

Oracle® Communications

EAGLE Application Processor Security Guide



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My Oracle Support (MOS)

My Oracle Support (<https://support.oracle.com>) is your initial point of contact for all product support and training needs. A representative at Customer Access Support can assist you with My Oracle Support registration.

Call the Customer Access Support main number at 1-800-223-1711 (toll-free in the US), or call the Oracle Support hotline for your local country from the list at <http://www.oracle.com/us/support/contact/index.html>. When calling, make the selections in the sequence shown below on the Support telephone menu:

- For Technical issues such as creating a new Service Request (SR), select **1**.
- For Non-technical issues such as registration or assistance with My Oracle Support, select **2**.
- For Hardware, Networking and Solaris Operating System Support, select **3**.

You are connected to a live agent who can assist you with My Oracle Support registration and opening a support ticket.

My Oracle Support is available 24 hours a day, 7 days a week, 365 days a year.

Acronyms

The following table provides information about the acronyms used in the document:

Table Acronyms

Acronym	Definition
CA	Certificate Authority
CSR	Certificate Signing Request
EPAP	EAGLE Application Processor
FQDN	Fully Qualified Domain Name
MOS	My Oracle Support
MPS	Multi Purpose Server
OHC	Oracle Help Center
PDBA	Provisioning Database Application
SNMP	Simple Network Management Protocol
UI	User Interface
VIP	Virtual IP

What's New in This Guide

This section introduces the documentation updates for Release 17.1 in Oracle Communications EAGLE Application Processor Security Guide.

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There are no updates to this document in this release.

1

Introduction

This chapter contains general information such as an overview of the manual, how to get technical assistance, and where to find additional information.

1.1 Overview

This document provides guidelines and recommendations for configuring the Oracle Communications EAGLE Application Processor (EPAP) to enhance the security of the system. The recommendations herein are optional and should be considered along with the approved security strategies of your organization. Additional configuration changes that are not included herein are not recommended and may hinder the product's operation or Oracle's capability to provide appropriate support.

1.2 Scope and Audience

This guide is intended for administrators that are responsible for product and network security.

1.3 Documentation Admonishments

Admonishments are icons and text throughout this manual that alert the reader to assure personal safety, to minimize possible service interruptions, and to warn of the potential for equipment damage.

Table 1-1 Admonishments

Icon	Description
 DANGER	Danger: (This icon and text indicate the possibility of <i>personal injury</i> .)
 WARNING	Warning: (This icon and text indicate the possibility of <i>equipment damage</i> .)
 CAUTION	Caution: (This icon and text indicate the possibility of <i>service interruption</i> .)
 TOPPLE	Topple: (This icon and text indicate the possibility of <i>personal injury and equipment damage</i> .)

1.4 Emergency Response

In the event of a critical service situation, emergency response is offered by the Customer Access Support (CAS) main number at 1-800-223-1711 (toll-free in the US), or by calling the Oracle Support hotline for your local country from the list at <http://www.oracle.com/us/support/contact/index.html>. The emergency response provides immediate coverage, automatic escalation, and other features to ensure that the critical situation is resolved as rapidly as possible.

A critical situation is defined as a problem with the installed equipment that severely affects service, traffic, or maintenance capabilities, and requires immediate corrective action. Critical situations affect service and/or system operation resulting in one or several of these situations:

- A total system failure that results in loss of all transaction processing capability
- Significant reduction in system capacity or traffic handling capability
- Loss of the system's ability to perform automatic system reconfiguration
- Inability to restart a processor or the system
- Corruption of system databases that requires service affecting corrective actions
- Loss of access for maintenance or recovery operations
- Loss of the system ability to provide any required critical or major trouble notification

Any other problem severely affecting service, capacity/traffic, billing, and maintenance capabilities may be defined as critical by prior discussion and agreement with Oracle.

1.5 Related Publications

For information about additional publications related to this document, refer to the Oracle Help Center site. See [Locate Product Documentation on the Oracle Help Center Site](#) for more information on related product publications.

1.6 Customer Training

Oracle University offers training for service providers and enterprises. Visit our web site to view, and register for, Oracle Communications training:

<http://education.oracle.com/communication>

To obtain contact phone numbers for countries or regions, visit the Oracle University Education web site:

www.oracle.com/education/contacts

1.7 Locate Product Documentation on the Oracle Help Center Site

Oracle Communications customer documentation is available on the web at the Oracle Help Center (OHC) site, <http://docs.oracle.com>. You do not have to register to access these documents. Viewing these files requires Adobe Acrobat Reader, which can be downloaded at <http://www.adobe.com>.

1. Access the Oracle Help Center site at <http://docs.oracle.com>.

2. Click `Industries`.
3. Under the `Oracle Communications` subheading, click the `Oracle Communications documentation link`.

The `Communications Documentation` page appears. Most products covered by these documentation sets will appear under the headings "Network Session Delivery and Control Infrastructure" or "Platforms."

4. Click on your `Product` and then the `Release Number`.
A list of the entire documentation set for the selected product and release appears.
5. To download a file to your location, right-click the `PDF link`, select `Save target as` (or similar command based on your browser), and save to a local folder.

2

EPAP Security Overview

This chapter describes basic security considerations and provides an overview of EPAP security.

2.1 Basic Security Considerations

The following principles are fundamental to using any application securely:

- **Keep software up to date.** This includes the latest product release and any patches that apply to it. Consult with your Oracle support team to plan for EPAP software upgrades.
- **Limit privileges as much as possible.** Users should be given only the access necessary to perform their work. User privileges should be reviewed periodically to determine relevance to current work requirements.
- **Monitor system activity.** Establish who should access which system components, and how often, and monitor those components.
- **Install software securely.** For example, use firewalls, secure protocols such as **SSL**, and strong passwords.
- **Learn about and use the EPAP security features.** See [Implementing EPAP Security](#) for more information.
- **Keep up to date on security information.** Oracle regularly issues security-related patch updates and security alerts. You must install all security patches as soon as possible. See the "Critical Patch Updates and Security Alerts" Web site: <http://www.oracle.com/technetwork/topics/security/alerts-086861.html>

2.2 Understanding the EPAP Environment

The **EPAP** platform, coupled with the Provisioning Database Application (**PDBA**), facilitates and maintains the database required by **EPAP-related features**. See the *Glossary* for a list of EPAP-related features. The EPAP serves two major purposes:

- Accept and store data provisioned by the customer
- Update customer provisioning data and reload databases on the Service Module cards in the Multi Purpose Server (**MPS**)

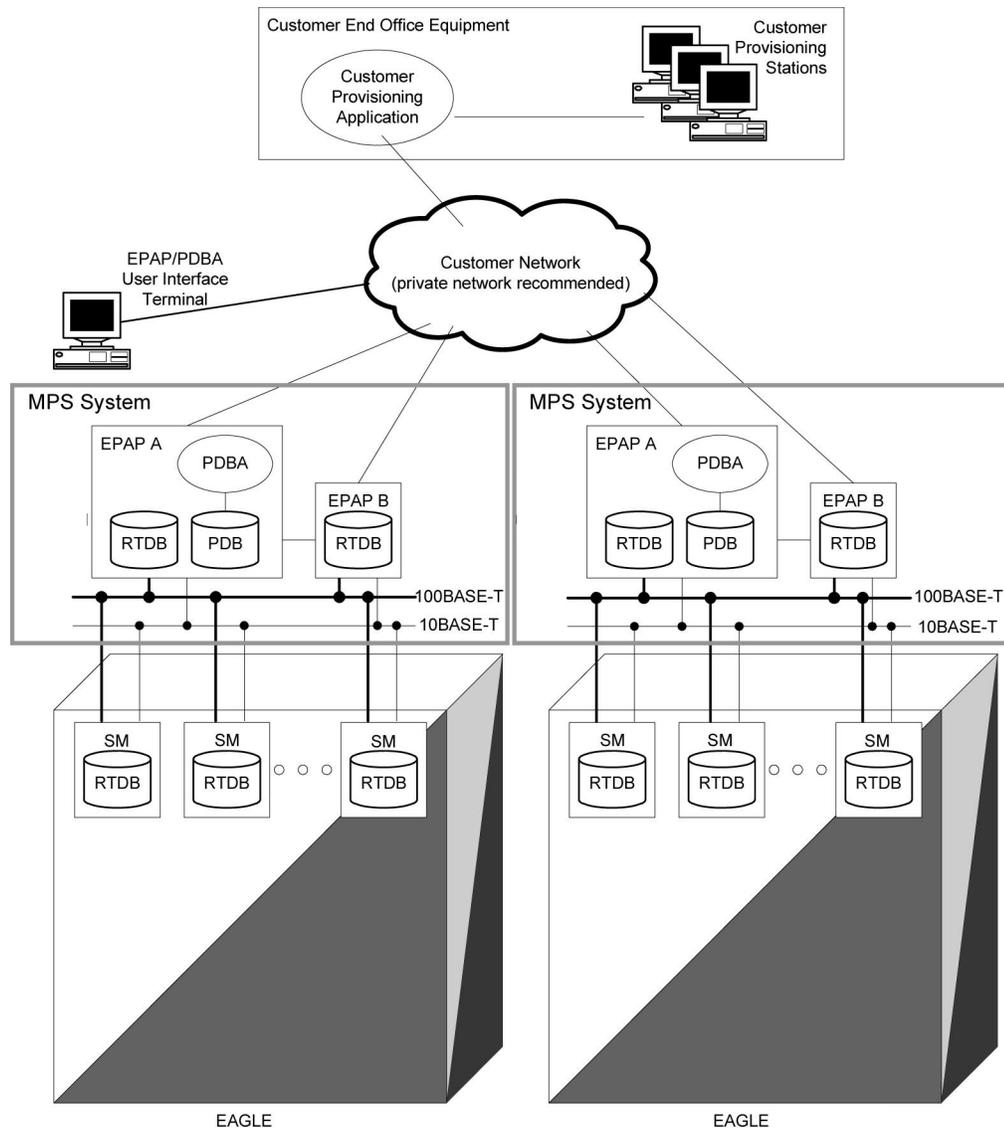
The MPS hardware platform supports high speed provisioning of large databases for the EAGLE. The MPS is composed of hardware and software components that interact to create a secure and reliable platform. MPS supports the EPAP.

