ssh-password, the SSH login accepts the username and password you set, as well as the default SSH/SFTP usernames: `User` and `admin`.

2. Configure your SSH client to connect to your Oracle Enterprise Communications Broker's management IPv4 address using the username you just created. The standard version of this command would be:

   ```
   ssh -l MJones 10.0.1.57
   ```

3. Enter the SSH password you set in the ACLI.

   ```
   MJones@10.0.2.54 password: 95X-SD
   ```

4. Enter your User password to work in User mode on the Oracle Enterprise Communications Broker. Enable Superuser mode and enter your password to work in Superuser mode.
5. An SSH session window opens and you can enter your password to use the ACLI.

GUI Access

To access theOracle Enterprise Communications Broker (OECB) for ongoing configuration and management, you must use the GUI. The system allows only a few user and provisioning procedures by way of the ACLI, such as setting the initial management IP address and changing GUI access passwords. The system does not allow disabling the GUI.

You can configure GUI access by way of HTTP or HTTPS at the configured management address, which you must set prior to attempting to log on.

When a user accesses the GUI, the OECB displays the log on screen. Upon successful log on, the system allows access to the System Administration and Service Provisioning controls.

Setting Your Login Banner

The Oracle Enterprise Communications Broker allows the user to create and edit the message displayed in the Login banner dialog, which appears upon successful login.

1. Click the **Configuration** tab.

   The Oracle Enterprise Communications Broker displays the configuration panel.
2. Click the **Wizards** dropdown.

   The Oracle Enterprise Communications Broker displays the widget menu panel.
3. Click the **Set login banner** link.

   The Oracle Enterprise Communications Broker displays the **Set login banner** dialog, which includes a text box allowing the user to write a login message.
4. Type your banner text and click the **Save** button to set the banner.

   The Oracle Enterprise Communications Broker sets the login banner.

System Boot

Whenever your Oracle Enterprise Communications Broker boots, the following information about the tasks and settings for the system appear in your terminal window.

- System boot parameters
- From what location the software image is being loaded: an external device or internal flash memory
- Requisite tasks that the system is starting
- Log information: established levels and where logs are being sent
- Any errors that might occur during the loading process

After the loading process is complete, the ACLI login prompt appears.

> **Note:**
>
> You can set boot parameters using the ACLI or the GUI. Boot parameter definitions, which help you understand what you should set them to, are provided below.

Oracle Enterprise Communications Broker Boot Parameters

Boot parameters specify the information that your Oracle Enterprise Communications Broker uses at boot time when it prepares to run applications. The Oracle Enterprise Communications Broker’s boot parameters:

- Allow you to set the IP address for the management interface (wancom0).
- Allow you to set a system prompt. The target name parameter also specifies the title name displayed in your web browser and SNMP device name parameters.
- Determine the software image to boot and from where the system boots that image.
- Sets up the username and password for network booting from an external FTP server.

In addition to providing details about the Oracle Enterprise Communications Broker’s boot parameters, this section explains how to view, edit, and implement them.

When displaying the boot parameters, your screen shows a help menu and the first boot parameter (boot device). Press Enter to continue down the list of boot parameters.

Upload the Stage 3 Boot Loader and System Image

Whenever you upgrade the software image, upload the Stage 3 boot loader and the new system image file to the system.

The Stage 3 boot loader is generally backward compatible with previous releases, but Oracle recommends that you install the Stage3 boot loader from the same Major.Minor version as the system image. It is not normally necessary to update the boot loader when installing a maintenance or patch release when the Major.Minor release is the same.

System upgrades typically consist of transferring the new system image and Stage 3 boot loader to the system and setting boot parameters to the new system software. To ensure compatibility, copy the Stage 3 boot loader to `/boot/bootloader` before you update the boot parameters to use the new software image file. You must name the boot loader file `/boot/bootloader` on the target system with no file extension. When upgrading an HA pair, you must perform the upgrade procedure on each HA node.

Use the following procedure to upload the Stage 3 boot loader and system image.

1. Obtain the Stage 3 boot loader image file (*.boot).
2. Upload the Stage 3 boot loader image file (*.boot) as `/boot/bootloader` to your system using an SSH File Transfer Protocol (SFTP) client.
3. Upload the new system software image (*.bz) to /boot/.
4. Validate the boot loader by rebooting the Oracle Enterprise Communications Broker after renaming the boot loader.

```
[Downloads]$ ls -la
total 148820
drwxr-xr-x  2 bob src     4096 Jun 17 15:16 .
drwxr-xr-x 28 bob src     4096 May 21 14:17 ..
-rw-r--r--  1 bob src 10164527 Jun 17 15:15 nnPCZ300.64.boot
-rw-r--r--  1 bob src 73849839 Jun 17 15:15 nnPCZ300.64.bz
[Downloads]$ sftp admin@123.45.67.890
admin@123.45.67.890's password:
Connected to 123.45.67.890.
sftp> cd /boot
sftp> put nnPSCZ300.64.boot
Uploading nnPCZ300.64.boot to /boot/nnPCZ300.64.boot
nnPCZ300.64.boot                              100% 9926KB   9.7MB/s   00:01
sftp> rm /boot/bootloader
sftp> rename nnPCZ300.64.boot /boot/bootloader
sftp> put nnPCZ300.64.bz
Uploading nnPCZ300.64.bz to /boot/nnPCZ300.64.bz
nnPCZ300.64.bz                                100%   70MB  14.1MB/s   00:05
sftp> bye
Received disconnect from 123.45.67.890: 11: Logged out.
[Downloads]$
```

Note:

The Stage 3 boot loader is ready for operation after upload and filename change, but validating it before booting the new system software is good practice.

Boot Parameter Changes

You can access and edit boot parameters by using either the ACLI or by interrupting the system boot process.

> **Note:**
>
> Changes to boot parameters do not go into effect until you reboot the Oracle Enterprise Communications Broker.

Oracle recommends that you use management port 0 (wancom0) as the boot interface, and that your management network is either:

- directly a part of your LAN for management port 0
- accessible through management port 0

Otherwise, your management messages may use an incorrect source address.

Set Boot Parameters Wizard

The Oracle Enterprise Communications Broker (OECB) requires you to enter the necessary parameters to boot the system in your deployment.

You can set the OECB boot parameters from the Set Boot Parameters Wizard on the Web GUI in either Basic mode or Expert mode.

1. Access the Set Boot Parameters Wizard: **Configuration**, **Wizards**, **Set Boot Parameters**.
2. In the Set Boot Parameters dialog, enter the following information:

Boot File	Name of the image file.
IP Address	Enter the IP address of the OECB.
VLAN	Range: 0-4095
Net Mask	Enter the net mask IP address in dot decimal format. For example, 255.255.0.0.
Gateway	Internet address of the boot host. Leave blank if the host is on the same network.
IPv6 Address	Enter the IPv6 address that you want to use.
IPv6 Gateway	Enter the IPv6 gateway that you want to use.
FTP Host IP	Enter the IP address of the FTP host.
FTP Username	Enter the FTP username for the FTP user on the boot host.
FTP Password	Enter the FTP password for the FTP user on the boot host.
Flags	Hexadecimal. Always starts with 0x. See "Configurable Boot Loader Flags."

Target Name	Name of the OECB, as displayed at the system prompt.
Console Device	Enter the type of console device. For example, VGA.
Console Baud Rate	Select a console baud rate from the drop-down list.
Other	For miscellaneous and deployment-specific boot settings.

3. Click **Complete**.

   The system displays a success message.

4. Click **OK**.

Configurable Boot Loader Flags

You may configure the following boot flags in the boot loader:

- 0x04 - disables autoboot timeout (ap3820 and ap4500 only)
- 0x08 - extend autoboot countdown timer to 15 seconds
- 0x40 - use DHCP for wancom0 (VM Edition only)
- 0x80 - network boot using TFTP instead of FTP

Change Boot Parameters from the ACLI

To access and change boot parameters from the ACLI:

1. In Superuser mode, type configure terminal, and press Enter.

   ```
   ORACLE# configure terminal
   ```

2. Type bootparam, and press Enter. The boot device parameters display.

   ```
   ORACLE(configure)# bootparam
   '.' = clear field;  '-' = go to previous field;  ^D = quit
   Boot File        : /boot/nnPCz100.gz
   ```

   To navigate through the boot parameters, press Enter and the next parameter appears on the following line.

   You can navigate through the entire list this way. To go back to a previous line, type a hyphen (-) and press Enter. Any value that you enter entirely overwrites the existing value and does not append to it.

3. To change a boot parameter, type the new value that you want to use next to the old value. For example, if you want to change the image you are using, type the new filename next to the old one. You can clear the contents of a parameter by typing a period and then pressing Enter.

   ```
   ORACLE(configure)# bootparam
   '.' = clear field;  '-' = go to previous field;  ^D = quit
   Boot File        : /boot/nnPCz100.gz /boot/nnPCz200.gz
   ```

When you have scrolled through all of the boot parameters, the system prompt for the configure terminal branch displays.

```
ORACLE(configure)#
```

4. Exit the configure terminal branch.
5. Reboot the Oracle Enterprise Communications Broker for the changes to take effect.

   The ACLI **reboot** and **reboot force** commands initiate a reboot. With the **reboot** command, you must confirm that you want to reboot. With the **reboot force** command, you do not have make this confirmation.

   ```
   ORACLE# reboot force
   ```

   The Oracle Enterprise Communications Broker completes the full booting sequence. If necessary, you can stop the auto-boot at countdown to fix any boot parameters.

   If you configured boot parameters correctly, the system prompt displays and you can go ahead with configuration, management, or monitoring tasks.

   > **Note:**
   >
   > If you configured the boot parameters incorrectly, the Oracle Enterprise Communications Broker goes into a booting loop and displays an error message.
   >
   > ```
   > Error loading file: errno = 0x226.
   > Can't load boot file!!
   > ```
   >
   > Press the space bar to stop the loop. Correct the error in the boot parameter, and reboot the system.

Change Boot Parameters by Interrupting a Boot in Progress

To access and change boot parameters by interrupting a boot in progress:

1. When the Oracle Enterprise Communications Broker is in the process of booting, you can press the space bar on your keyboard to interrupt when you see the following message appear:

   ```
   Press the space bar to stop auto-boot...
   ```

2. After you stop the booting process, you can enter the letter p to display the current parameters, the letter c to change the boot parameters or the @ (at-sign) to continue booting.

   ```
   [Acme Packet Boot]: c
   '.' = clear field;  '-' = go to previous field;  ^D = quit
   Boot File        : /boot/bzImage-bones64
   ```

To navigate through the boot parameters, press Enter and the next parameter appears on the following line.

You can navigate through the entire list this way. To go back to a previous line, type a hyphen (-) and press Enter. Any value that you enter entirely overwrites the existing value and does not append to it.

3. To change a boot parameter, type the new value that you want to use next to the old value. For example, if you want to change the image you are using, type the new filename next to the old one.

   ```
   [Acme Packet Boot]: c
   '.' = clear field;  '-' = go to previous field;  ^D = quit
   Boot File        : /boot/bzImage-bones64 /boot/bzImage.gz
   ```

4. After you have scrolled through the complete list of boot parameters, you return to the boot prompt. To reboot with your changes taking effect, type @ (the at-sign), and press Enter.

   ```
   [Acme Packet Boot]: @
   ```

   The Oracle Enterprise Communications Broker completes the full booting sequence, unless there is an error in the boot parameters.

   If you have configured boot parameters correctly, the system prompt displays and you can go ahead with configuration, management, or monitoring tasks.

   Note:

   If you have configured the boot parameters incorrectly, the Oracle Enterprise Communications Broker goes into a booting loop and displays an error message.

   ```
   Error loading file: errno = 0x226.
   Can't load boot file!!
   ```

   Press the space bar to stop the loop. Correct the error, and reboot your system.

Set Management IP Address

You must manually set your management IP address within the Oracle Enterprise Communications Broker's boot parameters.

To set your management interface IP, access the boot parameters using a serial console connection within the context of one of the methods described above.

1. Type the letter c (change) to start boot parameter editing.
2. Press Enter until you reach the parameter named **IP Address**.
3. Type in the desired IP address.
4. Press Enter until you reach the end of the boot parameter list.
5. Reboot your Oracle Enterprise Communications Broker.

After being set, the management interface IP address provides access to your system via ssh and the web GUI. You can verify the status of this interface using the following command to display the address and status of wancom0.

```
Oracle ECB# show interfaces brief
Slt Prt Vlan Interface  IP                     Gateway             Adm
Oper
Num Num   ID Name       Address                Address             Stat
Stat
--- --- ---- ---------- ---------------------- ------------------- ----
----
-   -    -   lo         127.0.0.1              -                    up
up
-   -    -   wancom0    122.30.204.127/16      -                    up   up
0   0    0   M00        122.170.1.200/16       0.0.0.0              up
up
---------------------------------------------------------------------------
-
Oracle ECB#
```

Format Hard Drive

Manual software installation, performed on virtual and COTs machines, does not include formatting the hard drive automatically. After manual software installation and boot parameter configuration, the user must format the hard drive from the ACLI.

Generic installation documentation may not include the requirement to format the hard-disk. Run the command **format hard-disk** from the Oracle Enterprise Communications Broker ACLI to create a persistent partition for your /opt directory, within which you can store data needed after a reboot. Perform this procedure the FIRST time you start your Oracle Enterprise Communications Broker.

Partial output is presented below. Be sure to accept all defaults presented during the format by typing the letter **y** when prompted.

```
ORACLE# format hard-disk
WARNING: Please ensure device is not currently in use by any applications
before proceeding
Continue [y/n]?: y
The following system partitions will now be created:
1: /opt 8000000 bytes
2: /crash 16218284032 bytes
Create the system partitions and filesystems as configured above [y/n]?: y
```

After the drive(s) are formatted, the system mounts the newly created partitions.

System Image Filename

The system image filename is a name you set for the image. This is also the filename the bootloader uses whenever booting your system. This filename must match the filename specified in the boot parameters. When your image is located on your Oracle Enterprise Communications Broker, the parameter should start with `/boot/` to indicate that the Oracle Enterprise Communications Broker is booting from it's local /boot directory.

If the filename set in the boot parameters does not point to the image you want sent to the Oracle Enterprise Communications Broker via SFTP, then you could not only fail to load the appropriate image, but you could also load an image from a different directory or one that is obsolete for your purposes. This results in a boot loop condition that you can fix by stopping the countdown, entering the appropriate filename, and rebooting the Oracle Enterprise Communications Broker.

Initialize the System

The Oracle Enterprise Communications Broker (OECB) requires initialization upon the first startup. You can initialize the OECB from the GUI.

> **Caution:**
>
> If you ever need to initialize the system again, be aware that all configuration is lost during initialization and that the system reboots when you click **Complete**.

If you plan to configure High Availability (HA), note that you use the Set Initial Configuration wizard to configure the primary OECB first. Upon successful configuration of the primary, HA operations begin as soon as you complete the Set Initial Configuration on the secondary OECB.

1. To initialize the system, navigate to the Configuration screen and select the **Set initial configuration** wizard from the wizard drop-down list.

   The system displays the Configure system dialog.

2. On the Configure System dialog, do the following:

High Availability mode	Select one of the following modes: • standalone—You want to deploy a single OECB. • high availability—You want to deploy OECBs in pairs, connecting them together and configuring one as primary and the other as a secondary.
Unique target name of this ECB	Type the name of this system. This setting has an operational impact on your high availability configuration.
Management interface IP address	Type the IP address to use for accessing the Web GUI, and press Enter.
Management interface subnet mask	Type subnet mask to use for accessing the Web GUI, and press Enter.
Management interface gateway IP address	Type the IP address to use for reaching this network's gateway, and press Enter.
SIP interface VLAN ID	Type the VLAN ID, if any, required for operation on the network of your SIP interface. Range: 0-4095

SIP interface IP address	Type the IP address to use for accessing the SIP interface, and press Enter. This step is required.
SIP interface subnet mask	Type subnet mask to use for accessing the SIP interface, and press Enter.
Setup system time zone	Select one of the following settings: • Yes—to set the system time zone. • No-to skip setting the system time zone.
System time zone	Select your time zone from the drop-down list.
Session capacity	Type the number of sessions you purchased for this OECB.

3. Click **Complete** to proceed with deleting the existing configuration, setting the values in your wizard, and rebooting your OECB.

Schema Changes

The Oracle Enterprise Communications Broker (OECB) requires the PCZ3.1.0 configuration schema to support creating multiple VLANS. You must upgrade the configuration schema after you upgrade the software.

After upgrading the software to PCZ3.1.0, the system prompts you to upgrade the configuration schema the first time you log on. The configuration upgrade creates a network called "ecb" and a SIP interface with the Realm ID set to "ecb." The upgrade also exposes the Realm ID parameter in the session agent, SIP interface, LDAP, and ENUM configurations. The configuration upgrade defaults all Realm IDs to "ecb" for existing configuration elements. After the system creates the "ecb" network and adds Realm ID parameter, you can add up to four VLANs. You can set the Realm ID, as needed, in the newly added VLANs.

The updated schema makes the following changes to the GUI to support configuring multiple VLANs.

Networks Configuration

The relationship between networks and SIP interfaces is one-to-one, where the network realm-id must be unique in each SIP interface configuration. Formerly, the Networks configuration page displayed all of the necessary parameters in a static format because the system supported only one network. Now, the Networks page differs because it displays the multi-instance configuration dialog, so that you can configure multiple networks with unique parameters. When you click **Add** on the Networks page, the OECB displays the Network settings page with all of the necessary parameters and the functionality to create more than one network. The Networks page also includes the following newly added parameters:

- Realm Identifier - The name of the interface, which must be unique in each configuration. Default: None. Valid values: Any.
- Enable REFER Termination - Terminate and process SIP REFER messages as call transfers to avoid proxying the REFER back to the User Agent. Default: Disabled.

- Send NOTIFY for REFER provisional responses - Send 202 Accepted and 180 Ringing NOTIFY messages for REFER provisional responses. Default: None. Valid values: all | initial | none.
- Enable TOS marking - Mark all egress SIP signaling packets for ToS on this interface. Default: Disabled.
- TOS value - Set the RFC 2475 compliant value that you want the OECB to insert in all egress SIP signaling traffic from this interface. Default: 0x00. Valid values: Any integer in decimal or hexadecimal format.

SIP Interface Configuration

Because previous releases supported only a single SIP Interface, all general SIP configuration elements were included in the Interfaces configuration. Now, with support for up to four SIP Interfaces, you must configure certain parameters uniquely for each interface.

New sip-config Object

To support configuring multiple VLANs, Oracle modified the "Interfaces" configuration by moving the following parameters into the newly added "Sip-config" object. (Configuration, Interface, sip-config). .

- Enum sag match—Use to enable and disable Session Agent Group matching, where the ECB considers session agent groups as part of the response from the ENUM server. Default: disabled. Valid selections: enabled | disabled.
- Default context—Use to set the default context the system uses for a call when it is unable to identify the source context by way of any other method. Default: Empty. Valid values: Name of a valid, existing dial context.
- Parallel forking—Use to enable and disable the system to fork all sessions to all contacts in an Agent of Record. Default: disabled. Valid values: enabled | disabled.
- Fork group timeout—Use to set the time, in seconds, after which the system tries the next fork group with the highest priority. Default: 0. Range: 0-32.
- Ascii based routing—Use to enable and disable routing based on alphanumeric entries in the User database. Default: disabled. Valid values: enabled | disabled.
- Proxy registration—Use to enable or disable the system to accept a registration from an unauthorized domain, and proxy the registration to the intended registrar. Default: disabled. Valid selections: enabled | disabled.

New SIP ports Configuration Dialog

Formerly, the SIP port was a stand alone parameter specified outside of the SIP interface configuration because there was only one SIP interface. Starting with PCZ3.1.0, you must configure a SIP port for each SIP interface. For this reason, the SIP interface configuration now includes the multi-instance SIP Ports configuration dialog where you set the following:

- Address-The IP address of this interface.
- Port-The port for this interface. Default: 5060. Range: 0-65535.
- Transport protocol-Default: UDP. Valid values: UDP, SCTP, TCP, and TLS.
- Allow anonymous (Formerly; Allow Session Agents and Registered End Points Only)-Set the criteria for accepting and processing a SIP request from another SIP element. Default: All. Valid values: All (allow all anonymous requests) | Registered (Allow session agents and registered endpoints.)

Agents Configuration

PCZ3.1.0 exposes the RealmID parameter in the Agents configuration. The configuration upgrade sets Realm ID to "ecb" for existing Agent configurations. You can set the Realm ID, as needed, for newly added VLANs.

LDAP Configuration

PCZ3.1.0 exposes the RealmID parameter in the LDAP configuration. The configuration upgrade sets Realm ID to "ecb" for existing LDAP configurations.

> **Note:**
>
> Only the "ecb" realm can support LDAP.

ENUM Configuration

PCZ3.1.0 exposes the RealmID parameter in the ENUM configuration. The configuration upgrade sets Realm ID to "ecb" for existing ENUM configurations. You can set the Realm ID, as needed, for newly added VLANs.

Adding a License with the Set License Wizard

TLS is the only software feature for which you need a license on the Oracle Enterprise Communications Broker. You must obtain a TLS license before you can add it. To obtain a license, you must present the correct system serial number to Oracle for your license to be generated.

1. From Configuration home, select **Set license** from the **Wizards** drop-down list.

   The Oracle Enterprise Communications Broker displays the **Set license** dialog.

2. Copy the serial number for your Oracle Enterprise Communications Broker and contact your customer support by logging into My Oracle Support or calling Oracle Customer support to make the request. Oracle replies shortly after with your license.

3. Having received your license from Oracle, enter your license in the Add license field.

   The system checks the license and, if correct, installs it. If the license is incorrect, the system tells you.

Setting Up System Basics

Before configuring and deploying your Oracle Enterprise Communications Broker, you might want to establish some basic attributes such as new User and Superuser passwords and system prompt.

New User and Superuser Passwords

Acme Command Line (ACLI) passwords provide access for SSH, SFTP, and GUI sessions. Common security practices include changing these passwords from their defaults, and at intervals defined by your organization. Refer to the ACLI `secret` command, documented in the *Oracle Communications Session Border Controller ACLI Reference Guide*, for information about changing user and superuser passwords. Refer to the "Password Policy" section in the *Administrative Security Essentials Guide* for information about password requirements and policy configuration.

New System Prompt

You can set the ACLI system prompt using **Configure system** or the **Set boot parameters** Wizard. Change the **target name** value to make it meaningful within your network. The target name may be up to 38 characters. A value that identifies the system in some way is often helpful.