During normal operation, information flows through the EPAP and PDBA with no intervention. Each EPAP has a graphical user interface that supports maintenance, debugging, and platform operations. The EPAP user interface includes a PDBA user interface for configuration and database maintenance.

2.3 Recommended Deployment Configurations

The EPAP is deployed in the central office of the carrier and service provider, co-located with the EAGLE **STP**. The customer network should be secured via firewall, and making the EPAP provisioning network its own private network or **VLAN** is further recommended where possible. For a generic model of the deployment strategy, see [Figure 2-1](#).

Figure 2-1 Generic EPAP Deployment Model



In addition to the firewalls, the EPAP system provides additional security capabilities that include application-specific remote IP address control.

2.4 EPAP SSL Certificate Security

Currently, EPAP uses self-signed SSL certificates. You can install an X.509 certificate for a provisionable or backup provisionable interface with customized parameters, install an SSL

certificate for a provisionable or backup provisionable interface from a trusted Certificate Authority (CA), install an SSL certificate for a Virtual IP (VIP) with customized parameters, and install an SSL certificate for a Virtual IP (VIP) from a trusted Certificate Authority (CA). For more information, see the following procedures:

- [Installing an SSL Certificate For a Provisionable Interface With Customized Parameters](#)
- [Installing an SSL Certificate For a Provisionable Interface From a Trusted Certificate Authority](#)
- [Installing an SSL Certificate For a Backup Provisionable Interface With Customized Parameters](#)
- [Installing an SSL Certificate For a Backup Provisionable Interface From a Trusted Certificate Authority](#)
- [Installing an SSL Certificate For a VIP With Customized Parameters](#)
- [Installing an SSL Certificate For a VIP From a Trusted Certificate Authority](#)

These procedures are devised to be executed on the EPAP 16.2 system deployed on TPD 7.4, on E5-APP-B-01/02 hardware.

2.5 Root User Is Disabled for SSH Login

The root user can log in through the serial interface for installation of the application. The root user will not have the permission to log in as an **SSH** user.

To login as an **SSH** user, the user `admusr` is provided. The `admusr` can run all commands, and when root permissions are required `sudo` can be used along with `admusr`.

3

Implementing EPAP Security

This chapter explains security related configuration settings that may be applied to the EPAP.

3.1 User and Group Administration

The EPAP user interface (**UI**) comes pre-defined with UI users to provide a seamless transition to the GUI. For instance, there is a pre-defined user that is used to access the **User Administration** menu, as shown in [Table 3-1](#).

Table 3-1 EPAP UI Logins

Login Name	Access Granted
epapmaint	Maintenance menu and all submenus
epapdatabase	Database menu and all submenus
epapdebug	Debug menu and all submenus
epapplatform	Platform menu and all submenus
uiadmin	User Administration menu
epapall	All of the above menus
epapconfig	Configuration menu and all submenus (text-based UI)

The **User Administration** menu is used to set up and perform administrative functions for users and groups, and also to terminate active sessions and modify system defaults.

Establishing Groups and Group Privileges

Each user is assigned to a group, and permissions to a set of functions are assigned to the group. The permissions determine the functions and restrictions for the users belonging to the group. EPAP users can fall into one of the following default groups:

- maint
- database
- platform
- debug
- pdba
- admin
- readonly

The readonly group is the default group for new users. The readonly group contains only actions that view status and information.

The **User Administration**, and then **Groups** menu allows administrator access to group functions to add, modify, delete, and retrieve a group. For more information, see *Groups* under *User Administration Menu* in *Administration Guide*.

Creating Users and Assigning to Groups

Each user that is allowed access to the user interface is assigned a unique username. This username and associated password must be provided during login.

Prior to adding a user, determine which group the user should be assigned based on their operational role. The group assignment determines the functions that a user can access.

After determining the proper group for a user, use the **User Administration**, and then **Users** menu to add the user.

The **User Administration**, and then **Users** menu can also be used to modify, delete, and retrieve user accounts, and to reset passwords. For more information, see *Users* under *User Administration Menu* in *Administration Guide*.

3.2 User Authentication

Users are authenticated using login credentials. Each user that is allowed access to the UI is assigned a unique username. This username and associated password must be provided during login.

Password Restrictions

Before beginning to use EPAP for provisioning, the EPAP software must be configured and initialized. During configuration, default password restrictions such as password aging and minimum password size can be changed via the **EPAP Configuration**, and then **Security** menu. For more information, see *Security* under *EPAP Configuration Menu* in *Administration Guide*.

The UI addresses security concerns with various restrictions and controls. In many cases, the frequency or severity of these checks is configurable by the administrator at both a user-specific and system-wide level. For information about modifying system-wide defaults, see *Modify Defaults* under *User Administration Menu* in *Administration Guide*. For information about user-specific settings, see *Users* under *User Administration Menu* in *Administration Guide*.

For information about topics such as password complexity, password aging, and password reuse, see *Change Password* under *EPAP Graphical User Interface Menus* in *Administration Guide*.

Changing Default Passwords for EPAP Administrative Account

As a security measure, passwords for the EPAP UI login names, the OS root, and the OS admusr must be changed from their default values to user-defined values. For more information, see [Secure Turnover to Customer](#).

Changing User Passwords

The **Change Password** screen of the EPAP GUI main menu provides all EPAP users with the capability to change their password. To change the password, the current password must be entered, then the new password is entered. The new password is confirmed by retyping the new password and clicking the Set Password button.

Password Change for System Users

The epapdev and appuser users can use the passwd command provided by the operating system. If changing a password using the passwd command, then the Linux PAM credit rules are used.

The system user `epapconfig` uses the option provided in the EPAP Configuration Menu. Linux PAM rules are not applicable while changing the password for the `epapconfig` user. Only the configured minimum password length applies.

 **Note:**

If the password for the `appuser` or `epapconfig` user is changed by the root user, the `appuser` or `epapconfig` user will be prompted to change the password again.

3.3 Modifying System Defaults

The **User Administration**, and then **Modify System Defaults** screen enables the administrator to manage system defaults. Use this screen to control settings such as maximum failed login attempts before disabling a user account, maximum account inactivity, maximum password age, and minimum password length. For more information, see *Modify Defaults* under *User Administration Menu* in *Administration Guide*.

3.4 SNMP Configuration

EPAP can use the industry-standard Simple Network Management Protocol (SNMP) interface to send alarms as trap messages to an **OCEEMS**. EPAP sends SNMPv2c only, SNMPv3 only, or both SNMPv2c and SNMPv3 traps to the OCEEMS if the configurable parameter `SNMP Alarm Feed` is set to `ON`. EPAP also supports GET and SET of the `resyncVar` **MIB** element.

The active EPAP server provides a single interface to **SNMP** data for the EPAP pair. For network configurations using the Stand-Alone PDBI feature, the PDBI provides its own SNMP interface directly with SNMP managers. The application sends SNMP traps to SNMP managers that are registered to receive traps.

Community Names / Strings

The default community names configured for Read and Write in the `snmpd.conf` file are `epapRdSnmp` and `epapWrSnmp`. You should change the default community names to prevent unauthorized access. Always use different names for the Read community and Write community.

For more information about configuring community names, see *Configure SNMP Agent Community* in *Administration Guide*.

3.5 Authorized IP Addresses

The **User Administration**, and then **Authorized IP** menu enables you to add, remove, and list authorized IP addresses (**IPv4** and/or **IPv6**), and to change the IP address authorization status. The IP addresses are authorized for both GUI and server access. For more information, see *EPAP Security Enhancements*, and *Authorized IPs* under *User Administration Menu*, in *Administration Guide*.

The PDBA maintains a list of IP addresses that are allowed to connect through the **PDBI**. Any connect request coming from an IP address that is not in the list is rejected. Each IP address in the list has either `READ` or `READ/WRITE` permission. The **PDBA**, and then **Authorized IP List** menu enables you to add, modify, remove, and list the IP addresses authorized to connect to the **PDBA** through the **PDB**. For more information, see *Authorized IP List* under *PDBA Menu* in *Administration Guide*.

3.6 Installing an SSL Certificate For a Provisionable Interface With Customized Parameters

Perform the following steps to install a certificate with customized parameters:

1. Log in to EPAP A as admusr.
2. Execute the following commands to determine the IP configuration for which the certificate files were generated.

```
[admusr@mps-A ~]$ sudo openssl verify /usr/TKLC/plat/etc/ssl/server.crt  
[admusr@mps-A ~]$ sudo openssl verify /usr/TKLC/plat/etc/ssl/  
server_dual.crt
```

Sample output for the above commands:

```
[admusr@mps-A ~]$ sudo openssl verify /usr/TKLC/plat/etc/ssl/server.crt  
/usr/TKLC/plat/etc/ssl/server.crt: CN = 10.250.51.149  
error 18 at 0 depth lookup:self signed certificate  
OK
```

The EPAP network configuration can be IPv4, IPv6, or dual stack (both IPv4 and IPv6), and you need to determine which certificate file corresponds to which network configuration:

- Both certificate files have the same IP address (either IPv4 or IPv6)
 - The server.crt file has the certificate for IPv4 and the server_dual.crt file has the certificate for IPv6
 - The server.crt file has the certificate for IPv6 and the server_dual.crt file has the certificate for IPv4
3. Sign the certificate files on the EPAP A server according to the determined network configuration information:
 - If both certificate files have been generated for the same IP address (either IPv4 or IPv6), sign both certificate files with that IP address by using the following commands:

```
[admusr@mps-A ~]$ sudo /usr/bin/openssl req -x509 -sha<SHA Hash> -nodes  
-days <No of days to certify the certificate for, after which the  
certificate shall expire> -subj "/CN=<EPAP A GUI IP address >" -newkey  
rsa:<RSA Key Management> -keyout /usr/TKLC/plat/etc/ssl/server.key -  
out /usr/TKLC/plat/etc/ssl/server.crt
```

```
[admusr@mps-A ~]$ sudo /usr/bin/openssl req -x509 -nodes -days <No of  
days to certify the certificate for, after which the certificate shall  
expire> -subj "/CN=<EPAP A GUI IP address >" -newkey rsa:<RSA Key  
Management> -keyout /usr/TKLC/plat/etc/ssl/server_dual.key -out /usr/  
TKLC/plat/etc/ssl/server_dual.crt
```

- If the server.crt file has the certificate for EPAP IPv4 and the server_dual.crt file has the certificate for EPAP IPv6, sign the certificate files by using the following commands:

```
[admusr@mps-A ~]$ sudo /usr/bin/openssl req -x509 -sha<SHA Hash> -nodes
-days <No of days to certify the certificate for, after which the
certificate shall expire> -subj "/CN=<EPAP A GUI IPv4 IP address >" -
newkey rsa:<RSA Key Management> -keyout /usr/TKLC/plat/etc/ssl/
server.key -out /usr/TKLC/plat/etc/ssl/server.crt
```

```
[admusr@mps-A ~]$ sudo /usr/bin/openssl req -x509 -nodes -days <No of
days to certify the certificate for, after which the certificate shall
expire> -subj "/CN=<EPAP A GUI IPv6 IP address >" -newkey rsa:<RSA Key
Management> -keyout /usr/TKLC/plat/etc/ssl/server_dual.key -out /usr/
TKLC/plat/etc/ssl/server_dual.crt
```

- If the server.crt file has the certificate for EPAP IPv6 and the server_dual.crt file has the certificate for EPAP IPv4, sign the certificate files by using the following commands:

```
[admusr@mps-A ~]$ sudo /usr/bin/openssl req -x509 -sha<SHA Hash> -nodes
-days <No of days to certify the certificate for, after which the
certificate shall expire> -subj "/CN=<EPAP A GUI IPv6 IP address >" -
newkey rsa:<RSA Key Management> -keyout /usr/TKLC/plat/etc/ssl/
server.key -out /usr/TKLC/plat/etc/ssl/server.crt
```

```
[admusr@mps-A ~]$ sudo /usr/bin/openssl req -x509 -nodes -days <No of
days to certify the certificate for, after which the certificate shall
expire> -subj "/CN=<EPAP A GUI IPv4 IP address >" -newkey rsa:<RSA Key
Management> -keyout /usr/TKLC/plat/etc/ssl/server_dual.key -out /usr/
TKLC/plat/etc/ssl/server_dual.crt
```

4. Sign the certificate files on the EPAP B server in the same way.
5. Restart the httpd service on both the EPAP A and B servers by using the following commands:

```
[admusr@mps-A ~]$ sudo systemctl restart httpd
[admusr@mps-B ~]$ sudo systemctl restart httpd
```

6. Open the EPAP A and B GUIs using https and install the SSL certificates.

- For IPv4, use the following commands:

```
https://<EPAP A GUI IPv4 IP>
https://<EPAP B GUI IPv4 IP>
```

- For IPv6, use the following commands:

```
https://[<EPAP A GUI IPv6 IP>]
https://[<EPAP B GUI IPv6 IP>]
```

7. Verify that the certificates installed successfully and the EPAP A and B GUIs opened successfully.

8. If the EPAP GUI does not open, on the EPAP A and B servers, follow these steps to reconfigure the IP addresses on EPAP through the epapconfig menu. This will re-install the SSL certificates with the default parameters.

- a. Check the value of EPAP_IP_VERSION, and then access the EPAP Configuration Menu:

```
[admusr@mps-A ~]$ uiEdit | grep -i EPAP_IP_VERSION
"EPAP_IP_VERSION" is set to "IPv4v6"
```

```
[admusr@mps-A ~]$ sudo su - epapconfig
```

- b. Enter choice **2** to access the Configure Network Interfaces Menu:

```
/-----EPAP Configuration Menu-----\
/-----\
| 1 | Display Configuration |
|-----|
| 2 | Configure Network Interfaces Menu |
|-----|
| 3 | Set Time Zone |
|-----|
| 4 | Exchange Secure Shell Keys |
|-----|
| 5 | Change Password |
|-----|
| 6 | Platform Menu |
|-----|
| 7 | Configure NTP Server |
|-----|
| 8 | PDB Configuration Menu |
|-----|
| 9 | Security |
|-----|
| 10 | SNMP Configuration |
|-----|
| 11 | Configure Alarm Feed |
|-----|
| 12 | Configure Query Server |
|-----|
| 13 | Configure Query Server Alarm Feed |
|-----|
| 14 | Configure SNMP Agent Community |
|-----|
| 15 | Mate Disaster Recovery |
|-----|
| e | Exit |
\-----/
Enter Choice: 2
```

- c. Enter choice **1** to Configure Provisioning Network:

```

/-----Configure Network Interfaces Menu-----\
| 1 | Configure Provisioning Network
| 2 | Configure Sync Network
| 3 | Configure DSM Network
| 4 | Configure Backup Provisioning Network
| 5 | Configure Static NAT Addresses
| 6 | Configure Provisioning VIP Addresses
| e | Exit
\-----/

```

```
Enter Choice: 1
```

- d. On the Configure Provisioning Network Menu, choose option 1 if the EPAP_IP_VERSION is IPv4, option 2 if the EPAP_IP_VERSION is IPv6, or options 1 and 2 in succession if the EPAP_IP_VERSION is IPv4v6.

- Enter 1 for IPv4 Configuration:

```

/-----Configure Provisioning Network Menu-----\
| 1 | IPv4 Configuration
| 2 | IPv6 Configuration
| e | Exit
\-----/

```

```
Enter Choice: 1
```

```

EPAP software and PDBA are running. Stop them? [N]: Y
Verifying connectivity with mate...
EPAP A provisioning network IP Address [192.168.61.45]:
EPAP B provisioning network IP Address [192.168.61.46]:
EPAP provisioning network netmask [255.255.255.0]:
EPAP provisioning network default router [192.168.61.250]:

```

- Press **Enter** to reconfigure the network with the same configuration.
- Enter 2 for IPv6 Configuration:

```

/-----Configure Provisioning Network Menu-----\
| 1 | IPv4 Configuration
| 2 | IPv6 Configuration
| e | Exit
\-----/

```

```
Enter Choice: 2
```

```

EPAP software and PDBA are running. Stop them? [N]: Y
Verifying connectivity with mate...
EPAP A provisioning network IPv6 Address [2606:B400:605:B80B:200:17FF:FE0F:2884]:
EPAP B provisioning network IPv6 Address [2606:B400:605:B80B:200:17FF:FE0F:2F2C]:
EPAP provisioning network IPv6 prefix [64]:
EPAP provisioning network IPv6 default router [FE80:0000:0000:0000:0226:98FF:FE1A:9AC1]:

```

- Press **Enter** to reconfigure the network with the same configuration.

- e. If you need assistance, contact [#unique_41](#).

9. Copy the key and cert files for the `tpdProvd` process running on the 20000 port.

```

cp /usr/TKLC/plat/etc/ssl/server.key /usr/TKLC/plat/etc/ssl/server.pem
cp /usr/TKLC/plat/etc/ssl/server.crt /usr/TKLC/plat/etc/ssl/server.cert

```

- Restart the `tpdProvd` process by killing the existing process and letting it restart.

```
ps -eaf | grep tpdProvd
```

Output:

```
tpdProvd 13468      1  0 03:42 ?                00:00:04 /usr/TKLC/plat/bin/tpdProvd
```

```
kill -9 <pid>
```

Example: `kill -9 13468`

Run `ps` again to check process is restarted

```
ps -eaf | grep tpdProvd
```

Output:

```
tpdProvd 9090      1  3 04:09 ?                00:00:00 /usr/TKLC/plat/bin/tpdProvd
```

- Repeat steps 9 and 10 on EPAP B.