3

Initial Configuration

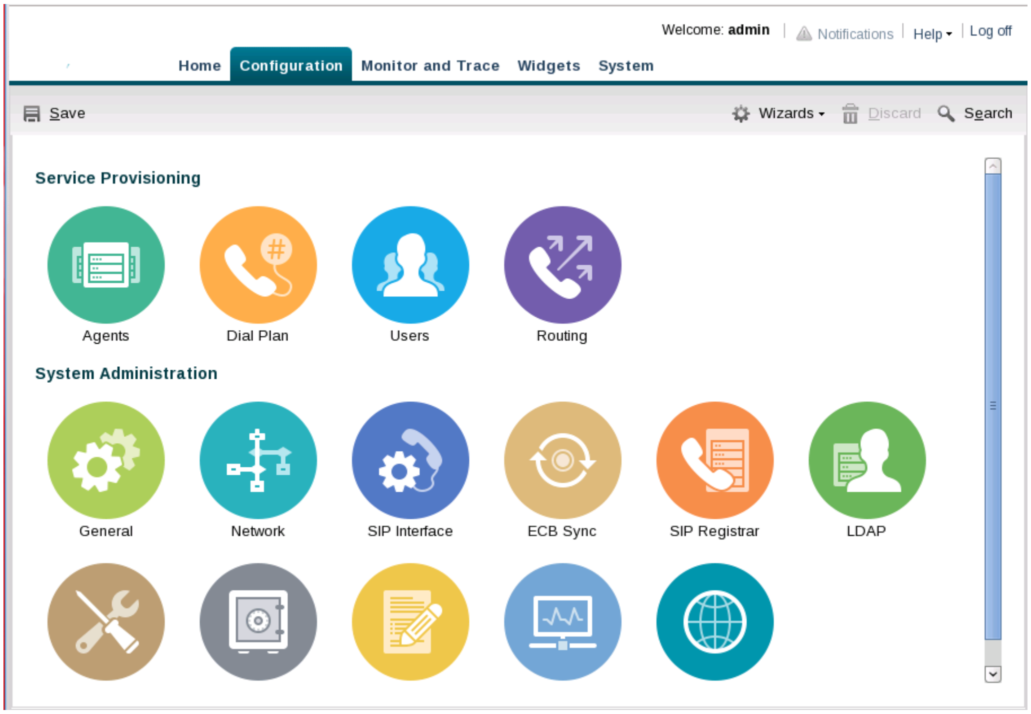
The initial configuration establishes system operations. You can perform the initial configuration of the Oracle Enterprise Communications Broker (OECB) from the GUI.

After you establish system operations, refer to the *Oracle Enterprise Communications Broker User's Guide* and the *Oracle Enterprise Communications Broker User's Guide* to configure SIP services and operations, as well as system file management and administrative functions.

System Administration

The Oracle Enterprise Communications Broker (OECB) GUI displays controls for administering the system under System Administration. In contrast, The OECB GUI displays tools used by network architects and service provisioning technicians under Service Provisioning. Service provisioning is the focus of the *Oracle Enterprise Communications Broker User's Guide*.

See "Configuration Icons" for an explanation of each icon.



Configuration Icons

The following information provides high-level descriptions of the Service Provisioning and System Administration controls on theOracle Enterprise Communications Broker (OECB) Configuration tab.

Service Provisioning

The Service Provisioning icons provide access to the configuration objects used to provision service.

- Agents—Add agents that specify SIP and ENUM devices. An agent is usually a SIP-aware device that serves as a transit target or source for signaling managed by the Oracle Enterprise Communications Broker. Agents are often specified as next-hops for the purposes of routing.
- Dial plan—Add multiple dialing-contexts and dial-patterns. Dialing-contexts define the system behavior for calls placed to and from either a corporate of geographic focus. Dialing-contexts include multiple dial-patterns, which define the normalization required to most effectively manage diverse signaling structures.
- Users—Add user and other key phone numbers associated with the enterprise. The user database can specify each entry's number or pattern, dialing context, agent, and policy, which can provide a starting point for processing the logic behind a user's call treatment.
- Policy—Add policies that specify the codec and time conditions, as well as the routing, redirect, outbound translation, constraints, header normalization, and cnam masking actions.
- Routing—Add routing tables. Routing entries specify strict paths for signaling traffic, allowing you to specify policy and cost for traffic based on source and destination.

System Administration

The System Administration icons provide access the objects used to configure system operation.

- General—Specify standard system management information parameters, such as system identification information, system management information interfaces (SNMP and Syslog), and global service configurations including Denial of Service and High Availability settings.
- Network—Specify your network and High Availability settings, and add host routes.
- SIP Interface—Specify the SIP interface and add SIP service ports. Configure SIP monitoring and SIP monitoring filters.
- ECB Sync—Specify Sync configuration settings and add Sync agents. Provides control over multiple Oracle Enterprise Communications Broker synchronization processes, including defining applicable Oracle Enterprise Communications Brokers and initiating the synchronization.
- SIP Registrar—Create and manage a SIP registrar object on the Oracle Enterprise Communications Broker to offload Agent of Record registration processes from other network elements.
- LDAP—Define servers and server access rules for using an external LDAP database as a source for user authentication and routing procedures.
- HMR—Create header manipulation rules that change session service messages for interoperability, policy, and other deployment purposes.

- Security—Configure login authentication, certificate records, and TLS profiles. Generate certificate requests and import certificates. Add a public key. Enable audit logging.
- Accounting—Configure connections to RADIUS servers to collect Call Detail Records (CDR) generated by the system.
- SNMP—Specify SNMP community for allowing access to READ functions and trap receivers.
- Web Server—Specify web server functionality, including HTTP and HTTPS operation. Specify the applicable TLS profile and inactivity timeout.

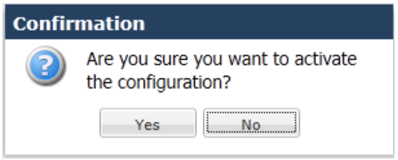
Save and Activate

The GUI retains configuration changes until you send them to your device or discard them from the GUI. Configuration dialogs include an **OK** button that sends your changes to the device.

You must also Save, then Activate your changes before your device can apply your changes. The Save link, appearing as a disc icon towards the top left corner of each GUI page, initiates configuration Save and Activate procedures to the system.

When you click Save, the GUI either saves the configuration to your device or prevents you from saving invalid data. The system highlights any fields containing invalid data, allowing you to find and correct the mistake.

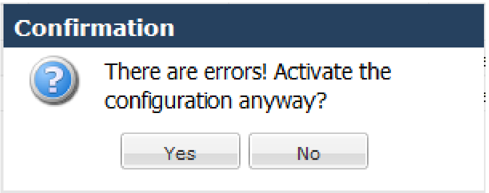
After the save is complete, the GUI displays a dialog asking you if you want to activate this configuration. Note that you can save without activating, for example, when you want to wait for a preferred maintenance window to apply the changes to avoid any service disruption.



Are you sure you want to activate the configuration?

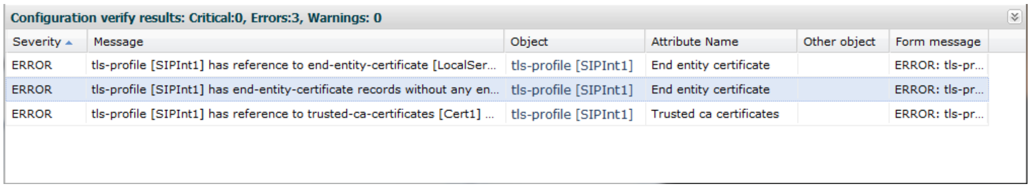
The confirmation dialog defaults to “No,” which leaves your changes saved to your system but not activated. Select "No" if you want to activate your configuration at a later time. Select "Yes" to activate the changes now. The GUI provides a final confirmation message indicating success when activation finishes.

The GUI also checks your configuration for errors every time you click the Save button, the system displays the following dialog if any errors occur.



There are errors! Activate the configuration anyway?

The system displays any configuration errors in a list at the bottom of the GUI. You can navigate to each object in the list by clicking the item in the Object column. The following screen capture shows an example of the errors list.



Configuration verify results: Critical:0, Errors:3, Warnings: 0

Severity ▲	Message	Object	Attribute Name	Other object	Form message
ERROR	tls-profile [SIPInt1] has reference to end-entity-certificate [LocalSer...	tls-profile [SIPInt1]	End entity certificate		ERROR: tls-pr...
ERROR	tls-profile [SIPInt1] has end-entity-certificate records without any en...	tls-profile [SIPInt1]	End entity certificate		ERROR: tls-pr...
ERROR	tls-profile [SIPInt1] has reference to trusted-ca-certificates [Cert1] ...	tls-profile [SIPInt1]	Trusted ca certificates		ERROR: tls-pr...

General and System-Config Settings

Use the General icon on the Configuration tab to reach the General and System-Config pages, where you can set the following system-wide parameters.

General

Use **General** to specify the following:

- Network Time Protocol (NTP) servers—Add one or more NTP servers.
- Denial of Service (DoS)—Set the maximum SIP packet and ARP packet rates.
- High Availability (HA)—Enable and disable HA, identify the primary and secondary devices, and specify synchronization.

System-Config

Use **System Config** to specify the following:

- System settings—Set the hostname, location, and default gateway, console timeout, and restart.
- SNMP—Enable and disable SNMP, specify the MIB system, and set SNMP traps and notifications.
- Syslog servers—Add one or more Syslog servers, specify the system log level, and specify the process log level.
- Communications Monitoring Probe—Enable and disable the Communications Monitor, set the group ID, set the TLS profile, enable and disable QoS, and add one or more Monitor collectors.
- Alarm threshold—Set the thresholds for one or more types of alarms.

Configure an NTP Server

You can specify one or more Network Time Protocol (NTP) servers for the Oracle Enterprise Communications Broker (OECB) from the General page.

> **Note:**
>
> The OECB media interface does not support management traffic for NTP. When configuring connectivity to these resources, do not configure these resources within a media interface subnet range.

1. Access the System Settings configuration object.

   Configuration, **General**, **General**.

2. On the Modify System settings page, for NTP servers, click **Add**, and enter the address or FQDN for the NTP server that you want to add.
3. (Optional) Add another NTP server to the list.
4. Click **OK** to exit the **Add** dialog.
5. On the Modify Settings page, click **OK**.
6. Save the configuration.

High Availability Settings

High availability is best configured using the ACLI's SETUP wizard. If you use setup, you find the HA fields available from the GUI already configured by SETUP.

Oracle Enterprise Communications Brokers can be deployed in pairs to deliver high availability (HA). Two Oracle Enterprise Communications Brokers operating in this way are called an HA node. Over the HA node, call state is shared, keeping sessions/calls from being dropped in the event of a failure.

Two Oracle Enterprise Communications Brokers work together in an HA node, one in active mode and one in standby mode.

- The active Oracle Enterprise Communications Broker checks itself for internal process and IP connectivity issues. If it detects that it is experiencing certain faults, it hands over its role as the active system to the standby Oracle Enterprise Communications Broker in the node.
- The standby Oracle Enterprise Communications Broker is the backup system, fully synchronized with active Oracle Enterprise Communications Broker’s session status. The standby Oracle Enterprise Communications Broker monitors the status of the active system so that, if needed, it can assume the active role without the active system having to instruct it to do so. If the standby system takes over the active role, it notifies network management using an SNMP trap.

Refer to the *Oracle Enterprise Session Border Controller Configuration Guide* for more detail about High Availability operations, including:

- Synchronization
- Checkpointing

Overview

To produce seamless switchovers from one Oracle Enterprise Communications Broker to the other, the HA node uses shared virtual MAC and virtual IP addresses for the media interfaces in a way that is similar to VRRP (virtual router redundancy protocol). Sharing addresses eliminates the possibility that the MAC and IPv4 address set on one Oracle Enterprise Communications Broker in an HA node will be a single point of failure. The standby Oracle Enterprise Communications Broker sends ARP requests using a utility IPv4 address and its hard-coded MAC addresses to obtain Layer 2 bindings.

When there is a switchover, the standby Oracle Enterprise Communications Broker issues gratuitous ARP messages using the virtual MAC address, establishing that MAC on another physical port within the Ethernet switch. To the upstream router, the MAC and IP are still alive, meaning that existing sessions continue uninterrupted.

Within the HA node, the Oracle Enterprise Communications Brokers advertise their current state and health to one another in checkpointing messages; each system is apprised of the other's status. Using Oracle's HA protocol, the Oracle Enterprise Communications Brokers communicate with UDP messages sent out and received on the interfaces carrying "heartbeat" traffic between the active and standby devices.

The standby Oracle Enterprise Communications Broker assumes the active role when:

- It has not received a checkpoint message from the active Oracle Enterprise Communications Broker for a certain period of time.
- It determines that the active Oracle Enterprise Communications Broker's health score has decreased to an unacceptable level.
- The active Oracle Enterprise Communications Broker relinquishes the active role.

Establishing Active and Standby Roles

Oracle Enterprise Communications Brokers establish active and standby roles in the following ways.

- If a Oracle Enterprise Communications Broker boots up and is alone in the network, it is automatically the active system. If you then pair a second Oracle Enterprise Communications Broker with the first to form an HA node, then the second system to boot up will establish itself as the standby automatically.
- If both Oracle Enterprise Communications Brokers in the HA node boot up at the same time, they negotiate with each other for the active role. If both systems have perfect health, then the Oracle Enterprise Communications Broker with the lowest HA interface IPv4 address will become the active Oracle Enterprise Communications Broker. The Oracle Enterprise Communications Broker with the higher HA interface IPv4 address will become the standby Oracle Enterprise Communications Broker.

If the physical link between the two Oracle Enterprise Communications Brokers fails during boot up or operation, both will attempt to become the active Oracle Enterprise Communications Broker. In this case, processing will not work properly.

Configure High Availability

The Oracle Enterprise Communications Broker (OECB) supports configuring a pair of OECBs for High Availability (HA) operations.

Set the following parameters to configure HA operations.

> **Note:**
>
> The OECB automatically populates the Name of primary OECB and Name of secondary OECB fields with the peer names that you entered when you ran the Installation Wizard.

1. Access the System Settings configuration object.

   Configuration, **General**, **General**.
2. On the Modify System settings page, expand **High Availability Settings**, and do the following:

Enable High Availability	Select to enable HA.
Name of primary ECB	Enter the name of the primary peer. Default: <*primary peer name*>.
IP address of primary ECB	Enter the IP address of the primary peer. Default: 169:254.1.1.
Name of secondary ECB	Enter the name of the secondary peer. Default: blank.
IP address of secondary ECB	Enter the IP address of the secondary peer. Default: 169:254.1.2.
Becoming standby time	Enter the time, in milliseconds, to wait for complete synchronization. Default: 180,000. Range: 5-2147483647.
Sync complete time	Enter the timeout, in milliseconds, for subsequent redundancy configuration synchronization requests. Default: 1,000. Range: 0-4294967295.
Sync number transactions	Enter the maximum number of redundancy synchronization transactions to keep. Default: 10,000. Range: 0-4294967295.

3. Click **OK**.
4. Save the configuration.

Forcing an HA Switchover

The Oracle Enterprise Communications Broker allows the user to cause an HA switchover manually. Executing this procedure forces the two Oracle Enterprise Communications Brokers in your HA node to trade roles. The active system becomes standby, and the standby becomes active.

To perform a successful manual switchover, the following conditions must be met:

- The Oracle Enterprise Communications Broker from which you trigger the switchover must be in one of the following states: active, standby, or becoming standby.
- A manual switchover to the active state is only allowed on a Oracle Enterprise Communications Broker in the standby or becoming standby state if it has achieved full media, signaling, and configuration synchronization.
- A manual switchover to the active state is only allowed on a Oracle Enterprise Communications Broker in the standby or becoming standby state if it has a health score above the value you configure for the threshold.

1. Click the **System** tab.

   The Oracle Enterprise Communications Broker displays the system navigation panel to the left of the window displaying the associated controls.

2. Click the **System** tab's **Force HA switchover** link.

   The Oracle Enterprise Communications Broker displays the **Force HA switchover** dialog, which includes a **Switch to standby** button.

3. Click the **Switch to standby** button.

The Oracle Enterprise Communications Broker executes the HA role change.

Configure System Config

The Oracle Enterprise Communications Broker (OECB) allows you to specify system identification and global settings by way of the parameters that you specify on the System Config page.

Set the following parameters to configure global system identification information.

1. Access the System Config configuration object.

   Configuration, **General**, **System config**.

2. On the Modify System config page, do the following.

Hostname	Enter the hostname used to identify the OECB by the software. For example, the IP address for Fully Qualified Domain Name.
Description	Enter a textual description of the OECB for informational purposes.
Location	Enter the location of the OECB for informational purposes. For example, you might include the site name and physical address of the OECB.
Default Gateway	Set the default gateway for this OECB for egress traffic with no explicit destination. Default: 0.0.0.0. **Note:** Changing this parameter can cause you to lose connectivity with the OECB GUI. Be prepared to access the OECB console, if you lose connectivity. See the *Oracle Communications Session Border Controller ACLI Configuration Guide* for instructions on setting the default gateway using the ACLI.
Restart	Select to cause the system to restart after a service disruption. Default: enabled.
SSH Timeout	Set the length of time, in seconds, that the system waits for the next command before disconnecting. Default: 0. Range: 0-65535.
Console Timeout	Set the length of time, in seconds, that the system waits to terminate an ACLI administrative session due to inactivity. Use 0 to disable console session timeout. Default: 0. Range: 0-65535.
PKO Rate Pkt	Set the rate per second at which the system sends packet data. Default: 0. Range: 0-32768.
PKO Rate Burst	Set the maximum burst rate of packets. Default: 0. Range: 0-0124.

3. Save the configuration.

SNMP Configuration

Use SNMP to support monitoring of devices attached to the network for conditions that warrant administrative attention on the Oracle Enterprise Communications Broker (OECB).

Use the MIB settings for informational purposes. The remainder of the parameters enable SNMP and the specific OECB events that you want reported to the SNMP system.

Note that you configure the SNMP community and the trap receiver settings by way of the SNMP icon.

Configure SNMP Settings

Use System Config to enable SNMP on the Oracle Enterprise Communications Broker (OECB) and to set global SNMP settings.

Note that neither the MIB system name nor the MIB system location that you enter in the following procedure correlate to the name and location fields in System Configuration.

1. Access the System Config configuration object.

   Configuration, **General**, **System config**.

2. On the Modify System config page, do the following.

MIB system contact	Set the contact information displayed in the OECB MIB transactions. You can enter a textual identification of your company’s contact person for the OECB and information about how to contact that person.
MIB system name	Set the identification of this OECB to display in MIB transactions. Use the FQDN.
MIB system location	Set the physical location of this OECB to report in MIB transactions.
SNMP enabled	Select to enable SNMP. Note that you must also enable SNMP, and set a snmp-syslog-level. Default: enabled.
Enable SNMP auth traps	Select to enable sending an SNMP trap in response to an unsuccessful authentication attempt. Default: disabled.
Enable SNMP syslog notify	Select to enable sending SNMP traps when the system generates an alarm. Default: disabled.
Enable SNMP monitor traps	• Select to generate traps with unique trap-IDs for each syslog event. • Deselect to generate a single trap-ID for all events, with different values in the description string. Default: disabled.

Enable env monitor traps	Select to enable environment monitor traps for main board PROM temperature, CPU voltage, power supplies, and fan speeds. Default: disabled.

3. Save the configuration.

Logging (Syslog)

Logging events is a critical part of diagnosing mis-configurations and optimizing operations. Oracle Enterprise Communications Brokers can send both syslog and process log data to appropriate hosts for storage and analysis.

Overview

The Oracle Enterprise Communications Broker generates two types of logs, syslogs and process logs. Syslogs conform to the standard used for logging servers and processes as defined in RFC 3164.

Process logs are Oracle proprietary logs. Process logs are generated on a per-task basis and are used mainly for debugging purposes. Because process logs are more data inclusive than syslogs, their contents encompass syslog log data when they are sent off box. A special application must be run on a remote server to receive process logs. Please contact your Oracle sales representative directly or calling Oracle Customer support for more information about the process log application.

Syslog and process log servers are both identified by an IPv4 address and port pair.

Process Log Messages

Process log messages are sent as UDP packets in the following format:

```
<file-name>:<log-message>
```

In this format, <file-name> indicates the log filename and <log-message> indicates the full text of the log message as it would appear if it were written to the normal log file.

Add a Syslog Server

The Oracle Enterprise Communications Broker (OECB) requires a connection to at least one Syslog Server to process the log events that the system can generate for diagnosing mis-configurations and for optimizing operations. The OECB supports adding up to eight Syslog servers.

1. Access the System Config configuration object.

   Configuration, **General**, **System config**.

2. On the Modify System config page, under Syslog Servers, click **Add**.
3. In the Add Syslog server dialog, do the following:

Address	Set the IP address or FQDN of the server to which you want to send Syslog messages from the OECB. Default: 0.0.0.0.

Port	Enter the port number on the Syslog server to which the OECB sends log messages. Range: 0-65535. Default: 514.
Facility	Enter the user-defined facility value sent in every syslog message from the OECB to the syslog server. This value must conform to IETF RFC 3164. Range: 0-99999999. Default: 4.

4. Click **OK**.
5. Save the configuration.

Configure Syslog Settings

Set the following parameters to configure system-wide Syslog and Process log functionality. Oracle recommends that you configure Debug and Trace levels temporarily and only when required because both log levels are verbose and can adversely impact system performance.

1. Access the System Config configuration object.

   Configuration, **General**, **System config**.
2. On the Modify System config page, do the following.

System log level	Select the severity level from the drop-down list that you want to cause the system to send a syslog trap to the Network Management System. Default: Warning.
Process log level	Select the severity level from the drop-down list that you want to cause the system to send a process trap to the Network Management System. Default: Notice.

3. Click **OK**.
4. Save the configuration.

Enterprise Operations Monitor

As a proactive call monitoring solution, the Oracle Enterprise Operations Monitor (EOM) captures and analyzes all required signaling messages and media from the network, providing full correlation and quality metrics in real time. The EOM enables you to drill down into the captured data for troubleshooting and root-cause analysis of any reported problem related to a user, user group, trunk, network device, or Internet Protocol (IP) address. The Enterprise Operations Monitor Mediation Engine (ME) is the application that collects SIP, DNS, ENUM and protocol message traffic received from one or more EOM probes.

You can configure the Oracle Enterprise Communications Broker (OECB) to act as an EOM probe, or as an exporter, that can:

- Establish an authenticated, persistent, reliable TCP connection between itself and one or more Oracle Enterprise Operations Monitor Mediation Engines.
- Send UTC-timestamped, unencrypted copy of a protocol messages to the Oracle Enterprise Operations Monitor Mediation Engine.
- Accompany the copied message with related data to include the port or vlan on which the message was sent and received, the local and remote IP:port information, and the transport layer protocol.

Add a Monitor Collector

You can configure the probes embedded in the Oracle Enterprise Communications Broker (OECB) to establish an IPFIX connection with one or more Oracle Enterprise Operations Monitor Mediation Engines (ME) to collect SIP, DNS, ENUM and protocol message traffic for the Enterprise Operations Monitor (EOM) to analyze. You might want to connect the OECB to multiple MEs, for example, to support monitoring continuity in the event of a service disruption.

- Configure at least one network interface.
- Obtain the IP address and port number of each target Oracle Enterprise Operations Monitor Mediation Engine that you want to connect.