3.7 Installing an SSL Certificate For a Provisionable Interface From a Trusted Certificate Authority

Perform the following steps to install an SSL certificate from a trusted Certificate Authority (CA):

- Log in as the `admusr` user on both the EPAP A and B servers, create a new certificate directory (`/var/TKLC/epap/free/certificate`), provide permissions to the new directory, and change to the new directory:

```
[admusr@mps-A ~]$ pwd
```

```
/home/admusr
```

```
[admusr@mps-A ~]$ sudo mkdir /var/TKLC/epap/free/certificate
```

```
[admusr@mps-A ~]$ sudo chmod 777 /var/TKLC/epap/free/certificate
```

```
[admusr@mps-A ~]$ cd /var/TKLC/epap/free/certificate
```

- On EPAP A, execute the following commands to determine the IP configuration for which the certificate files were generated.

```
[admusr@mps-A certificate]$ sudo openssl verify /usr/TKLC/plat/etc/ssl/server.crt
```

```
[admusr@mps-A certificate]$ sudo openssl verify /usr/TKLC/plat/etc/ssl/server_dual.crt
```

Sample output of the above commands:

```
[admusr@mps-A certificate]$ sudo openssl verify /usr/TKLC/plat/etc/ssl/server.crt
```

```
/usr/TKLC/plat/etc/ssl/server.crt: CN = 10.250.51.149
```

```
error 18 at 0 depth lookup:self signed certificate
```

```
OK
```

The EPAP network configuration can be IPv4, IPv6, or dual stack (both IPv4 and IPv6), and you need to determine which certificate file corresponds to which network configuration:

- Both certificate files have the same IP address (either IPv4 or IPv6)
 - The server.crt file has the certificate for IPv4 and the server_dual.crt file has the certificate for IPv6
 - The server.crt file has the certificate for IPv6 and the server_dual.crt file has the certificate for IPv4
3. Based on the determined network configuration information, generate certificate signing request (CSR) and private key files for the EPAP A server by using the appropriate commands from within the `certificate` directory.

 **Note:**

The `-subj` option in the following commands has example fields, which must be replaced with your organization-specific domain information. The `/C` field is for your country, `/ST` is for state, `/L` is for location, `/O` is for organization, `/OU` is for organizational unit, and `/CN` is the common name field, which is the IP address or fully-qualified domain name that you want to use with your certificate.

- If both certificate files have been generated for the same IP address (either IPv4 or IPv6), enter the following commands:

```
[admusr@mps-A certificate]$ sudo /usr/bin/openssl req -x509 -sha<SHA Hash> -nodes -days <No of days to certify the certificate for, after which the certificate shall expire > -newkey rsa:2048 -nodes -keyout server.key -out server.csr -subj "/C=US/ST=New York/L=Brooklyn/O=Example Brooklyn Company/OU=Example Org Unit/CN=<EPAP GUI IP address, e.g, 1.1.1.1>/emailAddress=xxx@yyy.com"
```

```
[admusr@mps-A certificate]$ sudo /usr/bin/openssl req -newkey rsa:2048 -nodes -keyout server_dual.key -out server_dual.csr -subj "/C=US/ST=New York/L=Brooklyn/O=Example Brooklyn Company/OU=Example Org Unit/CN=<EPAP GUI IP address, e.g, 1.1.1.1>/emailAddress=xxx@yyy.com"
```

- If the server.crt file has the certificate for EPAP IPv4 and the server_dual.crt file has the certificate for EPAP IPv6, enter the following commands:

```
[admusr@mps-A certificate]$ sudo /usr/bin/openssl req -x509 -sha<SHA Hash> -nodes -days <No of days to certify the certificate for, after which the certificate shall expire > -newkey rsa:2048 -nodes -keyout server.key -out server.csr -subj "/C=US/ST=New York/L=Brooklyn/O=Example Brooklyn Company/OU=Example Org Unit/CN=<EPAP GUI IPv4 IP address, e.g, 1.1.1.1>/emailAddress=xxx@yyy.com"
```

```
[admusr@mps-A certificate]$ sudo /usr/bin/openssl req -newkey rsa:2048 -nodes -keyout server_dual.key -out server_dual.csr -subj "/C=US/ST=New York/L=Brooklyn/O=Example Brooklyn Company/OU=Example Org Unit/CN=<EPAP GUI IPv6 IP address, e.g, 1.1.1.1>/emailAddress=xxx@yyy.com"
```

- If the server.crt file has the certificate for EPAP IPv6 and the server_dual.crt file has the certificate for EPAP IPv4, enter the following commands:

```
[admusr@mps-A certificate]$ sudo /usr/bin/openssl req -x509 -sha<SHA Hash> -nodes -days <No of days to certify the certificate for, after
```

```
which the certificate shall expire > -newkey rsa:2048 -nodes -keyout
server.key -out server.csr -subj "/C=US/ST=New York/L=Brooklyn/
O=Example Brooklyn Company/OU=Example Org Unit/CN=<EPAP GUI IPv6 IP
address, e.g, 1.1.1.1>/emailAddress=xxx@yyy.com"
```

```
[admusr@mps-A certificate]$ sudo /usr/bin/openssl req -newkey rsa:2048 -
nodes -keyout server_dual.key -out server_dual.csr -subj "/C=US/ST=New
York/L=Brooklyn/O=Example Brooklyn Company/OU=Example Org Unit/CN=<EPAP
GUI IPv4 IP address, e.g, 1.1.1.1>/emailAddress=xxx@yyy.com"
```

These commands generate the following files on the EPAP A server:

```
[admusr@mps-A certificate]$ ls -lrt
-rw-r--r-- 1 root root 1679 May 21 11:08 server.key
-rw-r--r-- 1 root root 968 May 21 11:08 server.csr
-rw-r--r-- 1 root root 1675 May 21 11:09 server_dual.key
-rw-r--r-- 1 root root 968 May 21 11:09 server_dual.csr
```

4. Generate certificate signing request (CSR) and private key files for the EPAP B server in the same way (steps 2 - 3), using the files serverB.csr and serverB_dual.csr for EPAP B. The following files will be generated on the EPAP B server:

```
[admusr@mps-B certificate]$ ls -lrt
-rw-r----- 1 root root 1679 May 21 11:02 server.key
-rw-r----- 1 root root 968 May 21 11:02 serverB.csr
-rw-r----- 1 root root 1679 May 21 11:02 server_dual.key
-rw-r----- 1 root root 968 May 21 11:02 serverB_dual.csr
```

5. Send the generated CSR files (server.csr, server_dual.csr, serverB.csr, and serverB_dual.csr) to the CA. The CA will provide signed certificate (server.crt, server_dual.crt, serverB.crt, and serverB_dual.crt) files in return.
6. Copy the appropriate files to the appropriate `ssl` directory, and rename (in the B server only) as needed:
 - a. On the EPAP A server, copy the four files generated through the `openssl` commands (server.key, server_dual.key, server.csr, server_dual.csr) and the two files provided by the CA for the EPAP A server (server.crt and server_dual.crt) to the `/usr/TKLC/plat/etc/ssl` directory.
 - b. On the EPAP B server, copy the four files generated through the `openssl` commands (server.key, server_dual.key, serverB.csr, serverB_dual.csr) and the two files provided by the CA for the EPAP B server (serverB.crt and serverB_dual.crt) to the `/usr/TKLC/plat/etc/ssl` directory.
 - c. After copying serverB.crt and serverB_dual.crt to the `/usr/TKLC/plat/etc/ssl` directory on the EPAP B server, rename them to server.crt and server_dual.crt respectively.
7. Restart the `httpd` service on both the EPAP A and B servers by using the following commands:

```
[admusr@mps-A certificate]$ sudo systemctl restart httpd
[admusr@mps-B certificate]$ sudo systemctl restart httpd
```

8. Open the EPAP A and B GUIs using `https` and install the SSL certificates.

- For IPv4, use the following commands:

```
https://<EPAP A GUI IPv4 IP>
https://<EPAP B GUI IPv4 IP>
```

- For IPv6, use the following commands:

```
https://[<EPAP A GUI IPv6 IP>]
https://[<EPAP B GUI IPv6 IP>]
```

9. Verify that the EPAP A and B GUIs opened successfully with the installed certificate.
10. If the EPAP GUI does not open, follow these steps on the EPAP A and B servers:

- a. Open the `/etc/httpd/conf.d/ssl.conf` file:

```
[admusr@mps-A certificate]$ sudo vi /etc/httpd/conf.d/ssl.conf
```

- b. Edit `/etc/httpd/conf.d/ssl.conf` and un-comment the appropriate code:

- If the CA provides `ca.crt` (CA intermediate certificate), change from:

```
#SSLCertificateChainFile /etc/httpd/conf/sslcert/ca.crt
```

to:

```
SSLCertificateChainFile /etc/httpd/conf/sslcert/ca.crt
```

- If the CA provides CA certificate(s), change from:

```
#SSLCACertificatePath /etc/httpd/conf/ca-cert
#SSLCACertificateFile /usr/share/ssl/certs/ca-bundle.crt
```

to:

```
SSLCACertificatePath /etc/httpd/conf/ca-cert
SSLCACertificateFile /usr/share/ssl/certs/ca-bundle.crt
```

- c. Make sure that these files (CA certs) are copied to the right path on both servers, as mentioned in `/etc/httpd/conf.d/ssl.conf`.
- d. Restart the `httpd` service using the following command on both servers:

```
[admusr@mps-A certificate]$ sudo systemctl restart httpd
[admusr@mps-B certificate]$ sudo systemctl restart httpd
```

- e. Verify that the EPAP A and B GUIs open successfully.

11. Copy the key and cert files for the `tpdProvd` process running on the 20000 port.

```
cp /usr/TKLC/plat/etc/ssl/server.key /usr/TKLC/plat/etc/ssl/server.pem
cp /usr/TKLC/plat/etc/ssl/server.crt /usr/TKLC/plat/etc/ssl/server.cert
```

- Restart the `tpdProvd` process by killing the existing process and letting it restart.

```
ps -eaf | grep tpdProvd
```

Output:

```
tpdProvd 13468      1  0 03:42 ?          00:00:04 /usr/TKLC/plat/bin/tpdProvd
```

```
kill -9 <pid>
```

Example: `kill -9 13468`

Run `ps` again to check process is restarted

```
ps -eaf | grep tpdProvd
```

Output:

```
tpdProvd 9090      1  3 04:09 ?          00:00:00 /usr/TKLC/plat/bin/tpdProvd
```

- Repeat steps 11 and 12 on EPAP B.