In the following procedure, the Monitor Collector is the ME.

1. Access the System Config configuration object.

   Configuration, **General**, **System config**.
2. On the Modify System settings page, under Monitor Collector, click **Add**, and do the following:

Address	Set the IP address of the target ME. Default: 0.0.0.0.
Port	Set the port number on which the ME listens. Range: 1025-65535. Default: 4739
Network interface	Select the local network interface from which to export traffic to the ME from the drop-down list. Default: wancom0:0.

3. Click **OK**.
4. (Optional) Repeat steps 2-3 for each additional monitor collector you want to connect to the OECB.
5. Click **OK**.
6. Save the configuration.

Configure Communications Monitoring Probe Settings

Configuring Communications Monitoring Probe settings allows you to make the Oracle Enterprise Communications Broker (OECB) act as a probe, sending network traffic information to an Oracle Communications Session Monitor Mediation Engine.
The Communications Session Monitor is Oracle's Communication Experience Manager. The manager is powered by the Oracle Communications Session Monitor Mediation Engine, a platform that collects SIP, DNS, ENUM, and protocol message traffic received from Oracle Communications Session Monitor Probes. The mediation engine stores the traffic in an internal database, and analyzes aggregated data to provide comprehensive multi-level monitoring, troubleshooting, and interoperability information.

Acting as a Probe, or as an exporter, the OECB can:

- Establish an authenticated, persistent, reliable TCP connection between itself and the Oracle Communications Session Monitor Mediation Engines.

- Send UTC time-stamped, unencrypted copy of a protocol messages to the Mediation Engine.
- Accompany the copied message with related data to include: the port and VLAN on which the message was sent or received, local and remote IP:port information, and the transport layer protocol.

1. Access the System Config configuration object.

   Configuration, **General**, **System config**.

2. Expand **Comm monitor**.

State	Select to enable the probe.
SBC grp ID	Set the `SBC group id` parameter to assign an integer value to the OECB in its role as an information exporter. Default: 0.
Monitor collector	Click **Add**, and do the following: a. Address—Enter the collector IP address to specify the IP address of the target Oracle Communications Session Monitor Mediation Engine. b. Port—Enter the collector port number of the target Oracle Communications Session Monitor Mediation Engine. Default: 4739. Range: 1025-65535. c. Network Interface—Select the network interface from which to export traffic to the Oracle Communications Session Monitor Mediation Engine. Most systems use M00:0. d. Click **OK**. e. Optional—Repeat to add another monitor collector.

3. Do one of the following:
   - Configure other settings on the Modify System Config page, and click **OK**.
   - Click **Back**.
4. Save the configuration.

Support for Multiple VLANs

The Oracle Enterprise Communications Broker (OECB) allows you to configure up to four separate Virtual Local Area Networks (VLAN) to help manage your deployment. For example, you might want separate networks for certain departments or locations. Each VLAN connects to its own uniquely defined network interface and SIP interface, which allows you to create separate networks.

When you perform the initial configuration, the system creates a default network called "ecb" and one SIP interface with the Realm ID set to "ecb." The system also populates the Realm ID parameter in the Session Agent, LDAP, and ENUM configurations with "ecb."

> **Note:**
>
> Only the default "ecb" network can act as the registrar, and LDAP support is also limited to the default "ecb" network. Additional networks cannot act as the registrar or support LDAP.

Add Multiple VLANs

To add additional network interfaces, go to the Networks configuration page and use the Service multi-instance configuration object. When you click **Add**, the system displays the Network settings page with the parameters necessary to configure a network. See "Configure a Network Interface" for instructions.

Note the following guidelines for adding VLANs:

- All VLANs use the S0P0 physical interface.
- Each VLAN must correspond to one, unique SIP interface
- The network Realm identifier, VLAN ID, and network IP address cannot repeat across networks

Network Interface Configuration

The network interface configuration specifies a logical network interface. The Oracle Enterprise Communications Broker supports up to four Virtual Local Area Networks (VLAN). You configure a SIP interface and one or more application (SIP) ports over each network interface.

Configure a Network Interface

Set the following parameters to configure a network interface. The network Realm identifier, VLAN ID, and network IP address cannot repeat across networks. They must be unique for each network.

1. Access the Networks configuration object.

   Configuration, Network, Networks

2. On the Service page, click **Add**, and do the following:

Realm Identifier	Enter the name of this interface.
VLAN ID	Enter the identification of a specific virtual interface in a physical interface, for example, a VLAN tab. If this network interface is not channelized, leave this field blank, and the value will correctly default to 0. The sub-port-id is only required if the operation type is Media. Default: 0. Range: 0-4095.
Hostname	Enter the fully qualified domain name.
Network IP Address	Enter the IPv4 address of this network interface.
Network IP subnet mask	Enter the net mask of this network interface in dotted decimal notation.

Network IP gateway address	Enter the gateway that this network interface uses to communicate with the next hop. You can set an additional, secondary gateway with the sec-gateway parameter.
Preferred DNS server IP address	Enter the IP address of the targeted DNS server.
Alternate DNS server IP address	Enter an alternate IP address for the targeted DNS server.
Alternate DNS server IP address	Enter an alternate IP address for the targeted DNS server.
DNS domain	Enter the default domain name.
Enable REFER termination	Select to terminate and process SIP REFER messages. Default: Disabled.
Send NOTIFY for REFER provisional responses	Select which NOTIFY messages for provisional responses you want the system to act on. Default: None. Valid values: None | Initial | All.
Enable ToS marking	Select to ToS mark egress packets. Default: Disabled.
ToS value	Set the ToS value to apply to egress packets. Default: 0x00.
Enable ICMP	Select to allow Internet Control Message Protocol (ICMP) traffic on this interface and respond to ICMP pings. Default: Disabled.
Enable gateway heartbeat	For High Availability, check this checkbox to allow the network interface to continually confirm that its gateway is reachable.
High availability settings	Use the arrow control to display the HA parameters.
Primary utility IP address	Enter the utility IP address for the primary peer to use.
Secondary utility IP address	Enter the utility IP address for the secondary peer to use.
Interface virtual MAC	Enter the virtual MAC address of the interface. (This address moves to which ever peer is active.)

3. Click **OK.**
4. (Optional) Repeat steps 2 and 3 to add another network interface (up to 4 total).
5. Save the configuration.

Enable ICMP

To configure ICMP functionality on a media interface, you define the IPv4 address on your Oracle Enterprise Communications Broker network interface and enable ICMP.

Enabling ICMP entries automatically opens the well-known port associated with a service.

Set the following parameters to enable ICMP functionality on a network interface:

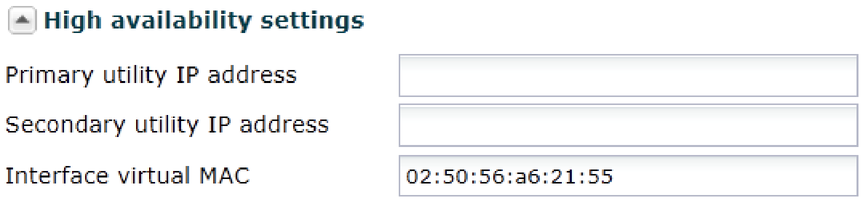
- **Enable icmp**—Check the checkbox to enable ICMP on this network interface.

  For security and by default, if ICMP is not enabled, the Oracle Enterprise Communications Broker discards ICMP requests or responses for the address. It is recommended that you only enable ICMP temporarily on a network interface.

Configure the Network Interface for High Availability Operations

After you configure the first parameters on the Modify Network Settings dialog, the High Availability (HA) setting fields allow you to manually specify the addressing to be used by this interface for HA operation. Oracle recommends, that you use `run setup` to configure HA.

1. Click the arrow next to High Availability settings. The system adds the following fields to the Modify Network Settings dialog.

   High availability settings

Primary utility IP address	
Secondary utility IP address	
Interface virtual MAC	02:50:56:a6:21:55

2. Primary utility IP address—Enter the utility IPv4 address for the primary HA peer. This address can be any unused IPv4 address within the subnet defined for the network interface. For example, given a network interface with the IPv4 address 168.0.4.15/24 (identifying the host associated with the network interface), the possible range of unused IPv4 addresses is 168.0.4.1 to 168.0.4.254. Ask your network administrator which IPv4 addresses are available for use.
3. Secondary utility IP address—Enter the utility IPv4 address for the secondary Oracle Enterprise Communications Broker peer. Usually, this IPv4 address is the next in the sequence up from the primary utility address. It is also generated from the range of unused IPv4 addresses within the subnet defined for the network interface.

Virtual MAC Addresses

To create an HA node, you create virtual MAC addresses for the media interfaces. You enter these addresses in virtual MAC address parameters for physical interface configurations.

This field is automatically populated with a valid virtual MAC address during `run setup`. It is recommended that you retain this configuration.

The HA node uses shared virtual MAC (media access control) and virtual IP addresses for the interfaces. When there is a switchover, the standby Oracle Enterprise Communications Broker sends out an ARP message using the virtual MAC address, establishing that MAC on another physical port within the Ethernet switch.

A MAC address is a hardware address that uniquely identifies Oracle Enterprise Communications Broker components. Given that, the virtual MAC address you configure allows the HA node to appear as a single system from the perspective of other network devices. To the upstream router, the MAC and IP are still alive, meaning that existing sessions continue uninterrupted through the standby Oracle Enterprise Communications Broker.

To configure a virtual MAC, enter the virtual MAC address in the **Interface virtual MAC** field.

SIP Interface Settings

A SIP Interface is an application layer interface logically residing "over" a network interface. The SIP interface defines the transport addresses (IP address and port) upon which the Oracle Enterprise Communications Broker receives and sends SIP messages. You can define a SIP interface for each network to which the Oracle Enterprise Communications Broker is connected. Note that these networks must be within the Oracle Enterprise Communications Broker's Network Interface subnet. SIP interfaces support UDP, TCP and TLS transport.

In addition to defining a SIP interface's network participation (**Port**), you can also define forking and other functionality (**Interface settings**).

Proxy Registrations

The Oracle Enterprise Communications Broker can proxy registrations when it receives REGISTERs for domains for which it is not a registrar. The user enables this functionality within the **sip-interface**. By default, the Oracle Enterprise Communications Broker rejects the registration.

The Oracle Enterprise Communications Broker's **sip-interface** configuration includes a checkbox titled **Proxy Registrations**, with which the user can enable this function. When checked, the Oracle Enterprise Communications Broker proxies the registration towards the intended registrar. When unchecked, the Oracle Enterprise Communications Broker responds with a **403: Unauthorized** message.

Configure a SIP Interface

The SIP interface defines the signaling interface through which the Oracle Enterprise Communications Broker (OECB) receives and sends SIP messages.

- Consider any SIP options that you want to add.
- Configure any inbound and outbound manipulation rules that you want to use with this interface.
- Configure any S8HR profiles that you want to use with this interface.

In the configuration, you specify how the OECB handles SIP messages and you can add SIP options.

1. Access the SIP Interface configuration object.

   Configuration, **SIP Interface**, **Interface**.

2. On the Modify Interface Settings page, do the following:

State	Select to enable this configuration. Default: Enabled.
Enable early media inhibit	Select to extract and store Session Description Protocol (SDP) messages from provisional responses before call setup.
Realm ID	Select the realm for this interface. Required to set SIP ports.
Description	Enter a description for this interface.
SIP Ports	Click **Add**, and do the following: a. Address—Enter the IP address of this interface. b. Port—Enter the port. Default: 5060. Range: 1-65535. c. Transport protocol—Select a protocol from the drop-down list. Default: UDP. Valid values: SCTP | TCP | TLS | UDP d. Allow anonymous—Set how you want the system to handle requests from a SIP realm. Default: All. Valid values: All (allow all anonymous connections) | Registered (session agents and registered endpoints, only) e. TLS profile—Select the TLS profile you want for this port. f. Click **OK**. g. (Optional) Add more SIP ports.
Options	Click **Add**, and do the following: a. Add optional parameters or features. b. Click **OK** or **Apply/Add another**.
Stop recurse	Enter one or more response codes that you want to cause this session agent to stop route recursion. You can enter individual response codes separated by a comma, such as 301,305 or a range such as 300-380. Default: 401,407. Valid values: 300-599.
Inbound manipulation	Select an inbound manipulation rule from the drop-down list.
Outbound manipulation	Select an outbound manipulation rule from the drop-down list.
S8hr profile	Select an S8HR profile from the drop-down list.

3. Click **OK**.
4. (Optional) Add another SIP interface.
5. Save the configuration.

Configure SIP-config

Use SIP-config to set the parameters that apply to all SIP call traffic on the Oracle Enterprise Communications Broker (OECB).

1. Access the SIP-config configuration object.

   Configuration, **SIP Interface**, **SIP-config**.

2. On the SIP config page, do the following:

Options	Click **Add**, and enter the option syntax for the option. Click either **OK** or **Apply/Add another**.
ENUM SAG match	Select to enable ENUM session agent group matching.
Default context	Set the default source context for the system to use for a given call when unable to identify source context by any other method.
Parallel forking	Select to cause the system to fork all sessions to all contacts of an Agent of Record.
Fork group timeout	Set the timeout value, in seconds, after which the OECB tries the next fork group with the highest priority. Default: 0. Range: 0-32.
ASCII based routing	Select to enable routing with alphanumeric entries in the user database and routing table.
Proxy registration	Select to allow the OECB to accept a registration from an unauthorized domain, and proxy the registration to the intended registyrar.

3. Save the configuration.

Restricting Session Initiation

The Oracle Enterprise Communications Broker can restrict the set of end stations that can initiate sessions to those originating via active session agents and previously registered users. By default, the Oracle Enterprise Communications Broker does not restrict session initiation. The user enables this functionality within the **sip-port**.

The Oracle Enterprise Communications Broker's **sip-port** configuration includes a checkbox titled **Allow session agents and registered end-points** with which the user can restrict session initiation. When checked, the Oracle Enterprise Communications Broker responds to session initiation by endpoints that are not behind an agent or not already registered with a **403: Unauthorized** message.

Configure a SIP Interface Port

A SIP interface port configuration defines the transport address and protocol that the Oracle Enterprise Communications Broker (OECB) uses for sending and receiving messages through a SIP interface. You can apply a TLS profile to the configuration, and you can limit SIP requests from session agents and registered end points. You must configure at least one port per SIP interface. You can optionally configure multiple SIP ports per SIP interface. For example, suppose you configure the OECB to receive calls by way of TCP and to send calls by way UDP, you must configure a SIP port for each protocol.

- Create the TLS profile that you want for this configuration.

In the following procedure, use step 4 to add more SIP interface ports.

1. Access the Ports configuration object. Click **Configuration**, **SIP Interface**, **Interfaces**.
2. On the Interfaces page, under Sip ports, click **Add**, and do the following:

Address	Enter the IP address of the SIP interface.
Port	Enter port number for the SIP interface. Default: 5060. Range: 0-65535.
Transport protocol	Select a protocol from the drop-down list. Default: UDP. Valid values: SCTP | TCP | TLS | UDP
TLS profile	Select the TLS profile you want for this port.
Allow anonymous	Set how you want the system to handle requests from a SIP realm. Default: All. Valid values: All (allow all anonymous connections) | Registered (session agents and registered endpoints, only)

3. Click **OK**.

   The system displays the SIP Ports page with a list of SIP interface ports you configured.
4. Optional—Click **Add** to add another SIP interface port.
5. Click **Back**.

   The system displays the Configuration tab, where you can do the following:

   - Continue configuring the OECB.
   - Save the configuration.

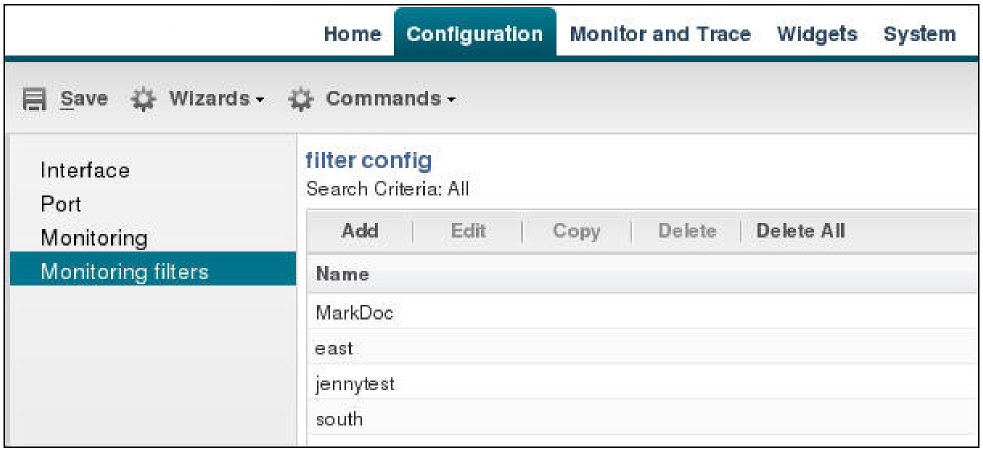
Optional—Configure SIP monitoring.

SIP Monitor and Trace Filter Configuration

The SIP Monitor and Trace function allows you to monitor SIP sessions for notable events and display the results in the Oracle Enterprise Communications Broker (OECB) SIP Notable Events summary. Such information may help you perform troubleshooting. For more targeted monitoring, you can configure filters on particular users and addresses on the OECB, and on a specific agent.

The OECB Configuration page includes the following objects for configuring SIP Monitoring filters:

- The SIP Interface configuration page displays the **Monitoring filters** object in the navigation pane, which you use to configure individual filters.

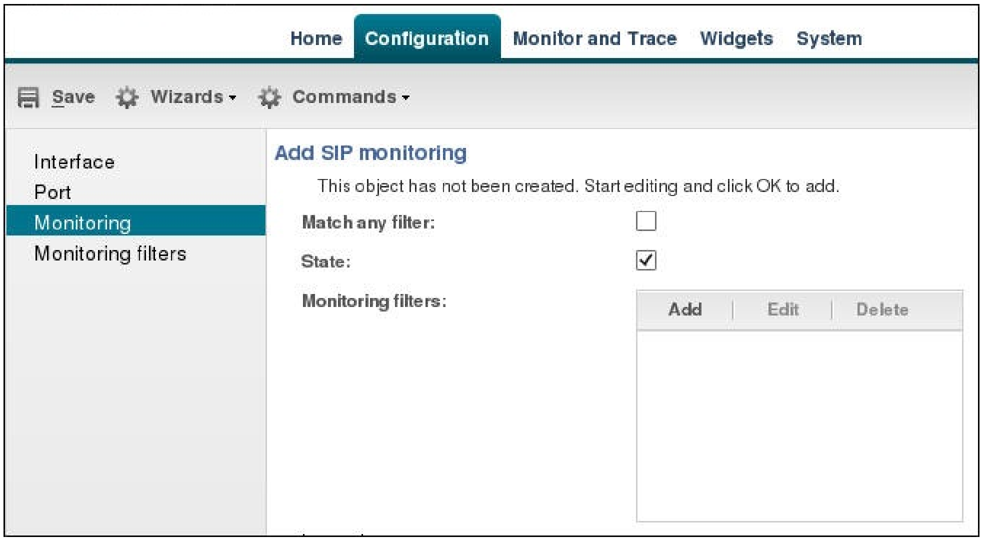


filter config

Search Criteria: All

Name
MarkDoc
east
jennytest
south

- The **Monitoring** object on the SIP interface configuration page displays the **Monitoring filters** element in the dialog. Use it to apply filters to the OECB.



Add SIP monitoring

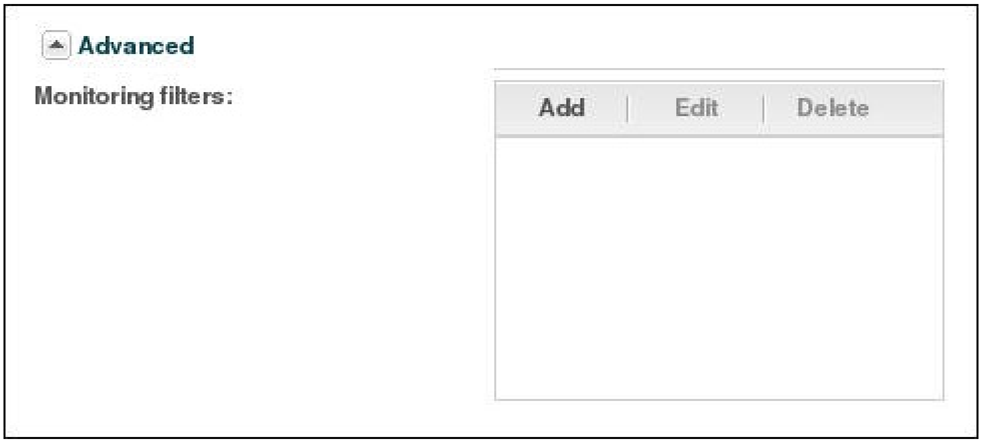
This object has not been created. Start editing and click OK to add.

Match any filter: □

State: ☑

Monitoring filters:

- The Add Agents configuration page displays the**Monitoring filters** configuration element to the Advanced section. Use it to apply filters to an agent.



Monitoring filters:

- **Note:**

  After the P-CZ2.0.0m4 release, the system does not support the former "Enable SIP Monitor and Trace" setting. You must re-configure SNMP event traps through the dialogs described in this topic.

Use the following filter configuration process for both new installations and upgrades.

1. Create one or more filters in the Monitoring Filters object. You may use an asterisk character as a filter, if you want to monitor all session data.
2. Add one or more filters to the Monitoring object.
3. (Optional) Add one or more monitoring filters to an agent that you want to monitor.

SIP REFER

SIP REFER provides the Oracle Enterprise Communications Broker with the ability to terminate SIP REFER messages and perform attended or unattended call transfers. You can enable REFER termination at both the agent and SIP interface, with agent configuration taking precedence. You can also configure the SIP interface to send NOTIFY messages for provisional responses.

SIP REFER Method Call Transfer for ECB

The Oracle Enterprise Communications Broker supports a handling mode for the REFER method that automatically converts a received REFER method into an INVITE method. This allows the Oracle Enterprise Communications Broker to transfer a call without having to proxy the REFER back to the other UA.

The Oracle Enterprise Communications Broker has a configuration parameter giving it the ability to provision the handling of REFER methods as call transfers. The parameter is called **Enable REFER termination**. When this feature is enabled, the Oracle Enterprise Communications Broker creates an INVITE message whenever it receives a REFER. The Oracle Enterprise Communications Broker sends this INVITE message to the address in the Refer-To header. Included in the INVITE message is all the unmodified information contained in the REFER message. The previously negotiated SDP is used in the new INVITE message. NOTIFY and BYE messages are sent to the UA upon call transfer completion. The user configures this function at the SIP interface or agent with agent configuration taking precedence.

If a REFER method is received containing no Referred-By header, the Oracle Enterprise Communications Broker adds one, allowing the Oracle Enterprise Communications Broker to support all call agent screen applications.