3.8 Installing an SSL Certificate For a Backup Provisionable Interface With Customized Parameters

Perform the following steps to install an SSL certificate for a backup prov interface with customized parameters:

- Log in to EPAP A as `admusr`.
- Switch to the root user as `"su -"`.
- Change the directory to `/usr/TKLC/plat/etc/ssl/`.
- Execute the following command to list the files in the directory `/usr/TKLC/plat/etc/ssl/`.

Sample output for the previous command:

```
[admusr@mps-A ssl]$ ls -ltrh server_bkprov*
-rw-r----- 1 root epap 1.7K May 23 06:33 server_bkprov_v4.key
-rw-r----- 1 root epap 1.1K May 23 06:33 server_bkprov_v4.crt
```

The EPAP network configuration can be IPv4, IPv6, or dual stack (both IPv4 and IPv6), and you need to determine which certificate file corresponds to which network configuration:

- Both certificate files are present in the `/usr/TKLC/plat/etc/ssl/` directory
 - The `server_bkprov_v4.crt` certificate file is present in the `/usr/TKLC/plat/etc/ssl/` directory
 - The `server_bkprov_v6.crt` certificate file is present in the `/usr/TKLC/plat/etc/ssl/` directory
- Exit from the root user:

```
[admusr@mps-A ssl]$ exit
logout
```

- Sign the certificate files on the EPAP A server according to the determined certificate file information:

- If both certificate files have been generated for the same IP address (either IPv4 or IPv6), sign both certificate files with that IP address by using the following commands:

```
sudo /usr/bin/openssl req -x509 -sha<SHA Hash> -nodes -days <No of days to certify the certificate for, after which the certificate shall expire> -subj "/CN=<EPAP A Backup Prov IPv4 address >" -newkey rsa:<RSA Key Management> -keyout /usr/TKLC/plat/etc/ssl/server_bkprov_v4.key -out /usr/TKLC/plat/etc/ssl/server_bkprov_v4.crt
```

```
sudo /usr/bin/openssl req -x509 -sha<SHA Hash> -nodes -days <No of days to certify the certificate for, after which the certificate shall expire> -subj "/CN=<EPAP A Backup Prov IPv6 address >" -newkey rsa:<RSA Key Management> -keyout /usr/TKLC/plat/etc/ssl/server_bkprov_v6.key -out /usr/TKLC/plat/etc/ssl/server_bkprov_v6.crt
```

- If the server_bkprov_v4.crt file is generated because the bakcup prov is configured for EPAP IPv4, sign the certificate files by using the following command:

```
sudo /usr/bin/openssl req -x509 -sha<SHA Hash> -nodes -days <No of days to certify the certificate for, after which the certificate shall expire> -subj "/CN=<EPAP A Backup Prov IPv4 address >" -newkey rsa:<RSA Key Management> -keyout /usr/TKLC/plat/etc/ssl/server_bkprov_v4.key -out /usr/TKLC/plat/etc/ssl/server_bkprov_v4.crt
```

- If the server_bkprov_v6.crt file is generated because the bakcup prov is configured for EPAP IPv6, sign the certificate files by using the following command:

```
sudo /usr/bin/openssl req -x509 -sha<SHA Hash> -nodes -days <No of days to certify the certificate for, after which the certificate shall expire> -subj "/CN=<EPAP A Backup Prov IPv6 address >" -newkey rsa:<RSA Key Management> -keyout /usr/TKLC/plat/etc/ssl/server_bkprov_v6.key -out /usr/TKLC/plat/etc/ssl/server_bkprov_v6.crt
```

7. Sign the certificate files on the EPAP B server in the same way.
8. Restart the httpd service on both the EPAP A and B servers by using the following commands:

```
[admusr@mps-A ~]$ sudo systemctl restart httpd
[admusr@mps-B ~]$ sudo systemctl restart httpd
```

9. Open the EPAP A and B GUIs using https and install the SSL certificates.

- For IPv4, use the following commands:

```
https://<EPAP A GUI IPv4 IP>
https://<EPAP B GUI IPv4 IP>
```

- For IPv6, use the following commands:

```
https://[<EPAP A GUI IPv6 IP>]
https://[<EPAP B GUI IPv6 IP>]
```

10. Verify that the certificates installed successfully and the EPAP A and B GUIs opened successfully.

11. If the EPAP GUI does not open, on the EPAP A and B servers, follow these steps to reconfigure the IP addresses on EPAP through the epapconfig menu. This will re-install the SSL certificates with the default parameters.

- a. Check the value of EPAP_IP_VERSION, and then access the EPAP Configuration Menu:

```
[admusr@mps-A ~]$ uiEdit | grep -i
"EPAP_A_BACKUP_PROV_NETWORK_IP_ADDRESS"
"EPAP_A_BACKUP_PROV_NETWORK_IP_ADDRESS" is set to "10.75.136.41"
```

```
[admusr@mps-A ~]$ uiEdit | grep -i
"EPAP_B_BACKUP_PROV_NETWORK_IP_ADDRESS_V6"
"EPAP_B_BACKUP_PROV_NETWORK_IP_ADDRESS_V6" is set to "
2606:b400:605:b912:200:17ff:fe0e:bf88"
```

```
[admusr@mps-A ~]$ sudo su - epapconfig
```

- b. Enter choice **2** to access the Configure Network Interfaces Menu:

```
/-----EPAP Configuration Menu-----\
/-----\
| 1 | Display Configuration |
|-----|
| 2 | Configure Network Interfaces Menu |
|-----|
| 3 | Set Time Zone |
|-----|
| 4 | Exchange Secure Shell Keys |
|-----|
| 5 | Change Password |
|-----|
| 6 | Platform Menu |
|-----|
| 7 | Configure NTP Server |
|-----|
| 8 | PDB Configuration Menu |
|-----|
| 9 | Security |
|-----|
| 10 | SNMP Configuration |
|-----|
| 11 | Configure Alarm Feed |
|-----|
| 12 | Configure Query Server |
|-----|
| 13 | Configure Query Server Alarm Feed |
|-----|
| 14 | Configure SNMP Agent Community |
|-----|
| 15 | Mate Disaster Recovery |
|-----|
| e | Exit |
\-----/
```

Enter Choice: **2**

- c. Enter choice 1 to Configure Provisioning Network:

```

/-----Configure Network Interfaces Menu-----\
| 1 | Configure Provisioning Network
| 2 | Configure Sync Network
| 3 | Configure DSM Network
| 4 | Configure Backup Provisioning Network
| 5 | Configure Static NAT Addresses
| 6 | Configure Provisioning VIP Addresses
| e | Exit
\-----\

Enter Choice: 1

```

- d. On the Configure Provisioning Network Menu, choose option 1 if the EPAP_IP_VERSION is IPv4, option 2 if the EPAP_IP_VERSION is IPv6, or options 1 and 2 in succession if the EPAP_IP_VERSION is IPv4v6.
- Enter 1 for IPv4 Configuration:

```

/-----Configure Provisioning Network Menu-----\
| 1 | IPv4 Configuration
| 2 | IPv6 Configuration
| e | Exit
\-----\

Enter Choice: 1

```

•

```

EPAP software and PDBA are running. Stop them? [N]: Y
Verifying connectivity with mate...
EPAP A backup provisioning network IP Address [10.75.136.41]:
EPAP B backup provisioning network IP Address [10.75.136.42]:
EPAP backup provisioning network netmask [255.255.255.0]:
EPAP backup provisioning network default router [10.75.136.1]:

```

- Press **Enter** to reconfigure the network with the same configuration.
- e. If you need assistance, contact [#unique_41](#).

3.9 Installing an SSL Certificate For a Backup Provisionable Interface From a Trusted Certificate Authority

Perform the following steps to install an SSL certificate for a backup prov interface from a trusted Certificate Authority (CA):

1. Log in as the admusr user on both the EPAP A and B servers, create a new certificate directory (`/var/TKLC/epap/free/`), provide permissions to the new directory, and change to the new directory:

```
[admusr@mps-A ~]$ pwd
/home/admusr
[admusr@mps-A ~]$ sudo mkdir /var/TKLC/epap/free/certificate
[admusr@mps-A ~]$ sudo chmod 777 /var/TKLC/epap/free/certificate
[admusr@mps-A ~]$ cd /var/TKLC/epap/free/certificate
```

2. Switch to the root user as "su -".
3. Change the directory to `/usr/TKLC/plat/etc/ssl/`.
4. Execute the following command to list the files in the directory `/usr/TKLC/plat/etc/ssl/`.
Sample output for the previous command:

```
[admusr@mps-A ssl]$ ls -ltrh server_bkprov*
-rw-r----- 1 root epap 1.7K May 23 06:33 server_bkprov_v4.key
-rw-r----- 1 root epap 1.1K May 23 06:33 server_bkprov_v4.crt
```

5. The EPAP Backup prov network configuration can be IPv4, IPv6, or dual stack (both IPv4 and IPv6), and you need to determine which certificate file corresponds to which network configuration:

- Both certificate files are present in the `/usr/TKLC/plat/etc/ssl/` directory
- The `server_bkprov_v4.crt` certificate file is present in the `/usr/TKLC/plat/etc/ssl/` directory
- The `server_bkprov_v6.crt` certificate file is present in the `/usr/TKLC/plat/etc/ssl/` directory

6. Exit from the root user:

```
[admusr@mps-A ssl]$ exit
logout
```

7. Based on the determined network configuration information, generate certificate signing request (CSR) and private key files for the EPAP A server by using the appropriate commands from within the `certificate` directory.

Note:

The `-subj` option in the following commands has example fields, which must be replaced with your organization-specific domain information. The `/C` field is for your country, `/ST` is for state, `/L` is for location, `/O` is for organization, `/OU` is for organizational unit, and `/CN` is the common name field, which is the IP address or fully-qualified domain name that you want to use with your certificate.

- If both certificate files have been generated for the same IP address (either IPv4 or IPv6), enter the following commands:

```
sudo /usr/bin/openssl req -x509 -sha<SHA Hash> -nodes -days <No of days
to certify the certificate for, after which the certificate shall
```

```
expire > -newkey rsa:2048 -nodes -keyout server_bkprov_v4.key -out
server_bkprov_v4.csr -subj "/C=US/ST=New York/L=Brooklyn/O=Example
Brooklyn Company/OU=Example Org Unit/CN=<EPAP Backup Prov IPv4 address>/
emailAddress=xxx@yyy.com"
```

```
sudo /usr/bin/openssl req -x509 -sha<SHA Hash> -nodes -days <No of days
to certify the certificate for, after which the certificate
shall expire > -newkey rsa:2048 -nodes -keyout server_bkprov_v6.key -
out server_bkprov_v6.csr -subj "/C=US/ST=New York/L=Brooklyn/O=Example
Brooklyn Company/OU=Example Org Unit/CN=<EPAP Backup Prov IPv6 address>/
emailAddress=xxx@yyy.com"
```

- If the server_bkprov_v4.crt file is generated because the bakcup prov is configured for EPAP IPv4, sign the certificate files by using the following command:

```
sudo /usr/bin/openssl req -x509 -sha<SHA Hash> -nodes -days <No of days
to certify the certificate for, after which the certificate shall
expire > -newkey rsa:2048 -nodes -keyout server_bkprov_v4.key -out
server_bkprov_v4.csr -subj "/C=US/ST=New York/L=Brooklyn/O=Example
Brooklyn Company/OU=Example Org Unit/CN=<EPAP Backup Prov IPv4 address>/
emailAddress=xxx@yyy.com"
```

- If the server_bkprov_v6.crt file is generated because the bakcup prov is configured for EPAP IPv6, sign the certificate files by using the following command:

```
sudo /usr/bin/openssl req -x509 -sha<SHA Hash> -nodes -days <No of days
to certify the certificate for, after which the certificate shall
expire > -newkey rsa:2048 -nodes -keyout server_bkprov_v6.key -out
server_bkprov_v6.csr -subj "/C=US/ST=New York/L=Brooklyn/O=Example
Brooklyn Company/OU=Example Org Unit/CN=<EPAP Backup Prov IPv6 address>/
emailAddress=xxx@yyy.com"
```

These commands generate the following files on the EPAP A server:

```
[admusr@mps-A certificate]$ ls -lrt
-rw-r----- 1 root root 1679 May 21 11:08 server_bkprov_v4.key
-rw-r----- 1 root root 968 May 21 11:08 server_bkprov_v4.csr
-rw-r----- 1 root root 1675 May 21 11:09 server_bkprov_v6.key
-rw-r----- 1 root root 968 May 21 11:09 server_bkprov_v6.csr
```

8. Generate certificate signing request (CSR) and private key files for the EPAP B server in the same way (steps 1- 7), using the files serverB_bkprov_v4.csr and serverB_bkprov_v6.csr for EPAP B. The following files will be generated on the EPAP B server:

```
[admusr@mps-B certificate]$ ls -lrt
-rw-r----- 1 root root 1679 May 21 11:02 server_bkprov_v4.key
-rw-r----- 1 root root 968 May 21 11:02 serverB_bkprov_v4.csr
-rw-r----- 1 root root 1679 May 21 11:02 server_bkprov_v6.key
-rw-r----- 1 root root 968 May 21 11:02 serverB_bkprov_v6.csr
```

9. Send the generated CSR files (server_bkprov_v4.csr, server_bkprov_v6.csr, serverB_bkprov_v4.csr and serverB_bkprov_v6.csr)

6.csr) to the CA. The CA will provide signed certificate files (server_bkprov_v4.crt , server_bkprov_v6.crt, serverB_bkprov_v4.crt, serverB_bkprov_v6.crt) in return.

10. Copy the appropriate files to the appropriate `ssl` directory, and rename as needed:
 - a. On the EPAP A server, copy the four files generated through the `openssl` commands (server_bkprov_v4.key, server_bkprov_v6.key, server_bkprov_v4.csr, server_bkprov_v6.csr) and the two files provided by the CA for the EPAP A server (server_bkprov_v4.crt and server_bkprov_v6.crt) to the `/usr/TKLC/plat/etc/ssl` directory.
 - b. On the EPAP B server, copy the four files generated through the `openssl` commands (server_bkprov_v4.key, server_bkprov_v6.key, serverB_bkprov_v4.csr, serverB_bkprov_v6.csr) and the two files provided by the CA for the EPAP B server (serverB_bkprov_v4.crt and serverB_bkprov_v6.crt) to the `/usr/TKLC/plat/etc/ssl` directory.
 - c. After copying serverB_bkprov_v4.crt and serverB_bkprov_v6.crt to the `/usr/TKLC/plat/etc/ssl` directory on the EPAP B server, rename them to server_bkprov_v4.crt and server_bkprov_v6.crt, respectively.
11. Restart the `httpd` service on both the EPAP A and B servers by using the following commands:

```
[admusr@mps-A certificate]$ sudo systemctl restart httpd
[admusr@mps-B certificate]$ sudo systemctl restart httpd
```

12. Open the EPAP A and B GUIs using `https` and install the SSL certificates.

- For IPv4, use the following commands:

```
https://<EPAP A GUI IPv4 IP>
https://<EPAP B GUI IPv4 IP>
```

- For IPv6, use the following commands:

```
https://[<EPAP A GUI IPv6 IP>]
https://[<EPAP B GUI IPv6 IP>]
```

13. Verify that the EPAP A and B GUIs opened successfully with the installed certificate.

14. If the EPAP GUI does not open, follow these steps on the EPAP A and B servers:

- a. Open the `/etc/httpd/conf.d/ssl.conf` file:

```
[admusr@mps-A certificate]$ sudo vi /etc/httpd/conf.d/ssl.conf
```

- b. Edit `/etc/httpd/conf.d/ssl.conf` and un-comment the appropriate code:

- If the CA provides `ca.crt` (CA intermediate certificate), change from:

```
#SSLCertificateChainFile /etc/httpd/conf/sslcert/ca.crt
```

to:

```
SSLCertificateChainFile /etc/httpd/conf/sslcert/ca.crt
```

- If the CA provides CA certificate(s), change from:

```
#SSLCACertificatePath /etc/httpd/conf/ca-cert
#SSLCACertificateFile /usr/share/ssl/certs/ca-bundle.crt
```

to:

```
SSLCACertificatePath /etc/httpd/conf/ca-cert
SSLCACertificateFile /usr/share/ssl/certs/ca-bundle.crt
```

- Make sure that these files (CA certs) are copied to the right path on both servers, as mentioned in `/etc/httpd/conf.d/ssl.conf`.
- Restart the httpd service using the following command on both servers:

```
[admusr@mps-A certificate]$ sudo systemctl restart httpd
[admusr@mps-B certificate]$ sudo systemctl restart httpd
```

- Verify that the EPAP A and B GUIs open successfully.

3.10 Installing an SSL Certificate For a VIP With Customized Parameters

Perform the following steps to install an SSL certificate for a Virtual IP (VIP) with customized parameters:

- When the EPAP is configured in IPv4 configuration, log in to EPAP A as admusr.
- Switch to the root user as "su -".
- Change the directory to `/usr/TKLC/plat/etc/ssl/`.
- Execute the following command to list the files in the directory `/usr/TKLC/plat/etc/ssl/`.

Sample output for the previous command:

```
[admusr@mps-A ssl]$ ls -ltrh server_vip_v*
-rw-r----- 1 root epap 1.7K May 25 03:34 server_vip_v4.key
-rw-r----- 1 root epap 1.1K May 25 03:34 server_vip_v4.crt
```

- Exit from the root user:

```
[admusr@mps-A ssl]$ exit
logout
```

The certificate file `server_vip_v4.crt` is present in the directory `/usr/TKLC/plat/etc/ssl/`. Continue with the next step to sign the certificate after exiting from the root user.