This SIP REFER method call transfer feature supports the following:

- Both unattended and attended call transfers.
- Both successful and unsuccessful call transfers.
- Early media from the Referred-To party to the transferee.
- REFER method transfer from different sources.
- The REFER event package as defined in RFC 3515. This applies for situations where multiple REFER methods are used within a single dialog.

- Third party initiated REFER method signalling the transfer of a call by associating the REFER method to the dialogue via the REFER TargetDialog.

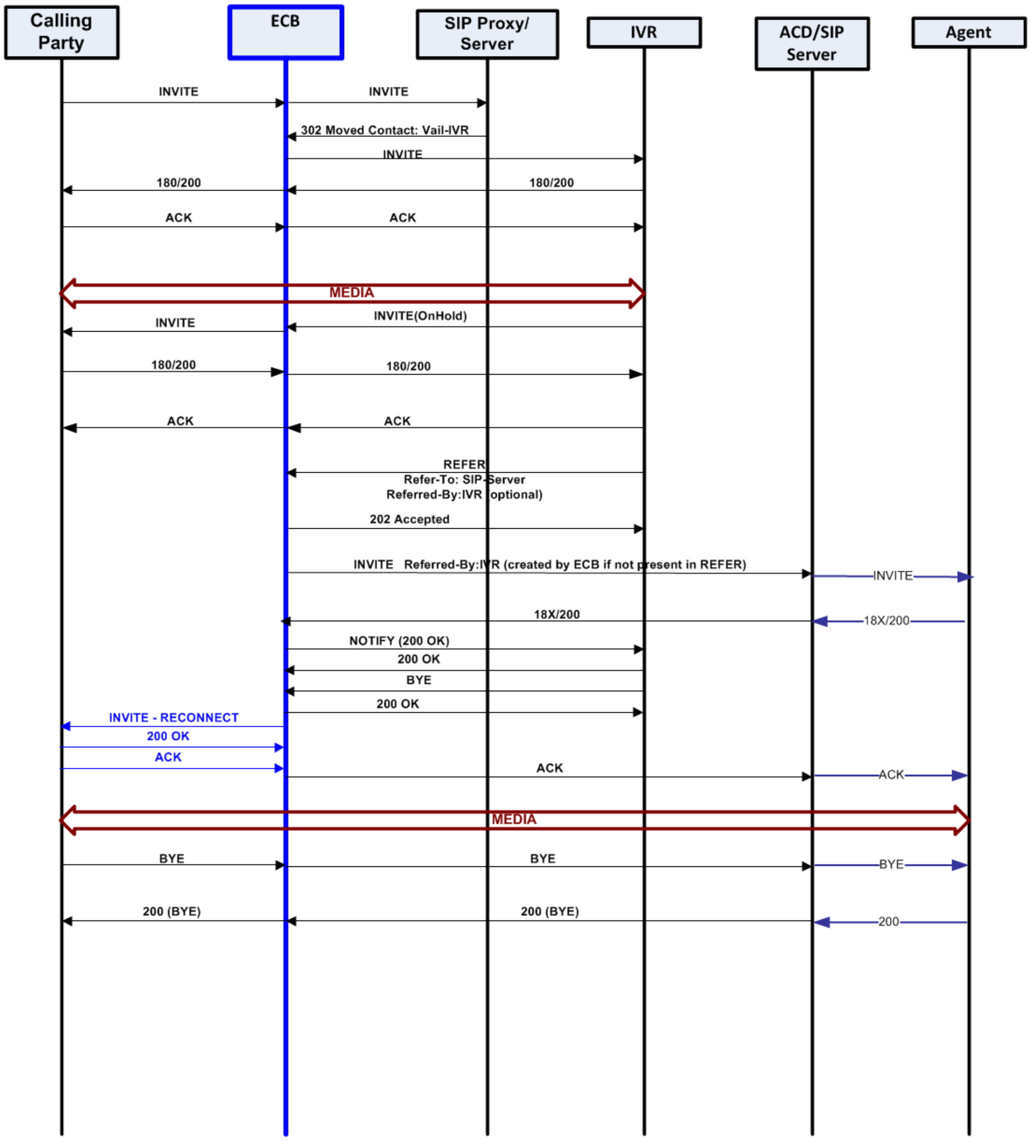
Unsuccessful Transfer Scenarios

The Oracle Enterprise Communications Broker does not successfully handle the following failed, unusual, and unexpected transfer scenarios:

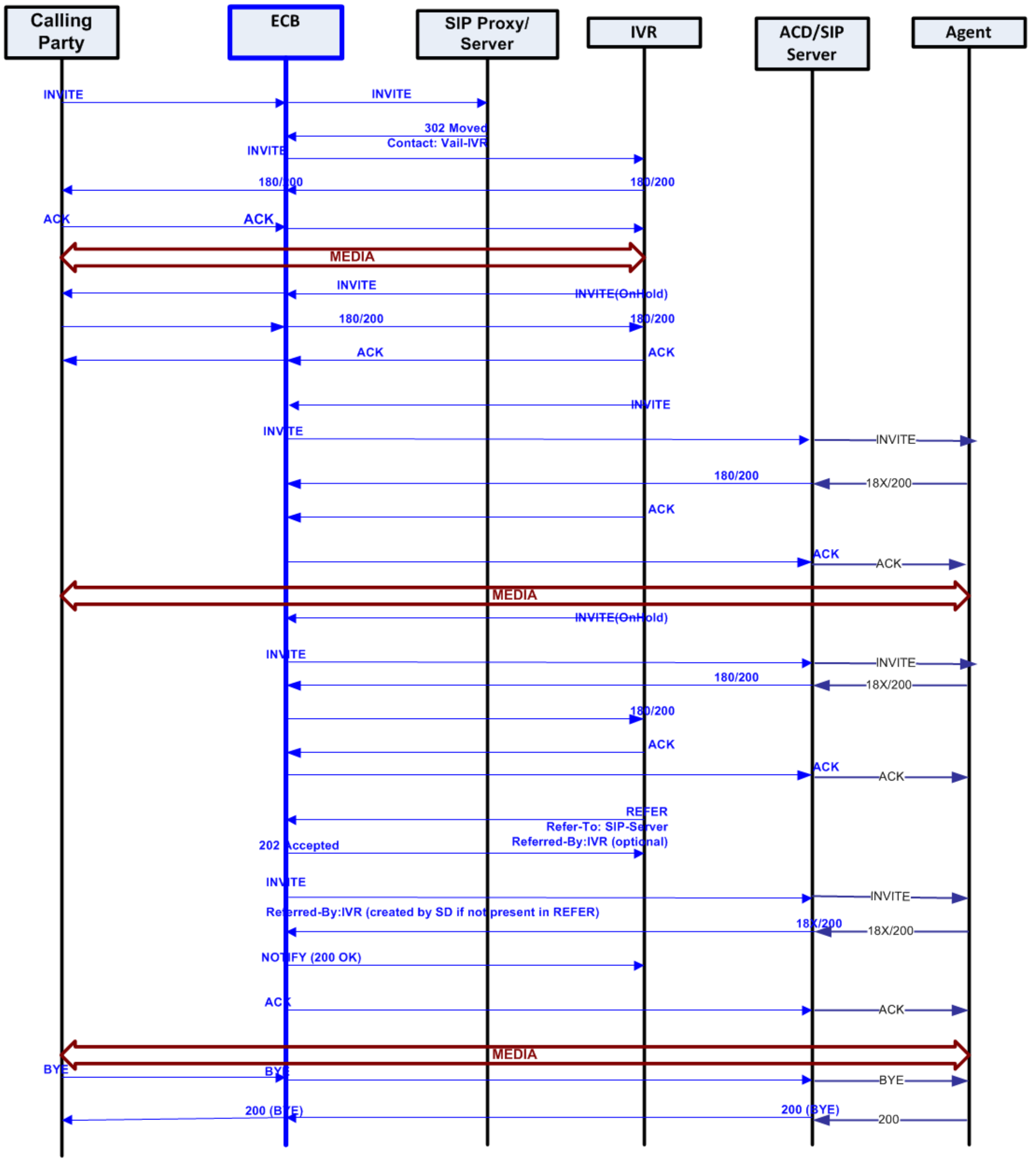
- The new INVITE to the Referred-To party gets challenged, the Oracle Enterprise Communications Broker does not answer the challenge. It is treated with the 401/407 response just as any other unsuccessful final response.
- The header of the REFER message contains a method other than INVITE or contains URI-parameters or embedded headers not supported by the Oracle Enterprise Communications Broker.
- The Oracle Enterprise Communications Broker shall allow the Referred-To URI that happens to resolve to the same next-hop as the original INVITE went to, to do so.
- The Oracle Enterprise Communications Broker ignores any MIME attachment(s) within a REFER method.
- The Oracle Enterprise Communications Broker recurses (when configured to do so) when the new INVITE sent to the Referred-To party receives a 3xx response.
- The transferee indicated support for 100rel, and the original two parties agreed on using it, yet the Referred-To party does not support it.
- The original parties negotiated SRTP keys.
- The original parties agreed on a codec using a dynamic payload type, and the Referred-To party happens to use a different dynamic payload number for that codec.

Call Flows

The following ladder diagram shows an example of call flow for an unattended call transfer:



The following ladder diagram shows an example call flow of an attended call transfer:



Configure SIP REFER Method

The Oracle Enterprise Communications Broker (OECB) allows you to set REFER termination on a per-agent and/or SIP interface basis. Agent configuration takes precedence over SIP interface configuration.

SIP Interface configuration includes the **Enable REFER termination** checkbox. Select **Enable REFER termination** to allow this agent to support SIP REFER method call transfers.

Follow the procedure below to enable SIP REFER termination support, setting the SIP interface first, if applicable to your deployment:

1. Click **Configuration**, **SIP Interface**.

   The OECB displays the **Modify Interface settings** dialog.

2. Select **Enable REFER termination**.
3. Click **Configuration**, **Agent**, **Edit**.

The OECB displays the **Modify Agents** dialog.

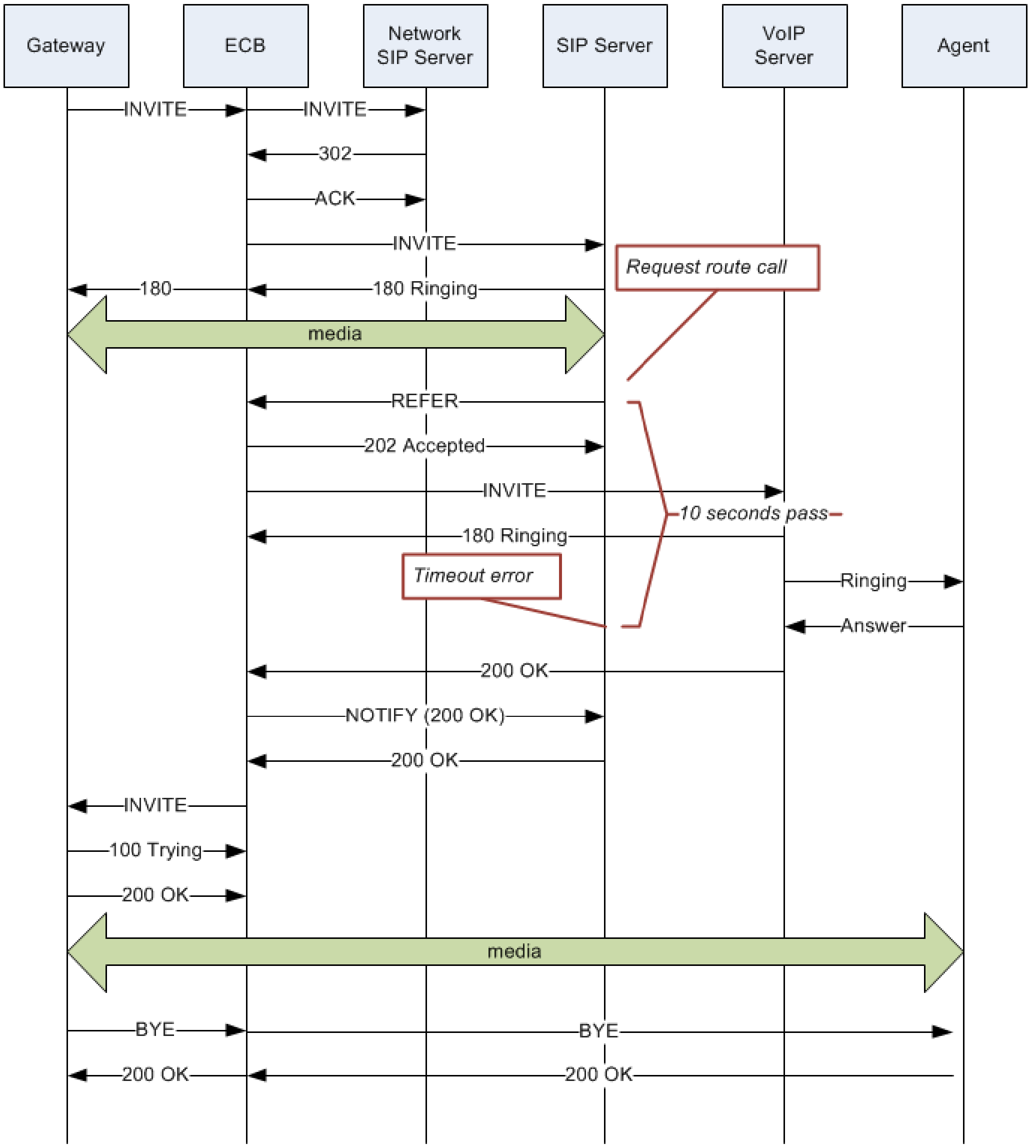
4. Select **Enable REFER termination**.
5. Save and activate the configuration.

180 and 100 NOTIFY in REFER Call Transfers for the ECB

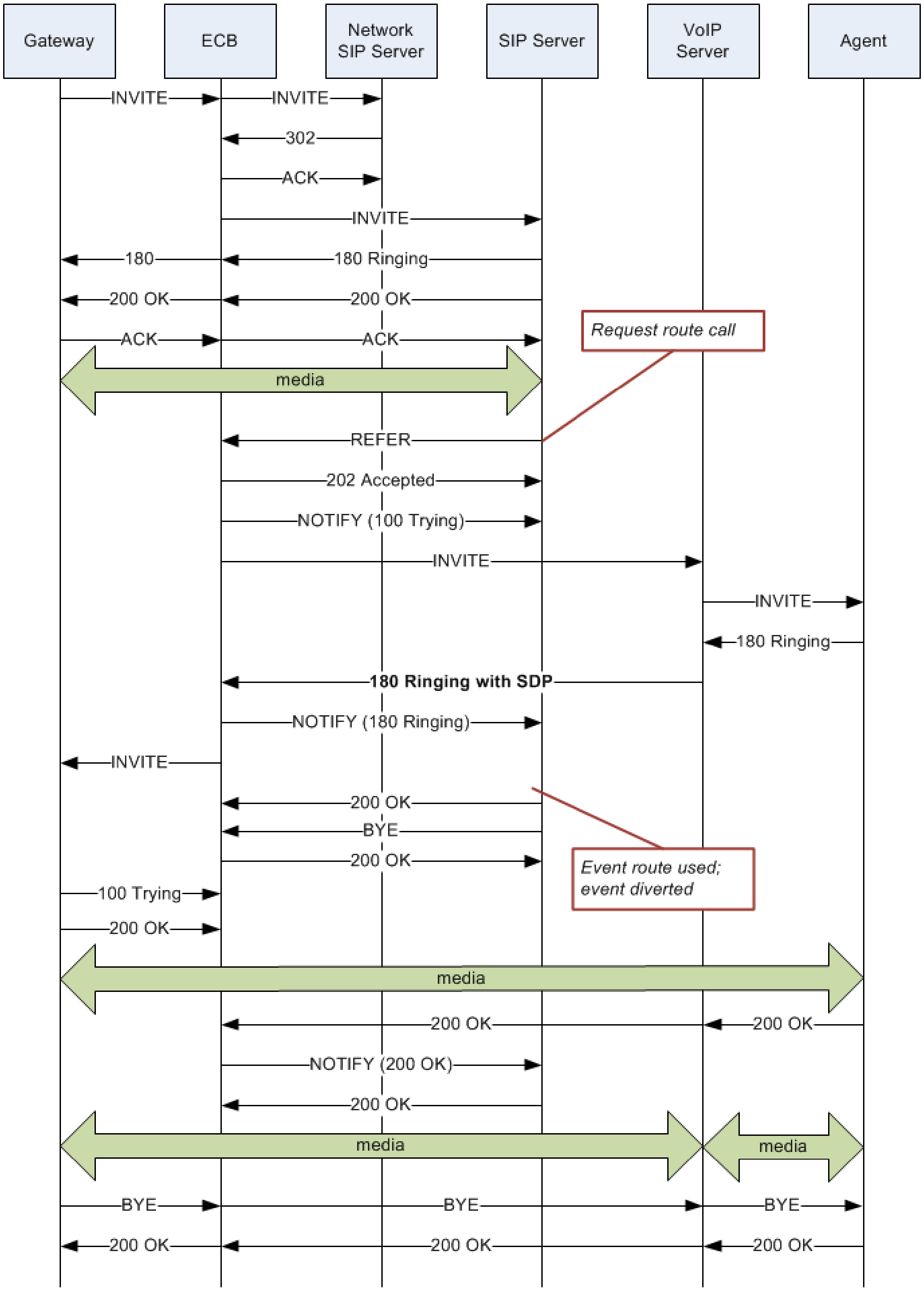
When you configure the Oracle Enterprise Communications Broker (OECB) to support REFER call transfers, you can enable it to send a NOTIFY message after it has sent either a 202 Accepted or sent a 180 Ringing message. If your network contains elements that comply with RFC 5589, and so expect the NOTIFY message after the 202 Accepted and each provisional 180 Ringing, you want to set the **Send NOTIFY messages for REFER Provisional Responses** to either **initial** or **all**, according to your needs.

Without this parameter changed from its default (**none**), the OECB does not return send the NOTIFY until it receives the 200 OK response from the agent being called. If the time between the REFER and the NOTIFY exceeds time limits, this sequencing can cause the OECB’s NOTIFY to go undetected by devices compliant with RFC 5589. Failures during the routing process can result.

The following ladder diagram shows how a sample call flow times out when the **Send NOTIFY messages for REFER Provisional Responses** parameter is not set.



When you compare the call flow above to the following one depicting the scenario when the OECB has the **Send NOTIFY messages for REFER Provisional Responses** changed from its default, the difference is that the OECB now responds with a NOTIFY in response to the 202 Accepted and it sends another one after the 180 Ringing. This prevents the time out and allows the event to be diverted successfully.



Sample Messages

In compliance with RFC 5589, the NOTIFY message with 100 Trying as the message body looks like the sample below. Note that the expires value in the subscription state header is populated with a value that equals 2* TIMER C, where the default value of TIMER C is 180000 milliseconds.

```
NOTIFY sips:4889445d8kjtk3@atlanta.example.com;gr=723jd2d SIP/2.0
Via: SIP/2.0/TLS 192.0.2.4;branch=z9hG4bKnas432
```

```
Max-Forwards: 70
To: <sips:transferor@atlanta.example.com>;tag=1928301774
From: <sips:3ld812adkjw@biloxi.example.com;gr=3413kj2ha>;tag=a6c85cf
Call-ID: a84b4c76e66710
CSeq: 73 NOTIFY
Contact: <sips:3ld812adkjw@biloxi.example.com;gr=3413kj2ha>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, tdialog
Event: refer
Subscription-State: active;expires=360
Content-Type: message/sipfrag
Content-Length: ...
SIP/2.0 100 Trying
```

Also in compliance with RFC 5589, the NOTIFY message with 180 Ringing as the message body looks like the sample below. Again, the expires value in the subscription state header is populated with a value that equals 2* TIMER C, where the default value of TIMER C is 180000 milliseconds.

```
NOTIFY sips:4889445d8kjtk3@atlanta.example.com;gr=723jd2d SIP/2.0
Via: SIP/2.0/TLS 192.0.2.4;branch=z9hG4bKnas432
Max-Forwards: 70
To: <sips:transferor@atlanta.example.com>;tag=1928301774
From: <sips:3ld812adkjw@biloxi.example.com;gr=3413kj2ha>;tag=a6c85cf
Call-ID: a84b4c76e66710
CSeq: 73 NOTIFY
Contact: <sips:3ld812adkjw@biloxi.example.com;gr=3413kj2ha>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, tdialog
Event: refer
Subscription-State: active;expires=360
Content-Type: message/sipfrag
Content-Length: ...
SIP/2.0 180 Ringing
```

Also in compliance with RFC 5589, the NOTIFY message with 200 OK as the message body looks like the sample below.

```
NOTIFY sips:4889445d8kjtk3@atlanta.example.com;gr=723jd2d SIP/2.0
Via: SIP/2.0/TLS 192.0.2.4;branch=z9hG4bKnas432
Max-Forwards: 70
To: <sips:transferor@atlanta.example.com>;tag=1928301774
From: <sips:3ld812adkjw@biloxi.example.com;gr=3413kj2ha>;tag=a6c85cf
Call-ID: a84b4c76e66710
CSeq: 74 NOTIFY
Contact: <sips:3ld812adkjw@biloxi.example.com;gr=3413kj2ha>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, tdialog
Event: refer
Subscription-State: terminated;reason=noresource
Content-Type: message/sipfrag
Content-Length: ...
SIP/2.0 200 OK
```

180 and 100 NOTIFY Configuration

You can apply the **Send NOTIFY messages for REFER Provisional Responses** setting to the sip-interface. By default, the Oracle Enterprise Communications Broker (OECB) only sends the final result NOTIFY message.

Do the following to enable 100 and 180 NOTIFY messages in REFER call transfers.

1. Click **Configuration**, **SIP Interface**.

   The OECB displays the **Modify Interface settings** dialog.

2. In the **Modify Interface settings** dialog, select one of the following settings for the **Send NOTIFY messages for REFER Provisional Responses** parameter.
   - **None**—Disable NOTIFY for REFER provisional responses.
   - **initial**—Send an immediate 100 Trying NOTIFY, and the final result NOTIFY.
   - **all**—Send an immediate 100 Trying NOTIFY, plus a notify for each non-100 provisional messages the OECB receives; and the final result NOTIFY.
3. Save and activate the configuration.

Accounting Settings

The Oracle Enterprise Communications Broker offers support for RADIUS, an accounting, authentication, and authorization (AAA) system. In general, RADIUS servers are responsible for receiving user connection requests, authenticating users, and returning all configuration information necessary for the client to deliver service to the user.

You can configure your Oracle Enterprise Communications Broker to send call accounting information to one or more RADIUS servers. This information can help you to see usage and QoS metrics, monitor traffic, and even troubleshoot your system.

Configure an Accounting Server

Use the following procedure to configure an accounting server to receive accounting detail from the Oracle Enterprise Communications Broker (OECB). You can also edit and delete existing accounting servers with this procedure,.