- Sign the certificate files on the EPAP A server according to the determined network configuration information:

The certificate file `server_vip_v4.crt` is generated, as the VIP is configured in IPv4 configuration. Sign the certificate file using the following command:

```
sudo /usr/bin/openssl req -x509 -sha<SHA Hash> -nodes -days <No of days to
certify the certificate for, after which the certificate shall expire> -
subj "/CN=<EPAP A VIP IPv4 address >" -newkey rsa:<RSA Key Management> -
keyout /usr/TKLC/plat/etc/ssl/server_vip_v4.key -out /usr/TKLC/
plat/etc/ssl/server_vip_v4.crt
```

7. Sign the certificate files on the EPAP B server in the same way.
8. Restart the `httpd` service on both the EPAP A and B servers by using the following commands:

```
[admusr@mps-A ~]$ sudo systemctl restart httpd
[admusr@mps-B ~]$ sudo systemctl restart httpd
```

9. Open the GUI using VIP IPv4 IP using `https` and install the SSL certificate using the following command:

```
https://<EPAP A VIP IPv4 IP>
```

10. Verify that the certificate installed successfully and the GUI opened successfully.
11. If the EPAP GUI does not open on the EPAP A server, follow these steps to reconfigure the VIP IP addresses on EPAP through the `epapconfig` menu. This will re-install the SSL certificates with the default parameters:

```
[admusr@mps-A ~]$ sudo su - epapconfig
```

- a. Enter choice **2** to access the Configure Network Interfaces Menu:

```
/-----EPAP Configuration Menu-----\
/-----\
| 1 | Display Configuration |
|-----|
| 2 | Configure Network Interfaces Menu |
|-----|
| 3 | Set Time Zone |
|-----|
| 4 | Exchange Secure Shell Keys |
|-----|
| 5 | Change Password |
|-----|
| 6 | Platform Menu |
|-----|
| 7 | Configure NTP Server |
|-----|
| 8 | PDB Configuration Menu |
|-----|
| 9 | Security |
|-----|
| 10 | SNMP Configuration |
|-----|
| 11 | Configure Alarm Feed |
|-----|
```

```

| 12 | Configure Query Server |
|----|-----|
| 13 | Configure Query Server Alarm Feed |
|----|-----|
| 14 | Configure SNMP Agent Community |
|----|-----|
| 15 | Mate Disaster Recovery |
|----|-----|
| e | Exit |
\-----/
Enter Choice: 2

```

- b. Enter choice 6 to Configure Provisioning VIP Addresses:

```

MPS Side A: hostname: hvar-A hostid: 4b0a1a8d
Platform Version: 6.1.4-7.4.0.0.0_88.37.0
Software Version: EPAP 162.0.16-0.59464
Thu May 25 07:06:20 EDT 2017

/-----Configure Provisioning VIP address Menu-----\
|-----|
| 1 | IPv4 Configuration |
|-----|
| 2 | IPv6 Configuration |
|-----|
| e | Exit |
\-----/

Enter Choice: 1

Verifying root connectivity with mate...
EPAP local provisioning Virtual IP Address [10.75.141.28]:
EPAP remote provisioning Virtual IP Address [10.75.141.29]:

```

- c. Press **Enter** to reconfigure the network with the same configuration.
d. If you need assistance, contact [#unique_41](#).

3.11 Installing an SSL Certificate For a VIP From a Trusted Certificate Authority

Perform the following steps to install an SSL certificate for a Virtual IP (VIP) from a trusted Certificate Authority (CA):

1. Log in as the `admusr` user on both the EPAP A and B servers, create a new certificate directory (`/var/TKLC/epap/free/`), provide permissions to the new directory, and change to the new directory:

```

[admusr@mps-A ~]$ pwd
/home/admusr
[admusr@mps-A ~]$ sudo mkdir /var/TKLC/epap/free/certificate
[admusr@mps-A ~]$ sudo chmod 777 /var/TKLC/epap/free/certificate
[admusr@mps-A ~]$ cd /var/TKLC/epap/free/certificate

```

2. When the EPAP is configured in IPv4 configuration, log in to EPAP A as admusr.
3. Switch to the root user as "su -".
4. Change the directory to /usr/TKLC/plat/etc/ssl/.
5. Execute the following command to list the files in the directory /usr/TKLC/plat/etc/ssl/.

Sample output for the previous command:

```
[admusr@mps-A ssl]$ ls -ltrh server_vip_v*
-rw-r----- 1 root epap 1.7K May 25 03:34 server_vip_v4.key
-rw-r----- 1 root epap 1.1K May 25 03:34 server_vip_v4.crt
```

6. Exit from the root user:

```
[admusr@mps-A ssl]$ exit
logout
```

The certificate file server_vip_v4.crt is present in the directory /usr/TKLC/plat/etc/ssl/. Continue with the next step to sign the certificate after exiting from the root user.

7. Generate certificate signing request (CSR) and private key files for EPAP A server using the following commands from within the certificate directory. The certificate file server_vip_v4.crt is generated since the VIP is configured in IPv4 configuration. Enter the following commands on EPAP A server:

```
sudo /usr/bin/openssl req -x509 -sha<SHA Hash> -nodes -days <No of days to
certify the certificate for, after which the certificate shall expire > -
newkey rsa:2048 -nodes -keyout server_vip_v4.key -out server_vip_v4.csr -
subj "/C=US/ST=New York/L=Brooklyn/O=Example Brooklyn Company/OU=Example
Org Unit/CN=<EPAP VIP IPv4 address>/emailAddress=xxx@yyy.com"
```

 **Note:**

The -subj option in the following commands has example fields, which must be replaced with your organization-specific domain information. The /C field is for your country, /ST is for state, /L is for location, /O is for organization, /OU is for organizational unit, and /CN is the common name field, which is the IP address or fully-qualified domain name that you want to use with your certificate.

These commands generate the following files on the EPAP A server:

```
[admusr@mps-A certificate]$ ls -lrt
-rw-r----- 1 root root 1679 May 21 11:08 server_vip_v4.key
-rw-r----- 1 root root 968 May 21 11:08 server_vip_v4.csr
```

8. Generate certificate signing request (CSR) and private key files for EPAP B server by executing steps 1 to 7. Sign the certificate files on the EPAP B server in the same way. Use the files serverB_vip_v4.csr and serverB_vip_v6.csr for EPAP B.

These commands generate the following files on the EPAP B server:

```
[admusr@mps-B certificate]$ ls -lrt
-rw-r--r-- 1 root root 1679 May 21 11:02 server_vip_v4.key
-rw-r--r-- 1 root root 968 May 21 11:02 serverB_vip_v4.csr
```

9. Send the generated CSR files (server_vip_v4.csr, serverB_vip_v4.csr) to the CA. The CA will provide signed certificate files (server_vip_v4.crt, serverB_vip_v4.crt) in return.
10. Copy the appropriate files to the appropriate ssl directory, and rename as needed:
 - On the EPAP A server, copy the two files generated through the openssl commands (server_vip_v4.key, server_vip_v4.csr) and the file provided by the CA (server_vip_v4.crt) to the /usr/TKLC/plat/etc/ssl directory.
 - On the EPAP B server, copy the two files generated through the openssl command (server_vip_v4.key , serverB_vip_v4.csr) and the file provided by the CA for the EPAP B server (serverB_vip_v4.crt) to the /usr/TKLC/plat/etc/ssl directory.
11. After copying server B_vip_v4.crt to the /usr/TKLC/plat/etc/ssl directory on the EPAP B server, rename them to server_vip_v4.crt.
12. Restart the httpd service on both the EPAP A and B servers by using the following commands:

```
[admusr@mps-A certificate]$ sudo systemctl restart httpd
[admusr@mps-B certificate]$ sudo systemctl restart httpd
```

13. Open the GUI using VIP IPv4 IP using https and install the SSL certificate using the following command:

```
https://<EPAP A VIP IPv4 IP>
```

14. Verify that the certificate installed successfully and the GUI opened successfully.
15. If the EPAP GUI does not open, follow these steps on the EPAP A and B servers:
 - a. Open the /etc/httpd/conf.d/ssl.conf file:

```
[admusr@mps-A certificate]$ sudo vi /etc/httpd/conf.d/ssl.conf
```

- b. Edit /etc/httpd/conf.d/ssl.conf and un-comment the appropriate code:

- If the CA provides ca.crt (CA intermediate certificate), change from:

```
#SSLCertificateChainFile /etc/httpd/conf/sslcert/ca.crt
```

to:

```
SSLCertificateChainFile /etc/httpd/conf/sslcert/ca.crt
```

- If the CA provides CA certificate(s), change from:

```
#SSLCACertificatePath /etc/httpd/conf/ca-cert
#SSLCACertificateFile /usr/share/ssl/certs/ca-bundle.crt
```

to:

```
SSLCACertificatePath /etc/httpd/conf/ca-cert  
SSLCACertificateFile /usr/share/ssl/certs/ca-bundle.crt
```

- c. Make sure that these files (CA certs) are copied to the right path on both servers, as mentioned in `/etc/httpd/conf.d/ssl.conf`.
- d. Restart the httpd service using the following command on both servers:

```
[admusr@mps-A certificate]$ sudo systemctl restart httpd  
[admusr@mps-B certificate]$ sudo systemctl restart httpd
```

- e. Verify that the EPAP A and B GUIs open successfully.

A

SSL Certificate Hostname Discrepancy

Web Server Misconfiguration: SSL Certificate Hostname Discrepancy

Probable Cause and Possible Resolutions:

This vulnerability can be caused by any of the following scenarios:

- Host is scanned through the IP address instead of Fully Qualified Domain Names (FQDNs)
- FQDN does not match with the certificate CN (Common Name) or SAN

 **Note:**

It is recommended to use the hostname instead of IP address in CN for the vendor provided certificates.

Following are some of the ways to connect (scan) using the hostname instead of IP address:

1. Add mapping of IP and hostname in host's file (/etc/hosts).
Open the the `/etc/hosts` file and add a line in the end
`<IP address> <hostname>`
Example: `10.75.124.247 epap1234`
where, `10.75.124.247` is the IP address and `epap1234` is the hostname.
2. Add a hostname mapped to the device mac address in the connected router DHCP settings. Customer's Network administration should perform this step.
3. Add the IP and hostname mapping entry in the local DNS server. Customer's Network administration should perform this step.

B

Configuring IPsec for Secure Packet Transmission between All Hosts

Perform the following steps to enable IPsec service between nodes. For example, Active and Standby PDBA EPAP nodes, PDB and RTDB EPAP nodes, and so on.