The remote server to which the accounting configuration sends messages uses at least one of two pieces of information for purposes of identification. The OECB accounting messages always include the NAS IP address, while some may include the NAS ID:

- Network Access Server (NAS) IP address (the IP address of the OECB SIP proxy).
- NAS ID. If you enter a value, the OECB sends the NAS ID to the remote server.

If you have more than one OECB pointing to the same accounting server, you can use the NAS ID to identify which OECB generated the record.

1. Access the Accounting Configuration object.

   Configuration, **Accounting**.

2. On the Add Accounting Configuration page, go to **Accounting Servers**, click **Add**, and do the following:

Hostname	Enter the name of the host associated with the account server in hostname format (FQDN) or as an IP address.
Port	Enter the number of the UDP port associated with the account server to which messages are sent. Default: 1813. Range: 1025-65535.
Secret	Enter the secret to pass from the account server to the client in text format.
NAS ID	(Optional) Enter the NAS ID in text format (FQDN allowed). The account server uses this value to identify the OECB for the transmittal of accounting messages.

3. Click **OK.**
4. (Optional) Repeat steps 2-3 to add more accounting servers.
5. Save the configuration.

Configure Accounting

You can configure the Oracle Enterprise Communications Broker (OECB) to perform accounting tasks and send the information to multiple FTP push servers and accounting servers. Accounting information can help you to see usage and QoS metrics, monitor traffic, and troubleshoot the system.

Set the accounting configuration parameters to indicate where and when you want the system to produce accounting messages. Specify one or more FTP push servers and accounting servers.

1. Access the Accounting Configuration object.

   Configuration, **Accounting**.

2. On the Accounting Configuration page, do the following:

State	Select to enable the accounting configuration. Default: Disabled.
Generate start	Specify how you want the OECB to handle generating a CDR Start message. Default: OK. Valid values: • OK—Generate the Start message when the system receives an OK message in response to an INVITE. • None—Do not generate a Start message. • Invite—Generate a Start message when the system receives a SIP session INVITE.
Generate interim	Specify an interim message to indicate to the accounting server that the SIP session parameters changed. Default: Re-invite Response. Valid values: • OK—Generate a Start message when the OECB receives an OK message in response to an INVITE. • Re-invite—Cause the OECB to transmit an interim message.

	• Reinvite—Generate an interim message when the OECB receives a SIP session reINVITE message. • Re Invite Cancel—Generate a Start message when the OECB receives a SIP session ReINVITE, and the ReINVITE is cancelled before the system responds. • Unsuccessful-Attempt—Generate an interim message when a SIP session set-up attempt from a preference-ordered list of next-hop destinations is unsuccessful. The interim message contains: the destination IP address, the disconnect reason, a timestamp for the failure, and the number that was called.
Intermediate period	Set the periodic recording interval in seconds. Default: 0. Range: 0-21447483647.
File output	Select to enable the OECB to generate local files containing accounting records. Default: Disabled.
File path	Specify where you want the system to store accounting record files on the OECB. (Do not use the /boot or /code file systems.) Default: /opt/logs/.
File rotate time	Set how often, in minutes, that you want to push the stored files. Default: 1440 (24 hours). Range: 0-21447483647. 0--means do not rotate the files. Note that the OECB overwrites the oldest file first.
FTP push	Select to enable the OECB to push files to the FTP server. Default: Disabled.
Push receiver	Click **Add**, and do the following: 1. • Server—Enter the IP address of the FTP or SFTP server that you want to receiver the pushed files. Default: 0.0.0.0. • Port—Set the port for the server. Default: 21 Valid values: For FTP-21. For SFTP-22. • Admin state—Select to enable this server. Default: Enabled. • Remote path—Enter the path name for sending files to the push receiver. Default: Empty. Valid values: <string> prefix for filenames. • File name prefix—Enter the file name prefix to prepend to the files the OECB sends to the push receiver. Default: Empty. Valid values: <string> prefix for filenames. • Priority—Set the priority for this push receiver. Default: 0. Range: 0-4. (0 is the highest priority.) • Protocol—Set the protocol you want the OECB to use. Default: FTP: Valid values: FTP | SFTP. • Username—Enter the user name you want the OECB to use to connect to the push receiver.

	• Do one of the following: Password—Click **Set** to enter and confirm the password you want to use to access the push receiver. Public key—Select the public key profile that you want from the drop-down list. • Temp remote file—Select to use a temporary remote file name for the file transfer. 2. Click **OK**. 3. (Optional) Repeat this procedure to add another push receiver.
Accounting servers	To add one or more accounting servers, click **Add** and do the following: 1. • Hostname—Enter the host name of the accounting server. • Port—Enter the port for the accounting server. Default: 1813. Range: 1025-65535. • Secret—Enter the secret for authentication. • NAS path—Enter the ID for the remote network accounting receiver. 2. Click **OK**. The system adds the server to the list in the Accounting server dialog. 3. (Optional) Repeat to add another accounting server.

3. Click **OK**.
4. Save the configuration.

FTP Push

In addition to local and RADIUS server storage, the Oracle Enterprise Communications Broker (OECB) can send accounting files to an FTP server. The information sent to the FTP server is the same as that stored locally.

Use FTP push to copy local CDR files to a remote FTP server on a periodic basis. You configure FTP push by defining push receivers with the login and FTP server credentials of the remote server. At the specified time interval (file rotate time), the OECB closes the current file and pushes the files that are complete and have not yet been pushed, including the just-closed file to the FTP server.

Push receiver configurations must include:

- Enabling the FTP push server
- The server’s IP address and port
- Remote path to the upload destination
- File name prefix
- Account login credentials

Multiple Push Receivers

OECB (OECB) supports up to five CDR push receivers for use with the local file storage and FTP push feature. For each receiver you configure, you can set the file transfer protocol that you want to use. (FTP or SFTP). The system uses the push receivers according to the priorities you assign by setting a 0 through 4 priority number to the server. 0 is the highest priority, and 4 (default) is the lowest.

Based on the priority level you set, the OECB uses the strategy that you set to select a CDR push receiver. If the highest priority push receiver selected using the strategy becomes unavailable, the OECB uses the strategy (hunt, round robin) to select another.

This feature is dynamically configurable. When you change the configuration, the OECB updates the list of push receivers if it has changed.

Secure FTP Push Configuration

You can configure the Oracle Enterprise Communications Broker (OECB) to securely log on to a push receiver using one of the following methods that creates a secure connection.

Password authentication—Set the **protocol** parameter on the push receiver to SFTP, configure a username and password, and leave the **public-key** parameter blank. Note that you must also import the host key from the SFTP server to the OECB for this type of authentication.

Public key authentication—Set the **protocol** parameter on the push receiver to SFTP, set the **public-key** parameter to a configured public key record name including an account **username**, and configure your SFTP server with the public key pair from the OECB.

It is often difficult to determine whether the SFTP server uses its RSA key or its DSA key for its server application. For this reason, Oracle recommends that you import both the RSA key and the DSA key to the OECB to ensure a successful FTP Push.

It is also common for the SFTP server to run the Linux operating system. For Linux, the command ssh-keygen-e creates the public key that you need to import to the OECB. The ssh-keygen-e command sequence requires you to specify the file export type, as follows.

```
[linux-vpn-1 ~]# ssh-keygen -e
Enter file in which the key is (/root/.ssh/id_rsa/): /etc/ssh/
ssh_host_rsa_key.pub
```

If you cannot access the SFTP server directly, but you can access it from another Linux host, use the ssh-keyscan command to get the key. An example command line follows.

```
root@server:~$ssh-keyscan -t dsa sftp.server.com
```

Add an FTP Push Receiver

The Oracle Enterprise Communications Broker (OECB) supports configuring up to five FTP push servers to receive accounting files. Use the **Push Receiver Add** dialog located on the **account-config** page to access the parameters for creating a list of FTP push receivers.

- If you plan to use a public key for authentication to the push receiver, create public key profile. See "Configure Secure FTP Push with Public Key Authentication."
- Configure accounting. See "Configure Accounting."

To add an FTP push server to the accounting configuration,

1. Access the Accounting Configuration object.

   Configuration, **Accounting**.

2. On the **Accounting config** page, do the following:

FTP push	Select to enable FTP push. Default: Disabled.
Push receiver	Click **Add**, and do the following: 1. • Server—Enter the IP address of the FTP or SFTP server that you want to receiver the pushed files. Default: 0.0.0.0. • Port—Set the port for the server. Default: 21 Valid values: For FTP-21. For SFTP-22. • Admin state—Select to enable this server. Default: Enabled. • Remote path—Enter the path name for sending files to the push receiver. Default: Empty. Valid values: <string> prefix for filenames. • File name prefix—Enter the file name prefix to prepend to the files the OECB sends to the push receiver. Default: Empty. Valid values: <string> prefix for filenames. • Priority—Set the priority you want the OECB to use when hunting for this push receiver versus your other ones. Default: 4. Range: 0-4. (0 is the highest priority.) • Protocol—Set the protocol you want the OECB to use. Default: FTP: Valid values: FTP | SFTP. • Username—Enter the user name you want the OECB to use to connect to the push receiver. • Do one of the following: Password—Click **Set** to enter and confirm the password you want to use to access the push receiver. Public key—Select the public key profile that you want from the drop-down list. • Temp remote file—Select to use a temporary remote file name for the file transfer. 2. Click **OK**.

	3. (Optional) Repeat this procedure to add another push receiver.

3. Click **OK**.
4. Save the configuration.

Security Settings

Security configuration from the GUI consists of creating the building blocks you can use to establish TLS-secured paths for your signaling traffic. The overall process includes generating certificate requests and certificate import.

The TLS configuration procedures that you can perform from the GUI includes:

- Configure Certificate Records.
- Generate Certificate Request for your CA.
- Import Certificates.
- Upload certificate files.
- Download certificate files.
- Configure TLS Profiles, which utilize your certificate records.
- Apply TLS Profiles to SIP Interfaces, agents and the web-server-config.

The dialogs available from the Security icon allow you to perform all procedures with the exception of applying a TLS profile to a configuration element. You apply TLS profiles to configuration elements using controls within their respective dialogs.

SHA 2 Support

The Oracle Enterprise Communications Broker (OECB) supports Secure Hash Algorithm (SHA) 2 for improved security.

The OECB supports SHA 2 for:

- Generating certificate requests, signing certificates, and verifying certificates.
- Configuring SHA-2 digital certificates on all interfaces through the dashboard, for example, the LDAP, SIP, and web/HTTPS: interfaces.
- Using the 2048 key size as the default for the signing algorithm.
- TLS 1.2 using the SHA-2 algorithm for certificates.

Add a Certificate Record

Use the certificate-record element to add certificate records to the Oracle Enterprise Communications Broker (OECB).

- Confirm that the system displays the Expert mode.

A certificate record represents either the end-entity or the Certificate Authority (CA) certificate on the OECB. When you configure a certificate for the OECB, the name that you enter must be the same as the name that you use to generate a certificate request. If configuring for an end stations CA certificate for mutual authentication, the certificate name must be the same name used during the import procedure.

- If this certificate record is used to present an end-entity certificate, associate a private key with this certificate record by using a certificate request.
- If this certificate record is created to hold a CA certificate or certificate in pkcs12 format, a private key is not required.

1. From the Web GUI, click **Configuration**, **Security**, **Certificate record**.
2. On the Certificate record page, click**Add**.
3. On the Add certificate record page, click **Show advanced**, and do the following:

Name	Enter the name of the certificate record.
Country	Enter a two character country name abbreviation. For example, US for the United States.
State	Enter a two character state or province name abbreviation. For example, NE for Nebraska.
Locality	Enter the name of the locality in the state or province. For example, a city, a township, or a parish. Range: 1-128 characters.
Organization	Enter the name of the organization holding the certificate. For example, a company name. Range: 1-64 characters.
Unit	Name of the unit within the organization holding the certificate. For example, a business unit or a department. Range: 1-64 characters.
Common name	Common name for the certificate record. For example, your name. Range: 1-64 characters.
Key size	Size of the key for the certificate. Supported values: 512 | 1024 | 2048. Default: 2048.
Alternate name	Alternate name of the certificate holder.
Trusted	Select to trust this certificate record.
Key usage list	Click **Add** and select a key that you want to use with this certificate record from the drop-down list, and do one of the following: • Click **OK**. • Click **Apply/Add Another**, add another key , and click **OK**. Repeat as needed. This parameter defaults to the combination of digitalSignature and keyEncipherment. For a list of other valid values and their descriptions, see the section “Key Usage Control” in the *ACLI Configuration Guide*.
Extended key usage list	Click **Add**, select an extended key that you want to use with this certificate record from the drop-down list, and do one of the following:

	• Click **OK**. • Click **Apply/Add Another**, add another extended key, and click **OK**. Repeat as needed. This parameter defaults to serverAuth. For a list of other valid values and their descriptions, see the section “Key Usage Control” in the *ACLI Configuration Guide*.
Options	

4. Click **OK**.

5. Save the configuration.

- Create TLS profiles, using the certificate records to further define the encryption behavior and to provide an entity that you can apply to a SIP interface.

TLS Profile Configuration

Certificate records must exist prior to this configuration.

Configure a TLS profile to further define the encryption behavior you want between these systems and to establish an entity that you can apply to SIP Interfaces. Steps required follow.

1. Access the TLS profile configuration object.

   Click **Configuration**, **Security**, **TLS profile**.
2. On the TLS profiles page, click Add, and do the following:
3. Name—Enter the name of the TLS profile. This parameter is required.
4. End entity certificate—Enter the name of the Certificate Record for the applicable entity.

5. Trusted CA certificates—Enter the names of the trusted CA certificate records.
6. Cipher list—The following cipher-lists are supported for the GUI only:
   - AES256-SHA (TLS_RSA_WITH_AES_256_CBC_SHA) - Firefox (version 12) and Chrome (version 19.0.1084.46m)
   - AES128-SHA (TLS_RSA_WITH_AES_128_CBC_SHA) - Firefox (version 12) and Chrome (version 19.0.1084.46m)
   - DES-CBC-SHA (SSL_RSA_WITH_DES_CBC_SHA or TLS_RSA_WITH_DES_CBC_SHA) - Internet Explorer (Version 9)
7. Verify depth—Specify the maximum depth of the certificate chain that will be verified. Default: 10. Range: 0-10.
8. Mutual authenticate—Define whether or not you want the Oracle Enterprise Communications Broker to mutually authenticate the client. Default: disabled. Valid values: enabled | disabled.
9. TLS version—Enter the TLS version you want to use with this TLS profile. Default: compatibility. Valid values: TLSv1, SSLv3, and compatibility.
10. Cert status check—Enables OCSP in conjunction with an existing TLS profile.

11. Cert status profile list—Assigns one or more cert-status-profiles to the current TLS profile. Each assigned cert-status-profile provides the information needed to access a single OCSP responder.
12. Ignore dead responder—Enables your device to establish a client connection when the OCSP responder is unavailable, assuming the associated certificate was signed by a trusted certificate authority. Default: disabled. Valid values: enabled | disabled.
13. Allow self signed cert—Enables your device to establish client connections to clients that present self-signed certificates. Default: disabled. Valid values: enabled | disabled.

Apply the TLS profile to a SIP Interface by selecting if from the SIP Interface TLS Profile drop-down list.

Generate a Certificate Request

Use the certificate-record element to select a certificate record and generate a certificate request.

- Confirm that the certificate record exists.

To get a certificate authorized by a Certificate Authority (CA), you must generate a certificate request from the certificate record on the device and send it to the CA.

1. From the Web GUI, click **Configuration**, **security**, **certificate-record**.

   The system displays a list of certificate records.
2. Select the certificate record for the device.
3. Click **Generate**.

   The system creates the request and displays it in a dialog.
4. Copy the information from the dialog and send it to your CA as a text file.

- When the CA replies with the certificate, import the certificate to the device with the corresponding certificate record.

Import a Certificate

Use the certificate-record element to import a certificate into the Oracle Enterprise Communications Broker (OECB).

Use this procedure to import either a device certificate or an end-station CA certificate for a mutual authentication deployment. You must import the certificate to the corresponding certificate record for the OECB. End-station CA certificates may or may not need to be imported against a pre-configured certificate record.

1. From the Web GUI, click **Configuration**, **security**, **certificate record**.
2. Select the certificate record for the device.
3. Click **Import**.

   The system displays a dialog from which you can import the certificate.
4. Select one of the following format types from the **Format** drop down list:
   - pkcs7

- x509
- Try-all. The system tries all possible formats until it can import the certificate.

5. Browse to the certificate file, and select the certificate to import.
6. Click **Import**.

   TheOECB imports the certificate.
7. Reboot the system.

- Apply the corresponding certificate record to the intended SIP interface.

RADIUS Authentication

The User Authentication and Access control feature supports authentication using one or more RADIUS servers. In addition, you can set two levels of privilege, one for all privileges and more limited set that is read-only.

User authentication configuration also allows you to use local authentication, localizing security to the Oracle Enterprise Communications Broker (OECB) log-in modes. These modes are User and Superuser, each requiring a separate password.

The components involved in the RADIUS-based user authentication architecture are the OECB and your RADIUS servers. In these roles:

- The OECB restricts access and requires authentication through the RADIUS server. The OECB communicates with the RADIUS server using either port 1812 or 1645, but does not know whether or not the RADIUS server listens on these ports
- Your RADIUS server provides an alternative method for defining OECB users and authenticating them through RADIUS. The RADIUS server supports the VSA called ACME_USER_CLASS, which specifies what kind of user is requesting authentication and what privileges to grant.
  The OECB also supports the use of the Cisco Systems Inc.™ Cisco-AVPair vendor specific attribute (VSA). This attribute allows for successful administrator login to servers that do not support the Oracle authorization VSA. While using RADIUS-based authentication, the OECB authorizes you to enter Superuser mode locally even when your RADIUS server does not return the ACME_USER_CLASS VSA or the Cisco-AVPair VSA. For this VSA, the Vendor-ID is 1 and the Vendor-Type is 9. The following below shows the values this attribute can return, and the result of each:
  - shell:priv-lvl=15—User automatically logged in as an administrator
  - shell:priv-lvl=1—User logged in at the user level, and not allowed to become an administrator
  - Any other value—User rejected

When RADIUS user authentication is enabled, the OECB communicates with one or more configured RADIUS servers that validates the user and specifies privileges. On the OECB, you configure:

- What type of authentication you want to use on the OECB
- If you are using RADIUS authentication, you set the port from which you want the OECB to send messages

- If you are using RADIUS authentication, you also set the protocol type you want the OECB and RADIUS server to use for secure communication

Although most common deployments use two RADIUS servers to support this feature, you may configure up to six. Among other settings for the server, there is a class parameter that specifies whether the OECB should consider a specific server as primary or secondary. As implied by these designations, the primary servers are used first for authentication, and the secondary servers are used as backups. If you configure more than one primary and one secondary server, the OECB chooses servers to which it sends traffic in a round-robin strategy. For example, if you specify three servers are primary, the OECB will round-robin to select a server until it finds an appropriate one. The system does the same for secondary servers.

The VSA attribute assists with enforcement of access levels by containing one of the following classes:

- None—All access denied
- User—Monitoring privileges are granted; your user prompt will resemble ORACLE>
- Admin—All privileges are granted (monitoring, configuration, etc.); your user prompt will resemble ORACLE#

After the system selects a RADIUS server, the OECB initiates communication and proceeds with the authentication process. The authentication process between the OECB and the RADIUS server takes place uses one the following methods, all of which are defined by RFCs:

Protocol	RFC
PAP (Password Authentication Protocol)	B. Lloyd and W. Simpson, PPP Authentication Protocols, RFC 1334, October 1992
CHAP (Challenge Handshake Authentication Protocol)	B. Lloyd and W. Simpson, PPP Authentication Protocols, RFC 1334, October 1992 W. Simpson, PPP Challenge Handshake Authentication Protocol (CHAP), RFC 1994, August 1996
MS-CHAP-V2	G. Zorn, Microsoft PPP CHAP Extensions, Version 2, RFC 2759, January 2000

Note:

MS-CHAP-V2 support includes authentication, only. The OECB does not support or allow password exchange.

Management Protocol Behavior

When you use local authentication, management protocols behave the same way that they do when you are not using RADIUS servers. When you use RADIUS servers for authentication, management protocols behave as follows:

- SSH in pass-through mode—The User and Admin accounts are authenticated locally, not through the RADIUS server. For all other accounts, the configured RADIUS servers are used for authentication. When authentication is successful, the user is granted privileges depending on the ACME_USER_CLASS VSA attribute.

- SSH in non-pass-through mode—When you create an SSH account on the Oracle Enterprise Communications Broker (OECB), you are asked to supply a user name and password. When local authentication succeeds, you are prompted for the ACLI user name and password. If your user ACLI name is user, then you are authenticated locally. Otherwise, you are authenticated using the RADIUS server. If RADIUS authentication is successful, the privileges you are granted depend on the ACME_USER_CLASS VSA attribute.
- SFTP in pass-through mode—When you do not configure an SSH account on the Oracle Enterprise Communications Broker, the RADIUS server is contacted for authentication for any user that does not have the user name user. The Oracle Enterprise Communications Broker uses local authentication if the user name is user.
- SFTP in non-pass-through mode—The User and Admin accounts are authenticated locally, not through the RADIUS server. For all other accounts, the configured RADIUS servers are used for authentication.

RADIUS Authentication Configuration

To enable RADIUS authentication and user access on your Oracle Enterprise Communications Broker, you need to configure global parameters for the feature and then configure the RADIUS servers that you want to use.

Global Authentication Settings

To configure the global authentication settings:

1. Click the **Configuration** tab.

   The Oracle Enterprise Communications Broker displays the configuration panel.
2. Click the **Security** configuration icon.

   The Oracle Enterprise Communications Broker displays the security configuration panel.
3. Click the **Login authentication** link from the navigation panel on the left-hand side of the security configuration panel.

   The Oracle Enterprise Communications Broker displays the **Modify Authentication** dialog.
4. Set the number of the port you want to use from message sent from the Oracle Enterprise Communications Broker to the RADIUS server in the **Source port** field. The default value is 1812. The valid values are:
   - 1645 | 1812
5. Set the type of user authentication you want to use on this Oracle Enterprise Communications Broker using the **Type** drop-down list. The default value is **local**. The valid values are:
   - local | radius
6. If you are using RADIUS user authentication, set the protocol to use with your RADIUS server(s) from the **Protocol** drop-down list. The default is **pap**. The valid values are:
   - pap | chap | mschapv2

7. Set the **allow-local-authorization parameter** to **enabled** if you want the Oracle Enterprise Communications Broker to authorize users to enter Superuser (administrative) mode locally even when your RADIUS server does not return the ACME_USER_CLASS VSA or the Cisco-AVPair VSA. The default for this parameter is **disabled**.
8. Check the **Login as admin** checkbox if you want users to be logged automatically in Superuser (administrative) mode. The default for this parameter is disabled.

RADIUS Server Settings

The parameters you set for individual RADIUS servers identify the RADIUS server, establish a password common to the Oracle Enterprise Communications Broker and the server, and establish trying times.

Setting the class and the authentication methods for the RADIUS servers can determine how and when they are used in the authentication process.

To configure a RADIUS server to use for authentication:

1. Navigate to the Radius servers list box directly below the main authentication configuration controls. The list box displays all previously configured Radius servers, if any. You can Add, Edit, Copy and Delete existing servers using the control across the top of this list box.
2. Click the Add link.

   The Oracle Enterprise Communications Broker displays the Add Radius server dialog.
3. Set the remote IP address for the RADIUS server in the **Add** field. There is no default value, and you are required to configure this address.
4. Set the port at the remote IP address for the RADIUS server in the **Port** field. The default port is set to **1812**. The valid values are:
   - 1645 | 1812
5. Set the state of the RADIUS server in the **State** field. Enable this parameter to use this RADIUS server to authenticate users. The default value is **enabled**. The valid values are:
   - enabled | disabled
6. Set the password that the RADIUS server and the Oracle Enterprise Communications Broker share in the **secret** dialog, available when you click the **set** button. This dialog requires you to enter the secret twice and click **OK**. This password is transmitted between the two when the request for authentication is initiated; this ensures that the RADIUS server is communicating with the correct client.
7. Set the NAS ID for the RADIUS server in the **Nas id** field. There is no default for this parameter.
8. Set the number of times that you want the Oracle Enterprise Communications Broker to retry for authentication information from this RADIUS server in the **retry-limit** field. The default value is **3**. The valid range is:
   - Minimum—1
   - Maximum—5

If the RADIUS server does not respond within this number of tries, the Oracle Enterprise Communications Broker marks is as dead.

9. Set the amount of time (in seconds) that you want theOracle Enterprise Communications Broker to wait before retrying for authentication from this RADIUS server in the **retry-time** field. The default value is **5**. The valid range is:
   - Minimum—5
   - Maximum—10
10. Set the amount of time in seconds before the Oracle Enterprise Communications Broker retries a RADIUS server that it has designated as dead because that server did not respond within the maximum number of retries in the **dead-time** field. The default is **10**. The valid range is:
    - Minimum—10
    - Maximum—10000
11. Set the maximum number of outstanding sessions for this RADIUS server. The default value is **255** in the **maximum-sessions** field. The valid range is:
    - Minimum—1
    - Maximum—255
12. Set the class of this RADIUS server as either primary or secondary in the **class** field. A connection to the primary server is tried before a connection to the secondary server is tried. The default value is **primary**. Valid values are:
    - primary | secondary

      The Oracle Enterprise Communications Broker tries to initiate contact with primary RADIUS servers first, and then tries the secondary servers if it cannot reach any of the primary ones.

      If you configure more than one RADIUS server as primary, the Oracle Enterprise Communications Broker chooses the one with which it communicates using a round-robin strategy. The same strategy applies to the selection of secondary servers if there is more than one.
13. Set the authentication method you want the Oracle Enterprise Communications Broker to use with this RADIUS server from the in the **authentication-method** drop-down. The default value is **pap**. Valid values are:
    - all | pap | chap | mschapv2

      This parameter has a specific relationship to the global protocol parameter for the authentication configuration, and you should exercise care when setting it. If the authentication method that you set for the RADIUS server does not match the global authentication protocol, then the RADIUS server is not used. The Oracle Enterprise Communications Broker simply overlooks it and does not send authentication requests to it. You can enable use of the server by changing the global authentication protocol so that it matches.
14. Save your work and activate your configuration.

TACACS+ Overview

Like DIAMETER and RADIUS, TACACS+ uses a client/server model in which a Network Access Server (NAS) acts in the client role and a TACACS+ equipped device (a daemon in TACACS+ nomenclature) assumes the server role. For purposes of the current implementation, the Oracle Enterprise Communications Broker functions as the TACACS+ client. Unlike RADIUS, which combines authentication and authorization, TACACS+ provides three distinct applications to provide finer grade access control.

Authentication is the process that confirms a user's purported identity. Authentication is most often based on a simple username/password association, but other, and more secure methods, are becoming more common. The following authentication methods are support by the current implementation: simple password, PAP (Protocol Authentication Protocol), and CHAP (Challenge Handshake Authentication Protocol).

Authorization is the process that confirms user privileges. TACACS+ can provide extremely precise control over access to system resources. In the current implementation, TACACS+ controls access to system administrative functions.

TACACS+ provides secure communication between the client and daemon by encrypting all packets. Encryption is based on a shared-secret, a string value known only to the client and daemon. Packets are encrypted in their entirety, save for a common TACACS+ header.

The cleartext header contains, among other fields, a version number, a sequence number. and a session ID. Using a methodology described in Section 5 of the TACACS+ draft RFC, the sender encrypts outbound cleartext messages by repetitively running the MD5 hash algorithm over the concatenation of the session ID, shared-secret, version number, and sequence number values, eventually deriving a virtual one-time-pad of the same length as the message body. The sender encrypts the cleartext message with an XOR (Exclusive OR) operation, using the cleartext message and virtual one-time-pad as inputs.

The message recipient, who possesses the shared-secret, can readily obtain the version number, sequence number, session ID, and message length from the cleartext header. Consequently, the recipient employs the same methodology to derive a virtual one-time-pad identical to that derived by the sender. The recipient decrypts the encrypted message with an XOR operation, using the encrypted message and virtual one-time-pad as inputs.

Details on the TACACS+ functions and configuration can be found in the Oracle Communications Session Border Controller ACLI Configuration Guide.

The TACACS+ implementation is based upon the following internet draft.

draft-grant-tacacs-02.txt, *The TACACS+ Protocol Version 1.78*

Other relevant documents include

RFC 1321, *The MD-5 Message Digest Algorithm*

RFC 1334, *PPP Authentication Protocols* .

RFC 1994, *PPP Challenge Handshake Authentication Protocol (CHAP)*

Note:

TACACs documentation in this guide excludes per-message definitions that duplicate IETF standards documentation.

TACACS+ Authentication

The Oracle Enterprise Communications Broker uses TACACS+ authentication services solely for the authentication of user accounts. Administrative users must be authenticated locally by the Oracle Enterprise Communications Broker.

The current TACACS+ implementation supports three types of user authentication: simple password (referred to as ascii by TACACS+), PAP, and CHAP.

ascii Login

ascii login is analogous to logging into a standard PC. The initiating peer is prompted for a username, and, after responding, is then prompted for a password.

PAP Login

PAP is defined in RFC 1334, *PPP Authentication Protocols*. This protocol offers minimal security in that passwords are transmitted as unprotected cleartext. PAP login differs from ascii login in that the username and password are transmitted to the authenticating peer in a single authentication packet, as opposed to the two-step prompting process used in ascii login.

CHAP Login

CHAP is defined in RFC 1994, *PPP Challenge Handshake Authentication Protocol.* CHAP is a more secure than PAP in that it is based on a shared-secret (known only to the communicating peers), and therefore avoids the transmission of cleartext authentication credentials. CHAP operations can be summarized as follows.

After a login attempt, the initiator is tested by the authenticator who responds with a packet containing a challenge value — an octet stream with a recommended length of 16 octets or more. Receiving the challenge, the initiator concatenates an 8-bit identifier (carried within the challenge packet header), the shared-secret, and the challenge value, and uses the shared-secret to compute an MD-5 hash over the concatenated string. The initiator returns the hash value to the authenticator, who performs the same hash calculation, and compares results. If the hash values match, authentication succeeds; if hash values differ, authentication fails.

Authentication Message Exchange

All TACACS+ authentication packets consist of a common header and a message body. Authentication packets are of three types: START, CONTINUE, and REPLY.

START and CONTINUE packets are always sent by the Oracle Enterprise Communications Broker, the TACACS+ client. START packets initiate an authentication session, while CONTINUE packets provide authentication data requested by the TACACS+ daemon. In response to every client-originated START or CONTINUE, the daemon must respond with a REPLY packet. The REPLY packet contains either a decision (pass or fail), which terminates the authentication session, or a request for additional information needed by the authenticator.

TACACS+ Header

The TACACS+ header format is as follows.

```
+----+----+--------+--------+--------+
|maj |min | type   | seq_no | flags  |
|ver |ver |        |        |        |
+----+----+--------+--------+--------+
| session_id                         |
+------------------------------------+
| length                             |
+------------------------------------+
```

maj ver

This 4-bit field identifies the TACACS+ major protocol version, and must contain a value of 0xC .

min ver

This 4-bit field identifies the TACACS+ minor protocol version, and must contain either a value of 0x0 (identifying TACACS+ minor version 0) or a value of 0x1 . (identifying TACACS+ minor version 1). Minor versions 0 and 1 differ only in the processing of PAP and CHAP logins.

type

This 8-bit field identifies the TACACS+ AAA service as follows:

0x1 — TACACS+ Authentication

0x2 — TACACS+ Authorization

0x3 — TACACS+ Accounting

sequence-no

This 8-bit field contains the packet sequence for the current session.

The first packet of a TACACS+ session must contain the value 1; each following packet increments the sequence count by 1. As TACACS+ sessions are always initiated by the client, all client-originated packets carry an odd sequence number, and all daemon-originated packets carry an even sequence number. TACACS+ protocol strictures do not allow the sequence_no field to wrap. If the sequence count reaches 255, the session must be stopped and restarted with a new sequence number of 1.

flags

This 8-bit field contains flags as described in Section 3 of the draft RFC; flags are not under user control.

session_id

This 32-bit field contains a random number that identifies the current TACACS+ session — it is used by clients and daemons to correlate TACACS+ requests and responses.

length

This 32-bit field contains the total length of the TACACS+ message, excluding the 12-octet header — in other words, the length of the message body.

Authentication START Packet

The Oracle Enterprise Communications Broker, acting as a TACACS+ client, sends an authentication START packet to the TACACS+ daemon to initiate an authentication session. The daemon must respond with a REPLY packet.

The authentication START packet format is as follows.

```
+-----------------------------------+
|           Common Header           |
|                                   |
|         type contains 0x1         |
+--------+--------+--------+--------+
|action  |priv_lvl|authen_ |service |
|        |        |type    |        |
|--------+--------+--------+--------+
|user_len|port_len|rem_addr|data_len|
|        |        |_len    |        |
+--------+--------+--------+--------+
|              user ...             |
+-----------------------------------+
|              port ...             |
+-----------------------------------+
|            rem-addr ...           |
+-----------------------------------+
|              data ...             |
+-----------------------------------+
```

action

This 8-bit field contains an enumerated value that identifies the requested authentication action. For the current TACACS+ implementation, this field always contains a value of 0x01 , indicating user login authentication.

priv_lvl

This 8-bit field contains an enumerated value that identifies the privilege level requested by an authenticating user. For the current TACACS+ authentication implementation, this field always contains a value of 0x01 , indicating the user level.

authen-type

This 8-bit field contains an enumerated value that identifies the authentication methodology. Supported values are as follows:

0x01 ASCII — simple login, Oracle Enterprise Communications Broker prompts for username and password

0x02 PAP — as specified in RFC 1334

0x03 CHAP — as specified in RFC 1994

service

This 8-bit field contains an enumerated value that identifies the service requesting the authentication. For the current TACACS+ implementation, this field always contains a value of 0x01 , indicating user login authentication.

user_len

This 8-bit field contains the length of the user field in octets.

port_len

This 8-bit field contains the length of the port field in octets. As the port field is not used in the current TACACS+ authentication implementation, the port_len field always contains a value of 0 as specified in Section 4 of the TACACS+ draft RFC.

rem_addr_len

This 8-bit field contains the length of the rem_addr field in octets. As the rem_addr field is not used in the current TACACS+ authentication implementation, the rem_addr_len field always contains a value of 0 as specified in Section 4 of the TACACS+ draft RFC.

data_len

This 8-bit field contains the length of the data field in octets.

user

This variable length field contains the login name of the user to be authenticated.

port

This variable length field contains the name of the Oracle Enterprise Communications Broker port on which authentication is taking place. Following Cisco Systems convention, this field contains the string tty10 .

rem_addr

This variable length field contains the location of the user to be authenticated. This field contains the localhost address.

data

This optional variable length field contains miscellaneous data.

Authentication REPLY Packet

The TACACS+ daemon sends an authentication REPLY packet to the Oracle Enterprise Communications Broker in response to a authentication START or authentication CONTINUE packet. Depending on the contents of the status field, the authentication REPLY packet either ends the authentication transaction, or continues the transaction by requesting addition information needed by the authenticator.

The authentication REPLY packet format is as follows.

```
+------------------------------------+
|            Common Header           |
|                                    |
|          type contains 0x1         |
+--------+--------+--------+--------+
|     (type field contains 0x1)      |
+--------+--------+-----------------+
| status |  flags |  server_msg_len |
|--------+--------+--------+--------+
|     data_len    |  server_msg ... |
+-----------------+-----------------+
|              data ...             |
+-----------------------------------+
```

status

This 16-bit field contains an enumerated value that specifies the current state of the authentication process. Supported values are as follows:

0x01 PASS — the user is authenticated, thus ending the session

0x02 FAIL — the user is rejected, thus ending the session

0x04 GETUSER — daemon request for the user name

0x05 GETPASS — daemon request for the user password

0x06 RESTART — restarts the transaction, possibly because the sequence number has wrapped, or possibly because the requested authentication type is not supported by the daemon

0x07 ERROR — reports an unrecoverable error

flags

This 8-bit field contains various flags that are not under user control.

server_msg_len

This 16-bit field contains the length of the server_msg field in octets. As the server_msg field is not used in REPLY packets sent by the current TACACS+ authentication implementation, the server_msg_len field always contains a value of 0 as specified in Section 4 of the TACACS+ draft RFC.

data_len

This 16-bit field contains the length of the data field in octets. As the data field is not used in REPLY packets sent by the current TACACS+ authentication implementation, the data_len field always contains a value of 0 as specified in Section 4 of the TACACS+ draft RFC.

server_msg

This optional variable length field contains a server message intended for display to the user. The current TACACS+ authentication implementation does not use this field.

data

This optional variable length field contains data pertinent to the authentication process. The current TACACS+ authentication implementation does not use this field.

Authentication CONTINUE Packet

The Oracle Enterprise Communications Broker, acting as a TACACS+ client, sends an authentication CONTINUE packet to the TACACS+ daemon in response to a REPLY message which requested additional data required by the authenticator.

The authentication CONTINUE packet format is as follows.

```
+-----------------------------------+
|           Common Header           |
|                                   |
|         type contains 0x1         |
+--------+--------+-----------------+
|   user_msg_len  |     data_len    |
|--------+--------+-----------------+
|  flags |       user_msg ...       |
+--------+--------------------------+
|              data ...             |
+-----------------------------------+
```

user_msg_len

This 16-bit field contains the length of the user_msg field in octets.

data_len

This 16-bit field contains the length of the data field in octets. As the data field is not used in the current TACACS+ authentication implementation, the data field always contains a value of 0 as specified in Section 4 of the TACACS+ draft RFC.

flags

This 8-bit field contains various flags that are not under user control.

user_msg

This variable length field contains a string that responds to an information request contained in a REPLY message.

data

This optional variable length field contains miscellaneous data, often in response to a daemon request. The current TACACS+ authentication implementation does not use the data field in Authentication CONTINUE packets.

Authentication Scenarios

Each of the supported user authentication scenarios is described in terms of packet flow in the following sections.

ASCII Authentication

The Oracle Enterprise Communications Broker initiates the authentication with an authentication START packet.

```
+-----------------------------------+
|           Common Header           |
|     minor_version contains 0x0    |
|         type contains 0x1         |
+--------+--------+--------+--------+
|action  |priv_lvl|authen_ |service |
|        |        |type    |        |
|  0x01  |  0x01  |  0x01  |  0x01  |
|--------+--------+--------+--------+
|user_len|port_len|rem_addr|data_len|
|        |        |_len    |        |
|    0   |    N   |    N   |    0   |
+--------+--------+--------+--------+
|                port               |
|               tty10               |
+-----------------------------------+
|              rem_addr             |
|         localhost address         |
+-----------------------------------+
```

- The action field specifies the requested authentication action — 0x01 for TAC_PLUSAUTHEN_LOGIN (authentication of a user login).
- The priv_lvl field specifies the privilege level requested by the user — 0x01 for TAC_PLUS_PRIV_LVL_USER.
- The authen_type field specifies the authentication methodology — 0x01 for TAC_PLUS_AUTHEN_TYPE_ASCII (simple login).
- The service field specifies the requesting service — 0x01 for TAC_PLUS_AUTHEN_SVC_LOGIN (login service).
- The user_len and data_len fields contain a value of 0 , as required by the TACACS+ protocol.
- The port_len and rem_addr_len fields contain the length, in octets, of the port and rem_addr fields.
- The port field contains the name of the Oracle Enterprise Communications Broker port on which authentication is taking place. Following Cisco Systems convention, this field contains the string tty10 .
- The rem_addr field specifies the location of the user to be authenticated. This field contains the localhost address.

The TACACS+ daemon returns an authentication REPLY requesting the username.

```
+-----------------------------------+
|           Common Header           |
|     minor_version contains 0x0    |
|         type contains 0x1         |
+--------+--------+-----------------+
| status |  flags |  server_msg_len |
|  0x04  |        |        0        |
|--------+--------+-----------------+
|     data_len    |
|        0        |
+-----------------+
```

- The status field specifies a daemon request — 0x04 for TAC_PLUS_AUTH_STATUS_GETUSER (get username).
- The server_msg_len data_len fields both contain a value of 0 , as required by the TACACS+ protocol.

The Oracle Enterprise Communications Brokerresponds with an authentication CONTINUE packet.

```
+-----------------------------------+
|           Common Header           |
|     minor_version contains 0x0    |
|         type contains 0x1         |
+-----------------+-----------------+
|   user_msg_len  |     data_len    |
|                 |        0        |
|--------+--------+-----------------+
|  flags |       user_msg ...       |
+--------+--------------------------+
```

- The user_msg_len field contains the length, in octets, of the user_msg field.
- The data_len field contains a value of 0 , as required by the TACACS+ protocol.
- The user_msg field contains the username to be authenticated.

The TCACS+ daemon returns a second authentication REPLY requesting the user password.

```
+-----------------------------------+
|           Common Header           |
|     minor_version contains 0x0    |
|         type contains 0x1         |
+--------+--------+--------+--------+
| status |  flags |  server_msg_len |
|  0x05  |        |        0        |
|--------+--------+--------+--------+
|     data_len    |
|        0        |
+-----------------+
```

- The status field specifies a daemon request — 0x05 for TAC_PLUS_AUTH_STATUS_GETPASS (get user password).
- The server_msg_len and data_len fields both contain a value of 0 , as required by the TACACS+ protocol.

The Oracle Enterprise Communications Broker responds with a second authentication CONTINUE packet.

```
+-----------------------------------+
|           Common Header           |
|     minor_version contains 0x0    |
|         type contains 0x1         |
+-----------------+-----------------+
|   user_msg_len  |     data_len    |
|                 |        0        |
|--------+--------+--------+--------+
|  flags |       user_msg ...       |
+--------+--------------------------+
```

- The user_msg_len field contains the length, in octets, of the user_msg field.

- The data_len field contains a value of 0 , as required by the TACACS+ protocol.
- The user_msg field contains the user password to be authenticated.
- Other, optional fields are not used.

The TACACS+ daemon returns a third authentication REPLY reporting the authentication result, and terminating the authentication session.

```
+-----------------------------------+
|           Common Header           |
|     minor_version contains 0x0    |
|         type contains 0x1         |
+--------+--------+-----------------+
| status |  flags |  server_msg_len |
|  0x01  |        |        0        |
|--------+--------+-----------------+
|     data_len    |
|        0        |
+-----------------+
```

- The status field specifies the authentication result — 0x01 for TAC_PLUS_AUTH_STATUS_PASS (authorization succeeds), or 0x02 for TAC_PLUS_AUTH_STATUS_FAIL (authorization fails).
- The server_msg_len , and data_len fields both contain a value of 0 , as required by the TACACS+ protocol.

PAP Authentication

The Oracle Enterprise Communications Broker initiates the authentication with an authentication START packet.

```
+-----------------------------------+
|           Common Header           |
|     minor_version contains 0x1    |
|         type contains 0x1         |
+--------+--------+--------+--------+
|action  |priv_lvl|authen_ |service |
|        |        |type    |        |
|  0x01  |  0x01  |  0x02  |  0x01  |
|--------+--------+--------+--------+
|user_len|port_len|rem_addr|data_len|
|        |        |_len    |        |
|    N   |    N   |    N   |    N   |
+--------+--------+--------+--------+
|                user               |
+-----------------------------------+
|                port               |
|               tty10               |
+-----------------------------------+
|              rem_addr             |
|         localhost address         |
+-----------------------------------+
|              data ...             |
+-----------------------------------+
```

- The action field specifies the requested authentication action — 0x01 for TAC_PLUSAUTHEN_LOGIN (authentication of a user login).
- The priv_lvl field specifies the privilege level requested by the user — 0x01 for TAC_PLUS_PRIV_LVL_USER.
- The authen_type field specifies the authentication methodology — 0x02 for TAC_PLUS_AUTHEN_TYPE_PAP (PAP login).
- The service field specifies the requesting service — 0x01 for TAC_PLUS_AUTHEN_SVC_LOGIN (login service).
- The user_len field contains the length, in octets, of the user field.
- The port_len field contains the length, in octets, of the port field.
- The rem_addr_len field contains the length, in octets, of the rem_addr field.
- The data_len field contains the length, in octets, of the date field.
- The user field contains the username to be authenticated.
- The port field contains the name of the Oracle Enterprise Communications Broker port on which authentication is taking place. Following Cisco Systems convention, this field contains the string tty10 .
- The rem_addr field specifies the location of the user to be authenticated. This field contains the localhost address.
- The data field contains the password to be authenticated.

The TCACS+ daemon returns an authentication REPLY reporting the authentication result.

```
+-----------------------------------+
|           Common Header           |
|     minor_version contains 0x1    |
|         type contains 0x1         |
+--------+--------+-----------------+
| status |  flags |   server_msg_len |
|  0x01  |        |        0        |
|--------+--------+-----------------+
|     data_len    |
|        0        |
+-----------------+
```

- The status field specifies the authentication result — 0x01 for TAC_PLUS_AUTH_STATUS_PASS (authorization succeeds), or 0x02 for TAC_PLUS_AUTH_STATUS_FAIL (authorization fails).
- The server_msg_len and data_len fields both contain a value of 0 , as required by the TACACS+ protocol.
- Other, optional fields are not used.