1. Switch to the root user as "su -".
2. Enable the service to be started and run the command:

```
systemctl enable ipsec
```

```
[admusr@mps-A~]$ systemctl enable ipsec
```

```
[admusr@mps-A~]$ Created symlink /etc/systemd/system/multi-user.target.wants/ipsec.service -> /usr/lib/systemd/system/ipsec.service
```

3. Configure the firewall (if enabled) to allow 500 and 4500/UDP ports for the IKE, ESP, and AH protocols by adding the IPsec service:

```
firewall-cmd --add-service="ipsec"
```

```
firewall-cmd --runtime-to-permanent
```

4. Initialize the new NSS database and run the following command as root:

```
ipsec initnss
```

For example:

```
[admusr@mps-A~]$ ipsec initnss
```

```
[admusr@mps-A ~]$ Initializing NSS database
```

5. Create Host-to-Host VPN Link. Change the directory to `/etc/ipsec.d/`.
6. Create a new file with the name `my_host-to-host.conf`.
7. Edit the file and enter all the details shown below:

It is mandatory to maintain the gap of one tab between `conn mytunnel` and `auto=start`. Similarly, the user needs to make more than one tunnel using “-also” keyword. For example, “`conn mytunnel-also`”.

```
conn mytunnel
    auto=start
    keyexchange=ike
    phase2=esp
    pfs=no
    type=tunnel
    authby=secret
```

```

leftid=(ip address of self linux machine)
left=(ip address of self linux machine)
right=(ip address of remote linux machine)
rightid=(ip address of remote linux machine)

```

If more than one IPsec connection is required, for example, from PROV EPAP to multiple Non-PROV EPAPs, then write as mentioned below:

```

conn mytunnel
  auto=start
  keyexchange=ike
  phase2=esp
  pfs=no
  type=tunnel
  authby=secret
  leftid=(ip address of self linux machine)
  left=(ip address of self linux machine)
  right=(ip address of remote linux machine)
  rightid=(ip address of remote linux machine)

```

```

conn mytunnel-also
  auto=start
  keyexchange=ike
  phase2=esp
  pfs=no
  type=tunnel
  authby=secret
  leftid=(ip address of self linux machine)
  left=(ip address of self linux machine)
  right=(ip address of remote linux machine)
  rightid=(ip address of remote linux machine)

```

8. Create a new file with the name `ipsec.secrets`. Edit the file and enter the following details. Here, pre-shared-key could be any passphrase:

```
siteA-public-IP siteB-public-IP: PSK "pre-shared-key"
```

In case of multiple sites:

```
siteA-public-IP siteB-public-IP: PSK "pre-shared-key"
siteA-public-IP siteC-public-IP: PSK "corresponding-pre-shared-key"
```

9. Edit file `/etc/ipsec.conf`. Go to line no. 17 and comment the flag `oe=off` like and save the file:

```
#oe=off
```

10. Start the IPsec services and run the command:

```
systemctl start ipsec
```

11. If the conf file is modified, restart the IPsec services and run the command:

```
systemctl restart ipsec
```

12. To verify the tunnel creations and traffic flow, run the following command:

```
ipsec traffic
```

For example:

```
[admusr@mps-A~]# ipsec traffic
006 #4: "mytunnel", type=ESP, add_time=1666264187, inBytes=600,
outBytes=544,id='x.x.x.x' 006 #6: "mytunnel-also", type=ESP,
add_time=1666264189, inBytes=2820, outBytes=2024,id='x.x.x.x'
```

13. Follow the same steps at the peer end.
14. Below is the sample site scenario where 1 CPA and 2 EPAP hosts are connected:

CPA Site IP: 10.71.141.10

EPAP Site A: 10.71.141.20

EPAP Site B: 10.71.141.21

Sample Files for CPA Site (10.71.141.10)

File - /etc/ipsec.d/my_host-to-host.conf

```
conn mytunnel
    auto=start
    keyexchange=ike
    phase2=esp
    pfs=no
    type=tunnel
    authby=secret
    leftid=10.75.141.10
    left=10.75.141.10
    right=10.75.141.20
    rightid=10.75.141.20
```

```
conn mytunnel-also
    auto=start
    keyexchange=ike
    phase2=esp
    pfs=no
    type=tunnel
    authby=secret
    leftid=10.75.141.10
    left=10.75.141.10
    right=10.75.141.21
    rightid=10.75.141.21
```

File - /etc/ipsec.d/ipsec.secrets

```
10.75.141.10 10.75.141.20 : PSK "Abc1234"
10.75.141.10 10.75.141.21 : PSK "Abc1234"
```

Sample Files for EPAP Site A (10.71.141.20)

File - /etc/ipsec.d/my_host-to-host.conf

```
conn mytunnel
    auto=start
    keyexchange=ike
    phase2=esp
    pfs=no
    type=tunnel
    authby=secret
    leftid=10.75.141.20
    left=10.75.141.20
    right=10.75.141.10
    rightid=10.75.141.10
```

File - /etc/ipsec.d/ipsec.secrets

```
10.75.141.20 10.75.141.10 : PSK "Abc1234"
```

Sample Files for EPAP Site B (10.71.141.21)

File - /etc/ipsec.d/my_host-to-host.conf

```
conn mytunnel
    auto=start
    keyexchange=ike
    phase2=esp
    pfs=no
    type=tunnel
    authby=secret
    leftid=10.71.141.21
    left=10.71.141.21
    right=10.75.141.10
    rightid=10.75.141.10
```

File - /etc/ipsec.d/ipsec.secrets

```
10.71.141.21 10.75.141.10 : PSK "Abc1234"
```

15. Below is the sample site scenario where 1 Prov and 2 Non-prov hosts are connected:

Prov Site IP: 10.71.141.30

Nov-Prov Site 1: 10.71.141.40

Non-Prov Site 2: 10.71.141.50

Sample Files for PROV Site (10.71.141.30)

File - /etc/ipsec.d/my_host-to-host.conf

```
conn mytunnel
    auto=start
    keyexchange=ike
    phase2=esp
    pfs=no
    type=tunnel
    authby=secret
    leftid=10.75.141.30
    left=10.75.141.30
    right=10.75.141.40
    rightid=10.75.141.40
```

```
conn mytunnel-also
    auto=start
    keyexchange=ike
    phase2=esp
    pfs=no
    type=tunnel
    authby=secret
    leftid=10.75.141.30
    left=10.75.141.30
    right=10.71.141.50
    rightid=10.71.141.50
```

File - /etc/ipsec.d/ipsec.secrets

```
10.75.141.30 10.75.141.40 : PSK "Abc1234"
10.75.141.30 10.71.141.50 : PSK "Abc1234"
```

Sample Files for Non-Prov Site (10.71.141.40)**File - /etc/ipsec.d/my_host-to-host.conf**

```
conn mytunnel
    auto=start
    keyexchange=ike
    phase2=esp
    pfs=no
    type=tunnel
    authby=secret
    leftid=10.75.141.40
    left=10.75.141.40
    right=10.75.141.30
    rightid=10.75.141.30
```

File - /etc/ipsec.d/ipsec.secrets

```
10.75.141.40 10.75.141.30 : PSK "Abc1234"
```

Sample Files for Non-Prov Site (10.71.141.50)

File - /etc/ipsec.d/my_host-to-host.conf

```
conn mytunnel
    auto=start
    keyexchange=ike
    phase2=esp
    pfs=no
    type=tunnel
    authby=secret
    leftid=10.71.141.50
    left=10.71.141.50
    right=10.75.141.30
    rightid=10.75.141.30
```

File - /etc/ipsec.d/ipsec.secrets

```
10.71.141.50 10.75.141.30 : PSK "Abc1234"
```

C

Secure Deployment Checklist

Use the following security checklist to help secure EPAP and its components:

- Change default passwords
- Set strong password restrictions
- Restrict admin functions to the required administrator groups
- Change the default community names in `snmpd.conf`
- Utilize the Authorized IP addresses feature

D

Secure Turnover to Customer

To ensure security of systems delivered to our customers and to satisfy Oracle policies, all passwords must be owned by the customer once transfer of ownership of systems has occurred.

D.1 Secure Turnover Process

Three key requirements address the fundamental principles of the secure turnover process:

- Oracle default passwords shall not remain on fielded systems.
- Oracle default passwords shall not be revealed to customers.
- Customer installed passwords shall not be known by Oracle.

Goals of the Secure Turnover Process

Following are the goals of the password handoff process:

1. Install the system securely with Oracle internal default passwords (passwords exclusively known and used by Oracle personnel).
2. Change the special account passwords during the installation process to a unique value (meeting password complexity rules required by the system).
3. Provide a non-repudiation process for the customer agent to set all special passwords.

Secure Turnover Procedure

Perform the following steps for secure system turnover:

1. System servers are installed by Oracle personnel using common ISO deliverables and installation procedures. The OS root password, OS admusr password, and the passwords for the default EPAP UI login accounts are from the build process, and are private and known only by Oracle.
2. Following installation, the Oracle installer performs a login to each server OS (real and virtual) as admusr and changes the password to a new unique secure password. The Oracle installer then switches user to root and changes the root password to a new unique password.
3. The Oracle installer uses a web browser to log in to the application on each relevant server using each default EPAP UI login name (such as uiadmin) and changes the password to a new unique password.
4. As a precursor to the official handoff of the system (all servers) to the customer, the Oracle installer ensures that the new unique passwords for root, admusr, and default EPAP UI login accounts have been securely given to the authorized customer agent.
5. The authorized customer agent is instructed to log in to each OS account on each server (real and virtual) and change the password for accounts admusr and root to the authorized operational setting for the customer.

6. The customer agent is instructed to use a web browser to log in to each relevant application server and change the password for the default EPAP UI login accounts to the authorized operational password for the customer.
7. Following the entry of the new passwords by the customer agent, the Oracle installer or authorized Oracle agent attempts to log in to each server using the previously known password. This should result in a failed login attempt verifiable in the server logs.
8. The customer agent again logs in to each OS account and the default EPAP UI login accounts using the new customer passwords to verify success with the new customer passwords.