CHAP Authentication

The Oracle Enterprise Communications Broker initiates the authentication with an authentication START packet.

```
+-----------------------------------+
|           Common Header           |
|     minor_version contains 0x1    |
|         type contains 0x1         |
+--------+--------+--------+--------+
|action  |priv_lvl|authen_ |service |
|        |        |type    |        |
|  0x01  |  0x01  |  0x03  |  0x01  |
|--------+--------+--------+--------+
|user_len|port_len|rem_addr|data_len|
|        |        |_len    |        |
|    N   |    N   |    N   |    N   |
+--------+--------+--------+--------+
|                user               |
+-----------------------------------+
|                port               |
|               tty10               |
+-----------------------------------+
|              rem_addr             |
|         localhost address         |
+-----------------------------------+
|              data ...             |
+-----------------------------------+
```

- The action field specifies the requested authentication action — 0x01 for TAC_PLUSAUTHEN_LOGIN (authentication of a user login).
- The priv_lvl field specifies the privilege level requested by the user — 0x01 for TAC_PLUS_PRIV_LVL_USER.
- The authen_type field specifies the authentication methodology — 0x03 for TAC_PLUS_AUTHEN_TYPE_CHAP (CHAP login).
- The service field specifies the requesting service — 0x01 for TAC_PLUS_AUTHEN_SVC_LOGIN (login service).
- The user_len field contains the length, in octets, of the user field.
- The port_len field contains the length, in octets, of the port field.
- The rem_addr_len field contains the length, in octets, of the rem_addr field.
- The data_len field contains the length, in octets, of the date field.
- The user field contains the username to be authenticated.
- The port field contains the name of the Oracle Enterprise Communications Broker port on which authentication is taking place. Following Cisco Systems convention, this field contains the string tty10 .
- The rem_addr field specifies the location of the user to be authenticated. This field contains the localhost address.
- The data field contains the password to be authenticated.

The TCACS+ daemon returns an authentication REPLY reporting the authentication result.

```
+----------------------------------+
|          Common Header           |
|     minor_version contains 0x1   |
|         type contains 0x1        |
+--------+--------+----------------+
| status |  flags | server_msg_len |
|  0x01  |        |       0        |
|--------+--------+----------------+
|     data_len    |
|        0        |
+-----------------+
```

- The status field specifies the authentication result — 0x01 for TAC_PLUS_AUTH_STATUS_PASS (authorization succeeds), or 0x02 for TAC_PLUS_AUTH_STATUS_FAIL (authorization fails).
- The server_msg_len and data_len fields both contain a value of 0 , as required by the TACACS+ protocol.
- Other, optional fields are not used.

TACACS+ Authorization

The Oracle Enterprise Communications Broker uses TACACS+ services to provide administrative authorization. With TACACS+ authorization enabled, each individual ACLI command issued by an admin user is authorized by the TACACS+ authorization service. The Oracle Enterprise Communications Broker replicates each ACLI command in its entirety, sends the command string to the authorization service, and suspends command execution until it receives an authorization response. If TACACS+ grants authorization, the pending command is executed; if authorization is not granted, the Oracle Enterprise Communications Broker does not execute the ACLI command, and displays an appropriate error message.

The daemon's authorization decisions are based on a database lookup. Data base records use regular expressions to associate specific command string with specific users. The construction of such records is beyond the scope of this document.

Authorization Message Exchange

All TACACS+ authorization packets consist of a common header and a message body. Authorization packets are of two types: REQUEST and RESPONSE.

The REQUEST packet, which initiates an authorization session, is always sent by the Oracle Enterprise Communications Broker. Upon receipt of every REQUEST, the daemon must answer with a RESPONSE packet. In the current TACACS+ implementation, the RESPONSE packet must contain an authorization decision (pass or fail). The exchange of a single REQUEST and the corresponding RESPONSE completes the authorization session.

Authorization REQUEST Packet

The Oracle Enterprise Communications Broker, acting as a TACACS+ client, sends an authorization REQUEST packet to the TACACS+ daemon to initiate an authorization session.

The authorization REQUEST packet format is as follows.

```
+-----------------------------------+
|           Common Header           |
|                                   |
|         type contains 0x2         |
+--------+--------+--------+--------+
|authen_ |priv_lvl|authen_ |authen- |
|method  |        |type    |service |
|--------+--------+--------+--------+
|user_len|port_len|rem_addr|arg_cnt |
|        |        |_len    |        |
+----+---+--------+--------+--------+
|arg1_len|arg2_len|  ...   |argN_len|
|        |        |        |        |
+--------+--------+--------+--------+
|              user ...             |
+-----------------------------------+
|              port ...             |
+-----------------------------------+
|            rem-addr ...           |
+-----------------------------------+
|              arg1 ...             |
+-----------------------------------+
|              arg2 ...             |
+-----------------------------------+
|              argN ...             |
+-----------------------------------+
```

authen_method

This 8-bit field contains an enumerated value that identifies the method used to authenticate the authorization subject — that is, an admin user. Because the admin user was authenticated locally by the Oracle Enterprise Communications Broker, this field always contains a value of 0x05 , indicating authentication by the requesting client.

priv_lvl

This 8-bit field contains an enumerated value that identifies the privilege level associated with the authorization subject. For the current TACACS+ authorization implementation, this field always contains a value of 0x00 .

authen-type

This 8-bit field contains an enumerated value that identifies the methodology. used to authenticate the authorization subject. Because the admin user was authenticated with a simple username/password exchange, this field always contains a value of 0x01 , indicating ascii login.

authen_service

This 8-bit field contains an enumerated value that identifies the service that requested authentication. Because an admin user is authenticated with a simple username/ password exchange, this field always contains a value of 0x01 , the login service.

user_len

This 8-bit field contains an integer that specifies the length, in octets, of the user field.

port_len

This 8-bit field contains an integer that specifies the length, in octets, of the port field.

rem_addr_len

This 8-bit field contains an integer that specifies the length, in octets, of the rem_addr field.

arg_cnt

This 8-bit field contains an integer that specifies the number or arguments contained with the REQUEST. Given the design of the current TACACS+ implementation, this field always contains a value of 0x02 .

arg1_len

This 8-bit field contains an integer that specifies the length, in octets, of the first argument.

Subsequent fields contain the length of each sequential argument.

user

This variable length field contains the login name of the user to be authorized.

port

This variable length field contains the name of the Oracle Enterprise Communications Broker port on which authorization is taking place. Following Cisco Systems convention, this field contains the string tty10 .

rem_addr

This variable length contains the location of the user to be authorized. This field contains the localhost address.

arg...

This variable length field contains a TACACS+ attribute value pair (AVP); each arg field holds a single AVP.

A TACACS+ AVP is an ASCII string with a maximum length of 255 octets. The string consists of the attribute name and its assigned value separated by either an equal sign (=) or by an asterisk (*). The equal sign (=) identifies a mandatory argument, one that must be understood and processed by the TACACS+ daemon; the asterisk (*) identifies an optional argument that may be disregarded by either the client or daemon.

Administrative authorization requires the use of only two TACACS+ AVPs: service and cmd .

The service AVP identifies the function to be authorized. In the case of the current implementation, the attribute value is always shell . Consequently the attribute takes the follow format:

service=shell

The cmd AVP identifies the specific ACLI command to be authorized. The command is passed in its entirety, from the administrative configuration root, **configure terminal**, through the final command argument. For example,

cmd=configure terminal security authentication type tacacsplus

Note the equal sign (=) used in the attribute examples, indicating that both are mandatory arguments.

Authorization RESPONSE Packet

The TACACS+ daemon sends an authorization RESPONSE packet to the Oracle Enterprise Communications Broker to report authorization results.

The authorization RESPONSE packet format is as follows.

```
+-----------------------------------+
|           Common Header           |
|                                   |
|         type contains 0x2         |
+--------+--------+-----------------+
|status  |arg_cnt | server_msg len  |
|        |        |                 |
|--------+--------+--------+--------+
|     data_len    |arg1_len|arg2_len|
|                 |        |        |
+--------+--------+--------+--------+
|   ...  |argN_len|    server_msg   |
|        |        |                 |
+--------+--------+-----------------+
|              data ...             |
+-----------------------------------+
|              arg1 ...             |
+-----------------------------------+
|              arg2 ...             |
+-----------------------------------+
|              argN ...             |
+-----------------------------------+
```

status

This 8-bit field contains an enumerated value that specifies the results of the authorization process. Supported values are 0x01 (Pass), 0x10 (Fail), and 0x11 (Error). Fail indicates that the authorization service rejected the proposed operation, while Error indicates the authorization service failed

If authorization succeeds (status=0x01), the ACLI command is executed; if authorization fails, for whatever the reason (status=0x10 or 0x11), the ACLI command is not executed, and an appropriate error message is generated.

arg_cnt

This 8-bit field contains an integer that specifies the number or arguments contained with the RESPONSE. Given the design of the current TACACS+ implementation, this field always contains a value of 0x02 .

server_msg_len

This 16-bit field contains an integer that specifies the length, in octets, of the server_msg field.

data_len

This 16-bit field contains an integer that specifies the length, in octets, of the data field.

arg1_len

This 8-bit field contains an integer that specifies the length, in octets, of the first argument.

Subsequent fields contain the length of each sequential argument.

server-msg

This optional variable length field contains a string that can be presented to the user.

data

This optional variable length field contains a string that can be presented to an administrative display, console, or log.

arg...

This optional variable length field contains a TACACS+ attribute value pair (AVP); each arg field holds a single AVP.

No arguments are generated in RESPONSE packets within the current TACACS+ implementation.

Authorization Pass

The Oracle Enterprise Communications Broker initiates the authorization with an authorization REQUEST packet.

```
+-----------------------------------+
|           Common Header           |
|                                   |
|         type contains 0x2         |
+--------+--------+--------+--------+
|authen_ |priv_lvl|authen_ |authen_ |
|method  |        |type    |service |
|  0x05  |  0x00  |  0x01  |  0x01  |
|--------+--------+--------+--------+
|user_len|port_len|rem_addr|arg_cnt |
|        |        |_len    |        |
|    N   |    N   |    N   |    2   |
+--------+--------+--------+--------+
|arg1_len|arg2_len|     user ...    |
|        |        |                 |
|    N   |    N   |    login name   |
+--------+--------+-----------------+
|                port               |
|               tty10               |
+-----------------------------------+
|              rem_addr             |
|         localhost address         |
+-----------------------------------+
|                arg1               |
|                AVP                |
|           service=shell           |
+-----------------------------------+
|                arg2               |
|                AVP                |
|  cmd=configure terminal security  |
+-----------------------------------+
```

- The authen_method field specifies the method used to authenticate the subject — 0x05 for TAC_PLUS_AUTHEN_METHOD_LOCAL (authentication by the client).
- The priv_lvl field specifies the privilege level requested by the user — 0x00 for TAC_PLUS_PRIV_LVL_MIN.
- The authen_type field specifies the authentication methodology — 0x01 for TAC_PLUS_AUTHEN_TYPE_ASCII (simple login).
- The authen_ service field specifies the requesting service — 0x01 for TAC_PLUS_AUTHEN_SVC_LOGIN (login service).
- The user_len field contains the length, in octets, of the user field.
- The port_len field contains the length, in octets, of the port field.
- The rem_addr_len field contains the length, in octets, of the rem_addr field.
- The arg_cnt field contains the number of arguments in the message body.
- The arg1_len field contains the length, in octets, of the service AVP.
- The arg2_len field contains the length, in octets, of the service AVP.
- The user field contains the login name of an admin user.
- The port field contains the name of the Oracle Enterprise Communications Broker port on which authentication is taking place. Following Cisco Systems convention, this field contains the string tty10 .
- The rem_addr field specifies the location of the user to be authenticated. This field contains the localhost address.
- The arg1 field contains the mandatory service AVP.
- The arg2 field contains the mandatory cmd AVP.

The TACACS+ daemon returns a authorization RESPONSE reporting the status, and terminating the authorization session.

```
+-----------------------------------+
|           Common Header           |
|                                   |
|         type contains 0x2         |
+--------+--------+-----------------+
| status |arg_cnt |  server_msg_len |
|  0x01  |   0    |        0        |
|--------+--------+----------------+
|     data_len    |
|        0        |
+-----------------+
```

- The status field specifies the authorization status — 0x01 for TAC_PLUS_AUTHOR_STATUS_PASS_ADD (authorization approved).
- The arg_cnt field contains a value of 0 — the authorization RESPONSE returns no arguments.
- The server_msg_len and data_len fields both contain a value of 0, as required by the TACACS+ protocol.

Authorization Fail

The Oracle Enterprise Communications Broker initiates the authorization with an authorization REQUEST packet.

```
+-----------------------------------+
|           Common Header           |
|                                   |
|         type contains 0x2         |
+--------+--------+--------+--------+
|authen_ |priv_lvl|authen_ |authen_ |
|method  |        |type    |service |
|  0x05  |  0x00  |  0x01  |  0x01  |
|--------+--------+--------+--------+
|user_len|port_len|rem_addr|arg_cnt |
|        |        |_len    |        |
|    N   |    N   |    N   |    2   |
+--------+--------+--------+--------+
|arg1_len|arg2_len|      user ...   |
|        |        |                 |
|    N   |    N   |    login name   |
+--------+--------+-----------------+
|               port                |
|              tty10                |
+-----------------------------------+
|             rem_addr              |
|         localhost address         |
+-----------------------------------+
|               arg1                |
|               AVP                 |
|           service=shell           |
+-----------------------------------+
|               arg2                |
|               AVP                 |
|   cmd=configure terminal scurity  |
+-----------------------------------+
```

- The authen_method field specifies the method used to authenticate the administrative subject — 0x05 for TAC_PLUS_AUTHEN_METHOD_LOCAL (authentication by the client).

- The priv_lvl field specifies the privilege level requested by the user — 0x00 for TAC_PLUS_PRIV_LVL_MIN.
- The authen_type field specifies the authentication methodology — 0x01 for TAC_PLUS_AUTHEN_TYPE_ASCII (simple login).
- The authen_ service field specifies the requesting service — 0x01 for TAC_PLUS_AUTHEN_SVC_LOGIN (login service).
- The user_len field contains the length, in octets, of the user field.
- The port_len field contains the length, in octets, of the port field.
- The rem_addr_len field contains the length, in octets, of the rem-addr field.
- The arg_cnt field contains the number of arguments in the message body.
- The arg1_len field contains the length, in octets, of the service AVP.
- The arg2_len field contains the length, in octets, of the service AVP.
- The user field contains the login name of an admin user.
- The port field contains the name of the Oracle Enterprise Communications Broker port on which authentication is taking place. Following Cisco Systems convention, this field contains the string tty10 .
- The rem_addr field specifies the location of the user to be authenticated. This field contains the localhost address.
- The arg1 field contains the mandatory service AVP.
- The arg2 field contains the mandatory cmd AVP.

The TACACS+ daemon returns an authorization RESPONSE reporting the status, and terminating the authorization session.

```
+-----------------------------------+
|           Common Header           |
|                                   |
|         type contains 0x2         |
+--------+--------+--------+--------+
| status |arg_cnt |  server_msg_len |
|  0x10  |   0    |        0        |
|--------+--------+--------+--------+
|     data_len    |
|        0        |
+-----------------+
```

- The status field specifies the authorization status — 0x10 for TAC_PLUS_AUTHOR_STATUS_FAIL (authorization rejected).
- The arg_cnt field contains a value of 0 — the authorization RESPONSE returns no arguments.
- The server_msg_len and data_len fields both contain a value of 0 , as required by the TACACS+ protocol.

TACACS+ Accounting

The Oracle Enterprise Communications Broker uses TACACS+ accounting to log administrative actions. With accounting enabled, each individual ACLI command executed by an admin user is logged by the accounting service.

Accounting Message Exchange

All TACACS+ accounting packets consist of a common header and a message body. Accounting packets are of two types: REQUEST and REPLY.

The REQUEST packet has three variant forms. The START variant initiates an accounting session; the STOP variant terminates an accounting session; the WATCHDOG variant updates the current accounting session. REQUEST packets are always sent by the Oracle Enterprise Communications Broker. Upon receipt of every REQUEST, the daemon must answer with a REPLY packet.

A TACACS+ accounting session proceeds as follows.

1. Immediately following successful authorization of an admin user, the Oracle Enterprise Communications Broker sends an accounting REQUEST START packet.
2. The daemon responds with an accounting REPLY packet, indicating that accounting has started.
3. For each ACLI command executed by an admin user, the Oracle Enterprise Communications Broker sends an accounting REQUEST WATCHDOG packet requesting accounting of the ACLI command. As the Oracle Enterprise Communications Broker sends the WATCHDOG only after an admin user’s access to the ACLI command is authorized, the accounting function records only those commands executed by the user, not those commands for which authorization was not granted.
4. The daemon responds with an accounting REPLY packet, indicating that the ACLI operation has been recorded by the accounting function.
5. Steps 3 and 4 are repeated for each authorized ACLI operation.
6. Immediately following logout (or timeout) of an admin user, the Oracle Enterprise Communications Broker sends an accounting REQUEST STOP packet.
7. The daemon responds with an accounting REPLY packet, indicating that accounting has stopped.

Accounting REQUEST Packet

The Oracle Enterprise Communications Broker, acting as a TACACS+ client, sends an accounting REQUEST START variant to the TACACS+ daemon following the successful authorization of an admin user. It sends an accounting REQUEST WATCHDOG variant to the daemon following the authorization of an admin user’s access to an ACLI command. It sends an accounting REQUEST STOP variant to the daemon at the conclusion of the ACLI session.

The accounting REQUEST packet format is as follows.

```
+----------------------------------+
|          Common Header           |
|                                   |
|         type contains 0x3         |
+--------+--------+--------+--------+
| flags  |authen_ |priv_lvl|authen- |
|        |method  |        |type    |
|--------+--------+--------+--------+
|authen_ |user_len|port_len|rem_addr|
|service |        |        |_len    |
+----+---+--------+--------+--------+
|arg_cnt |arg1_len|arg2_len|argN_len|
|        |        |        |        |
+--------+--------+--------+--------+
|argN_len|         user ...         |
+--------+--------------------------+
|              port ...             |
+-----------------------------------+
|            rem-addr ...           |
+-----------------------------------+
|              arg1 ...             |
+-----------------------------------+
|              arg2 ...             |
+-----------------------------------+
|              argN ...             |
+-----------------------------------+
```

flags

This 8-bit field contains an enumerated value that identifies the accounting REQUEST variant.

0x2 — START

0x4 — STOP

0x8 — WATCHDOG

authen_method

This 8-bit field contains an enumerated value that identifies the method used to authenticate the accounting subject — that is, an admin user. Because an admin user is authenticated locally by the Oracle Enterprise Communications Broker, this field always contains a value of 0x05 , indicating authentication by the requesting client.

priv_lvl

This 8-bit field contains an enumerated value that identifies the privilege level associated with the accounting subject. For the current TACACS+ accounting implementation, this field always contains a value of 0x00 .

authen-type

This 8-bit field contains an enumerated value that identifies the methodology. used to authenticate the accounting subject. Because an admin user is authenticated with a simple username/password exchange, this field always contains a value of 0x01 , indicating ascii login.

authen_service

This 8-bit field contains an enumerated value that identifies the service that requested authentication. Because an admin user is authenticated with a simple username/ password exchange, this field always contains a value of 0x01 , the login service.

user_len

This 8-bit field contains an integer that specifies the length, in octets, of the user field.

port_len

This 8-bit field contains an integer that specifies the length, in octets, of the port field.

rem_addr_len

This 8-bit field contains an integer that specifies the length, in octets, of the rem_addr field.

arg_cnt

This 8-bit field contains an integer that specifies the number or arguments contained with the accounting REQUEST.

arg1_len

This 8-bit field contains an integer that specifies the length, in octets, of the first argument.

Subsequent fields contain the length of each sequential argument.

user

This variable length field contains the login name of the accounting subject.

port

This variable length field contains the name of the Oracle Enterprise Communications Broker port on accounting is taking place. Following Cisco System convention, this field always contains the string tty10 .

rem_addr

This variable length contains the location of the authorization subject. This field always contains the localhost address.

arg...

This variable length field contains a TACACS+ attribute value pair (AVP); each arg field holds a single AVP.

A TACACS+ AVP is an ASCII string with a maximum length of 255 octets. The string consists of the attribute name and its assigned value separated by either an equal sign (=) or by an asterisk (*). The equal sign (=) identifies a mandatory argument, one that must be understood and processed by the TACACS+ daemon; the asterisk (*) identifies an optional argument that may be disregarded by either the client or daemon.

Administrative accounting requires the use of five TACACS+ AVPs: service, task-id, start_time, and stop_time.

The task_id AVP, included in accounting REQUEST START, STOP, and WATCHDOG variants, correlates session initiation, watchdog updates, and termination packets;

each associated START, STOP, and WATCHDOG packet must contain matching task-id AVPs.

task_id=13578642

The start_time AVP, included in accounting REQUEST START and WATCHDOG variants, specifies the time at which a specific accounting request was initiated. The start time is expressed as the number of seconds elapsed since January 1, 1970 00:00:00 UTC.

start_time=1286790650

The stop_time AVP, included in accounting REQUEST STOP variants, specifies the time at which a specific accounting session was terminated. The stop time is expressed as the number of seconds elapsed since January 1, 1970 00:00:00 UTC.

stop_time=1286794250

The service AVP, included in accounting REQUEST START, STOP, and WATCHDOG variants, identifies the function subject to accounting. In the case of the current implementation, the attribute value is always shell . Consequently the attribute takes the follow format:

service=shell

The cmd AVP, included in accounting REQUEST WATCHDOG variants, identifies the specific ACLI command to be processed by the accounting service. The command is passed in its entirety, from the administrative configuration root, **configure terminal**, through the final command argument. For example,

cmd=configure terminal security authentication type tacacsplus

Note the equal sign (=) used in the attribute examples, indicating that all are mandatory arguments.

Accounting REPLY Packet

The TACACS+ daemon sends an accounting REPLY packet to the Oracle Enterprise Communications Broker to report accounting results.

The accounting REPLY packet format is as follows.

```
+------------------------------------+
|           Common Header            |
|                                    |
|         type contains 0x3          |
+-----------------+--------+---------+
|  server_msg_len |     data_len     |
|--------+--------+------------------+
| status |      server_msg ...       |
+--------+---------------------------+
|              data ...              |
+------------------------------------+
```

server_msg_len

This 16-bit field contains the length, in octets, of the server_msg field.

data_len

This 16-bit field contains the length, in octets, of the data field.

status

This 8-bit field contains the status of the previous accounting request. Supported values are:

0x1 — Success

0x2 — Error/Failure

server_msg

This optional variable length field can contain a message intended for display to the user. This field is unused in the current TACACS+ implementation.

data

This optional variable length field can contain miscellaneous data. This field is unused in the current TACACS+ implementation.

Accounting Scenario

The Oracle Enterprise Communications Broker initiates the accounting session with an accounting REQUEST START.

```
+-----------------------------------+
|           Common Header           |
|                                   |
|         type contains 0x3         |
+--------+--------+--------+--------+
| flags  |authen_ |priv_lvl|authen- |
|        |method  |        |type    |
|  0x02  |  0x05  |  0x00  |  0x01  |
|--------+--------+--------+--------+
|authen_ |user_len|port_len|rem_addr|
|service |        |        |_len    |
|  0X01  |    N   |    N   |    N   |
+----+---+--------+--------+--------+
|arg_cnt |arg1_len|arg2_len|arg3_len|
|    3   |    N   |    N   |    N   |
+--------+--------+--------+--------+
|                user               |
|    login name of an admin user    |
+-----------------------------------+
|                port               |
|               tty10               |
+-----------------------------------+
|              rem_addr             |
|          localhost address        |
+-----------------------------------+
|                AVP                |
|           task-id=13578642        |
+-----------------------------------+
|                AVP                |
|        start_time=1286790650      |
+-----------------------------------+
|                AVP                |
|           service=shell           |
+-----------------------------------+
```

- The flags field contains an enumerated value (0x02) that identifies an accounting REQUEST START.
- The authen_method field specifies the method used to authenticate the ACCOUNTING subject — 0x05 for TAC_PLUS_AUTHEN_METHOD_LOCAL (authentication by the client).
- The priv_lvl field specifies the privilege level requested by the user — 0x00 for TAC_PLUS_PRIV_LVL_MIN.
- The authen_type field specifies the authentication methodology — 0x01 for TAC_PLUS_AUTHEN_TYPE_ASCII (simple login).
- The authen_ service field specifies the requesting service — 0x01 for TAC_PLUS_AUTHEN_SVC_LOGIN (login service).
- The user_len field contains the length, in octets, of the user field.
- The port_len field contains the length, in octets, of the port field.
- The rem_addr_len field contains the length, in octets, of the rem_addr field.
- The arg_cnt field contains the number of arguments in the message body.
- The arg1_len field contains the length, in octets, of the task_id AVP.
- The arg2_len field contains the length, in octets, of the start_time AVP.
- The arg3_len field contains the length, in octets, of the service AVP.
- The user field contains the login name of an admin user.
- The port field contains the name of the Oracle Enterprise Communications Broker port on which authentication is taking place. Following Cisco Systems convention, this field contains the string tty10 .
- The rem_addr field specifies the location of the user to be authenticated. This field contains the localhost address.
- The arg1 field contains the mandatory task_id AVP.
- The arg2 field contains the mandatory start_time AVP.
- The arg3 field contains the mandatory service AVP.

The TACACS+ daemon returns an accounting REPLY reporting the status, indicating that accounting has started.

```
+-----------------------------------+
|           Common Header           |
|                                   |
|         type contains 0x3         |
+-----------------+-----------------+
|  server_msg_len |     data_len    |
|        0        |        0        |
|--------+--------+-----------------+
| status |
|  0x01  |
+--------+
```

- The server_msg_len and data_len fields both contain a value of 0 , as required by the TACACS+ protocol.
- The status field specifies the authorization status — 0x01 for TAC_PLUS_ACCT_STATUS_SUCCESS (accounting processed).

The Oracle Enterprise Communications Broker reports ACLI command execution with an accounting REQUEST WATCHDOG.

```
+-----------------------------------+
|           Common Header           |
|                                   |
|         type contains 0x3         |
+--------+--------+--------+--------+
| flags  |authen_ |priv_lvl|authen- |
|        |method  |        |type    |
|  0x08  |  0x05  |  0x00  |  0x01  |
|--------+--------+--------+--------+
|authen_ |user_len|port_len|rem_addr|
|service |        |        |_len    |
|  0X01  |    N   |    N   |    N   |
+----+---+--------+--------+--------+
|arg_cnt |arg1_len|arg2_len|arg3_len|
|    4   |    N   |    N   |    N   |
+--------+--------+--------+--------+
|arg4_len|           user           |
|        | login name of admin user |
+--------+--------------------------+
|                port               |
|               tty10               |
+-----------------------------------+
|              rem_addr             |
|         localhost address         |
+-----------------------------------+
|                AVP                |
|          task-id=13578642         |
+-----------------------------------+
|                AVP                |
|       start_time=1286790650       |
+-----------------------------------+
|                AVP                |
|           service=shell           |
+-----------------------------------+
|                AVP                |
|  cmd=configure terminal security  |
+-----------------------------------+
```

- The flags field contains an enumerated value (0x08) that identifies an accounting REQUEST WATCHDOG.
- The authen_method field specifies the method used to authenticate the ACCOUNTING subject — 0x05 for TAC_PLUS_AUTHEN_METHOD_LOCAL (authentication by the client).
- The priv_lvl field specifies the privilege level requested by the user — 0x00 for TAC_PLUS_PRIV_LVL_MIN.

- The authen_type field specifies the authentication methodology — 0x01 for TAC_PLUS_AUTHEN_TYPE_ASCII (simple login).
- The authen_ service field specifies the requesting service — 0x01 for TAC_PLUS_AUTHEN_SVC_LOGIN (login service).
- The user_len field contains the length, in octets, of the user field.
- The port_len field contains the length, in octets, of the port field.
- The rem_addr_len field contains the length, in octets, of the rem_addr field.
- The arg_cnt field contains the number of arguments in the message body.
- The arg1_len field contains the length, in octets, of the task_id AVP.
- The arg2_len field contains the length, in octets, of the start_time AVP.
- The arg3_len field contains the length, in octets, of the service AVP.
- The arg4_len field contains the length, in octets, of the cmd AVP.
- The user field contains the login name of an admin user.
- The port field contains the name of the Oracle Enterprise Communications Broker port on which authentication is taking place. Following Cisco Systems convention, this field contains the string tty10 .
- The rem_addr field specifies the location of the user to be authenticated. This field contains the localhost address.
- The arg1 field contains the mandatory task_id AVP.
- The arg2 field contains the mandatory start_time AVP.
- The arg3 field contains the mandatory service AVP.
- The arg4 field contains the mandatory cmd AVP.

The TACACS+ daemon returns an accounting REPLY reporting the status, indicating that the ACLI operation has been processed.

```
+-----------------------------------+
|           Common Header           |
|                                   |
|         type contains 0x3         |
+-----------------+-----------------+
|  server_msg_len |     data_len    |
|        0        |        0        |
|--------+--------+-----------------+
| status |
|  0x01  |
+--------+
```

- The server_msg_len and data_len fields both contain a value of 0 , as required by the TACACS+ protocol.
- The status field specifies the authorization status — 0x01 for TAC_PLUS_ACCT_STATUS_SUCCESS (accounting processed).

The Oracle Enterprise Communications Broker reports an admin user logout or timeout with an accounting REQUEST STOP.

```
+-----------------------------------+
|           Common Header           |
|                                   |
|         type contains 0x3         |
+--------+--------+--------+--------+
| flags  |authen_ |priv_lvl|authen- |
|        |method  |        |type    |
|  0x04  |  0x05  |  0x00  |  0x01  |
|--------+--------+--------+--------+
|authen_ |user_len|port_len|rem_addr|
|service |        |        |_len    |
|  0X01  |    N   |    N   |    N   |
+----+---+--------+--------+--------+
|arg_cnt |arg1_len|arg2_len|arg3_len|
|    3   |    N   |    N   |    N   |
+--------+--------+--------+--------+
|                user               |
|    login name of an admin user    |
+-----------------------------------+
|                port               |
|               tty10               |
+-----------------------------------+
|              rem_addr             |
|         localhost address         |
+-----------------------------------+
|                AVP                |
|          task-id=13578642         |
+-----------------------------------+
|                AVP                |
|        stop_time=1286790650       |
+-----------------------------------+
|                AVP                |
|           service=shell           |
+-----------------------------------+
```

- The flags field contains an enumerated value (0x04) that identifies an accounting REQUEST STOP.
- The authen_method field specifies the method used to authenticate the ACCOUNTING subject — 0x05 for TAC_PLUS_AUTHEN_METHOD_LOCAL (authentication by the client).
- The priv_lvl field specifies the privilege level requested by the user — 0x00 for TAC_PLUS_PRIV_LVL_MIN.
- The authen_type field specifies the authentication methodology — 0x01 for TAC_PLUS_AUTHEN_TYPE_ASCII (simple login).
- The authen_ service field specifies the requesting service — 0x01 for TAC_PLUS_AUTHEN_SVC_LOGIN (login service).
- The user_len field contains the length, in octets, of the user field.
- The port_len field contains the length, in octets, of the port field.

- The rem_addr_len field contains the length, in octets, of the rem_addr field.
- The arg_cnt field contains the number of arguments in the message body.
- The arg1_len field contains the length, in octets, of the task_id AVP.
- The arg2_len field contains the length, in octets, of the start_time AVP.
- The arg3_len field contains the length, in octets, of the service AVP.
- The user field contains the login name of an admin user.
- The port field contains the name of the Oracle Enterprise Communications Broker port on which authentication is taking place. Following Cisco Systems convention, this field contains the string tty10 .
- The rem_addr field specifies the location of the user to be authenticated. This field contains the localhost address.
- The arg1 field contains the mandatory task_id AVP.
- The arg2 field contains the mandatory start_time AVP.
- The arg3 field contains the mandatory service AVP.

The TACACS+ daemon returns an accounting REPLY reporting the status, indicating that accounting has terminated.

```
+-----------------------------------+
|           Common Header           |
|                                   |
|         type contains 0x3         |
+-----------------+-----------------+
|  server_msg_len |     data_len    |
|        0        |        0        |
|--------+--------+-----------------+
| status |
|  0x01  |
+--------+
```

- The server_msg_len and data_len fields both contain a value of 0 , as required by the TACACS+ protocol.
- The status field specifies the authorization status — 0x01 for TAC_PLUS_ACCT_STATUS_SUCCESS (accounting processed).

Managing TACACS+ Operations

TACACS+ management is supported by the following utilities.

TACACS+ MIB

An Oracle proprietary MIB provides external access to TACACS+ statistics.

MIB counters are contained in the apSecurityTacacsPlusStatsTable that is defined as follows.

```
SEQUENCE {
    apSecurityTacacsPlusCliCommands                  Counter32
    apSecurityTacacsPlusSuccess Authentications      Counter32
    apSecurityTacacsPlusFailureAuthentications     Counter32
    apSecurityTacacsPlusSuccess Authorizations     Counter32
    apSecurityTacacsPlusFailureAuthorizations      Counter32
}
```

apSecuritysTacacsPlusStats Table (1.3.6.1.4.1.9148.3.9.9.4)

Object Name	Object OID	Description
apSecurityTacacsCliCommands	1.3.6.1.4.1.9148.3.9.1.4.3	Global counter for ACLI commands sent to TACACS + Accounting
apSecurityTacacsSuccess Authentications	1.3.6.1.4.1.9148.3.9.1.4.4	Global counter for the number of successful TACACS+ authentications
apSecurityTacacsFailureAuthentications	1.3.6.1.4.1.9148.3.9.1.4.5	Global counter for the number of unsuccessful TACACS+ authentications
apSecurityTacacsSuccess Authorizations	1.3.6.1.4.1.9148.3.9.1.4.6	Global counter for the number of successful TACACS+ authorizations
apSecurityTacacsFailure Authorizations	1.3.6.1.4.1.9148.3.9.1.4.7	Global counter for the number of unsuccessful TACACS+ authorizations

SNMP Trap

SNMP traps are issued when

- a TACACS+ daemon becomes unreachable
- an unreachable TACACS+ daemon becomes reachable
- an authentication error occurs
- an authorization error occurs

TACACS+ Faults

The Oracle Enterprise Communications Broker supports two TACACS+ traps, apSysMgmtTacacsDownTrap and apSysMgmtTacacsDownClearTrap.

The apSysMgmtTacacsDownTrap is generated when a TACACS+ server becomes unreachable.

The apSysMgmtTacacsDownClearTrap is generated when a TACACS+ server that was unreachable becomes reachable.

The OECB searches for a TACACS+ server until it finds an available one and then stops searching. However, in the TACACS+ SNMP implementation, SNMP expects the OECB to make connection attempts to all servers. When there is only one TACACS+ server and that server goes down, the OECB behaves normally, sending a apSysMgmtTacacsDownTrap trap when the server goes down, and a apSysMgmtTacacsDownClearTrap trap when the server comes back up. When there is more than one TACACS+ server and the active server goes down, an apSysMgmtTacacsDownTrap trap is sent, indicating that some servers are down and the next server is tried. If all servers fail, an apSysMgmtTacacsDownTrap is sent indicating that all servers are down. If one of the servers comes back up while the rest are still down, an apSysMgmtTacacsDownTrap is sent indicating that some servers are still down.

TACACS+ Logging

All messages between the Oracle Enterprise Communications Broker and the TACACS+ daemon are logged in a cleartext format, allowing an admin user to view all data exchange, except for password information.

TACACS+ Configuration

Configuration of TACACS+ consists of the following steps.

1. Enable TACACS+ client services
2. Specify one or more TACACS+ servers (daemons)

Add TACACS+ Authentication and Servers

To configure TACACS+, you enable TACACS+ client services and specify one or more TACACS+ servers.

1. Access the Login Authentication configuration object.

   Configuration, **Security**, **Authentication**.

2. On the Modify Authentication page, do the following:

Source port	Range: 1645-1812. Default: 1812.
Type	Select TACACS from the drop-down list.
Protocol	Select acsii for the authentication protocol.
TACACS accounting	Select to enable accounting of admin operations. Default: enabled.
Server assigned privilege	Select to allow only Admin users to use configuration commands. Default: Disabled.
Allow local authentication	Select to enable local authentication. Default: Disabled.
Login as Admin	Select to enable logging in as Admin.
Management strategy	Select an authentication management strategy from the drop-down list. • Use either Hunt or Round-Robin when using multiple TACACS+ servers. • Use Hunt when using a single TACACS+ server. Default: Hunt.
Management servers	Click **Add**, and do the following to add one or more authentication management servers: a. Enter the IP address of a management server.

	b. (Optional) Click **Apply / Add Another**. c. **OK**.
TACACS servers	Click **Add**, and do the following: a. Address—Enter the IP address of this server. b. Port—Enter the port number of the server you want to receive TACACS+ client requests. Range: 1025-65535. Default: 49. c. State—Select to enable this server. Default: Enabled. d. Secret—Enter and confirm the 16-digit string for the shared secret used by the TACACS+ client and the server to encrypt and decrypt TACACS+ messages. e. Dead time—Enter the time, in seconds, for the quarantine period imposed upon a TACACS+ server that becomes unreachable. Range: 10-10000 seconds. Default: 10. f. Authentication methods—Add one or more authentication methods. Default: all.

3. Click **OK**.
4. Save the configuration.

SNMP

This section explains how to configure Simple Network Management Protocol (SNMP) communities and trap receivers. These features are not essential for baseline Oracle Enterprise Communications Broker service, but they are necessary to use an element management system to manage Oracle Enterprise Communications Brokers. They provide important monitoring and system health information that contribute to a robust deployment of the Oracle Enterprise Communications Broker.

Overview

SNMP is used to support monitoring of network-attached devices for conditions that warrant administrative attention. SNMP is comprised of three groups of settings on a Oracle Enterprise Communications Broker. These settings are system-wide configurations including MIB contact information, SNMP community settings, and trap receivers.

Basic SNMP Parameters

The Oracle Enterprise Communications Broker includes several parameters that control basic SNMP functionality. The MIB-related elements are for informational purposes, and are helpful if set. The remainder of the parameters determines if certain Oracle Enterprise Communications Broker events are reported to the SNMP system.

SNMP Community

An SNMP community is a grouping of network devices and management stations used to define where information is sent and accepted. An SNMP device or agent might belong to more than one SNMP community. SNMP communities provide a type of password protection for viewing and setting management information within a community. You can define multiple SNMP communities on a Oracle Enterprise Communications Broker to segregate access modes per community and NMS host.

Trap Receivers

A trap receiver is an application used to receive, log, and view SNMP traps for monitoring the Oracle Enterprise Communications Broker. An SNMP trap is the notification sent from a network device, the Oracle Enterprise Communications Broker in this case, that declares a change in service. Multiple trap receivers can be defined on a Oracle Enterprise Communications Broker either for redundancy or to segregate alarms with different severity levels to individual trap receivers.

Each server that an element management system is installed on should be configured as a trap receiver on all Oracle Enterprise Communications Broker's managed by that element management system.

SNMP Community Settings

Follow the steps below to configure an SNMP community on the Oracle Enterprise Communications Broker (OECB).

1. Access the SNMP Community configuration object.

   Configuration, **SNMP**,

2. On the SNMP community page, do the following:

Community	Enter an SNMP community name of an active community where this OECB can send or receive SNMP information. A community name value can also be used as a password to provide authentication, thereby limiting the NMSs that have access to this OECB. With this field, the SNMP agent provides trivial authentication based on the community name that is exchanged in plain text SNMP messages. For example, public. Default: blank Valid values: alpha-numeric characters.
IP addresses	Enter an IPv4 address that is valid within this SNMP community. This IPv4 address corresponds with the IPv4 address of the NMS application that monitors or configures this OECB. You can enter multiple addresses. Click **OK** or **Apply/Add another**.

3. Save the configuration.

Set Trap Receiver Settings

Follow the steps below to configure trap receivers on your device.

1. From the Trap receiver list, click Add.

The system displays the Add SNMP Trap Settings dialog.

2. Community name—Enter the SNMP community name to which this trap receiver belongs. For example, **Public**. Valid values: Alpha-numeric characters. Default: Blank.
3. IP address—Enter the IPv4 address of an authorized NMS. This value is the IPv4 address of an NMS where traps are sent. Enter the IP address in dotted decimal format.
4. IP Port—Enter the port number of an authorized NMS. If you do not specify a port number, the default SNMP trap port of 162 is used.

Web Server Settings

Configure your preferences for the Oracle Enterprise Communications Broker's web server using the Modify web-server-config dialog, available from the Web Server icon. Configuration field descriptions are provided below.

1. Inactivity timeout—Enter the amount of time, in minutes, that the Web GUI must have remained inactive before it ends the Web session. For example, if this timeout value is set as 5, after 5 minutes of no activity, the Web session disconnects. Default is 10. Valid values are 0 to 20. Zero (0) disables this parameter.

> **Note:**
>
> The following HTTP state and HTTPS state parameters may have already been set via the GUI installation wizard on your Oracle Enterprise Communications Broker. You can edit these parameters if required.

2. HTTP state—Specify whether or not to enable HTTP for accessing the Web server. Default is enabled. A check mark indicates enabled, and a blank box indicates disabled.
3. HTTPS state—Specify whether or not to enable HTTPS (secure connection) for accessing the Web server. Default is disabled. A check mark indicates enabled, and a blank box indicates disabled.
4. TLS profile—Enter the Transport Layer Security (TLS) Protocol profile name to use with HTTPS. Valid values are **alpha-numeric characters.** Default is blank.

> **Note:**
>
> If you specify a TLS profile, and HTTP is enabled, the Oracle Enterprise Communications Broker checks against the TLS profile table for a match. If there is no match, the applicable errors display during the verification of the configuration.

5. Click OK.

4 Maintenance and Debugging

Oracle Enterprise Communications Broker (OECB) software closely aligns with Oracle Session Border Controller (SBC) software. The vast majority of reference and debugging processes, procedures, and information is common across Oracle SBC products.

Common Maintenance and Debugging Documentation

The following table directs you to other Oracle documentation that provides monitoring and debugging information.

Log File Definition and Descriptions Fault Information Management Manual Configuration Management Process and Procedures	Oracle SBC Maintenance and Troubleshooting Guide
MIB Descriptions MIB Definition and Identification (OID Reference) SNMP GETs SNMP Trap Definition and Descriptions	Oracle SBC MIB Reference Guide
Manual HDR Management HDR Group Definition and Descriptions	Oracle SBC Historical Data Recording (HDR) Resource Guide

Your Oracle Enterprise Communications Broker Image

Your Oracle Enterprise Communications Broker arrives with the most recent, manufacturing-approved run-time image installed on the flash memory. If you want to use this image, you can install your Oracle Enterprise Communications Broker, establish a connection to the Oracle Enterprise Communications Broker, and then begin to configure it. On boot up, your system displays information about certain configurations not being present. You can dismiss these displays and begin configuring your Oracle Enterprise Communications Broker.

If you want to use an image other than the one installed on your Oracle Enterprise Communications Broker when it arrives, you can use the information in this section to obtain and install it.

Obtain a New Image

You can download software images onto the platform of your Oracle Enterprise Communications Broker (OECB) from various sources. You can take any one of the following actions:

- Obtain an image from the Oracle Software Delivery Cloud.
- Obtain an image from your Oracle customer support representative, who will transfer it to your system.

Regardless of how you obtain the image, you need to use Secure File Transfer Protocol (SFTP) to copy it from its source to your OECB.

Upgrade Software - Web GUI System Tab

You can upgrade the system software from the System tab on the Web GUI. The system requires a reboot after the upgrade.

1. From the GUI, click the **System** tab.
2. Click **Upgrade Software**.
3. Click **Verification**.
4. Verify that system health, synchronization health, current configuration version, and disk usage are appropriate and adequate for the upgrade.
5. From the drop-down list, select **Upload Method**, and select one of the following methods.
   - Local—Use to select a file from your system for transfer.
   - Flash—Use to select a file already on the device.
   - Network—Use to specify parameters for network boot by way of file transfer.

   The system displays the Upgrade Software dialog with the fields required for your upgrade.
6. Complete the required fields.
   - Software file to upload. (Local) Use **Browse** to locate the file on your local system.
   - Software file. (Flash) The location and name of the file on the device.
   - Boot file. (Network) The complete name of the boot file.
   - Host IP. (Network) The IP address of the FTP server.
   - FTP username. (Network) The user name to log onto the FTP server.
   - FTP password. (Network) The password to log onto the FTP server.
7. Optional. Select **Reboot After Upload**.
8. Click **Complete**.
   - If you did not select **Reboot After Upload**, the system displays a message stating that a reboot is required for the changes to take effect.
   - If you selected **Reboot After Upload**, the system displays a message stating that it is about to reboot.

9. Click `OK`.

   If you selected **Reboot After Upload**, the system reboots.

Display Log Files

The Oracle Enterprise Communications Broker (OECB) allows you to view log files without needing to download them.

1. Access the **File management** page. Click**System**, **File management**.

   The OECB displays the system navigation panel to the left of the associated controls.
2. On the **File management** page, select the Log file type from the drop-down list.

   The OECB displays file list, displaying all log file categories.
3. Expand a log file category and select a log file by selecting the check box by the file name.

   The OECB enables the **View** control.
4. Click **View**.

   The OECB displays the **Viewing log:[filename]** dialog with the log file's contents.

Display System Health

The Oracle Enterprise Communications Broker (OECB) provides a widget that allows you to see the current health score and state of the OECB.

- Access the **System health** page. Click **Widgets**, **System**, **System health**.

  The GUI displays the **System health table**, where you can see the health score and state of the OECB.

Obtain Support Information

The Oracle Enterprise Communications Broker (OECB) allows you obtain a pre-defined file containing information that support personnel normally request.

1. Acces the **Support information** page. Click **System**, **Support information**.
2. On the **Support information** page, click**Support information**.
3. Click **Support information**.

   The OECB displays a **Progress** message box, which indicates the system is generating support information output. When complete, your browser displays a dialog where you to decide what to do with the support-info.log file.
4. Do one of the following:
   - Follow the dialog's instructions to select the application you want to use to display your support-info.log file.
   - Save the file locally.