



Oracle Private Cloud Appliance X9-2 Site Preparation and Installation



A Brief Overview of How to Prepare and Install a New PCA X9-2

June 14, 2022 | Version 1.02
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PURPOSE STATEMENT

This document provides an overview of features and enhancements included in release <Release>. It is intended solely to help you assess the business benefits of upgrading to <Release> and to plan your I.T. projects.

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INTRODUCTION

This Tech Brief provides best practices and guidance for installing the Oracle Private Cloud Appliance X9-2 discussing the current process for the initial installation and configuration of the new Oracle Private Cloud Appliance X9-2.

For the first wave of installs, Oracle Advanced Customer Services (ACS) installation will be required, but it is still good to be familiar with the process.

The initial install of a system is an important part of the customer experience. Fortunately, the physical installation processes for the PCA X9-2 will be familiar and the initial configuration is simple. It is familiar because physical installation is extremely similar to previous generations of PCA. Initial configuration is simple because it is all wizard-driven. As with anything else, proper planning also plays a large role in the success of an installation.

It is worth noting that even though the installation process is familiar and simple, the administration and use of the PCA X9-2 is a completely new experience. People will not be able to rely on their previous administrative knowledge of PCA systems. This means that product training for the PCA X9-2 will be very important. Therefore, please take the time to attend product training on the PCA X9-2 prior to delivery. Everyone should understand what can be done with the PCA X9-2, how those things are accomplished, and how the system should be configured to achieve your desired results.

We will cover some basic steps on how the system is delivered and initially configured. These steps will include:

- Site Requirements
- Delivery and Set-up
- Power On
- Initial Configuration
- Initial Administration

SITE REQUIREMENTS

The site requirements are a topic that will be very familiar to anyone that has been involved with the installation of an Oracle Engineered System in the past, and so they will not be explicitly enumerated here. The official site installation guide can be found with the other PCA X9 official documentation at this location:

<https://docs.oracle.com/en/engineered-systems/private-cloud-appliance/3.0/install-3.0.1/index.html>

First, need to highlight some important preparation steps. Site requirements should all be checked prior to the hardware being delivered. This includes:

- Making sure the receiving area for the PCA X9-2 can handle the dimensions of the packaged rack
- Ensuring that the path from the receiving area to the data center floor is clear and that the rack can physically be moved along that route
- Verifying that cooling and electrical needs have all been addressed with the customer's data center operations team

There are multiple PDU options available for the PCA X9-2 depending on country, data center power availability, and expected PCA capacity. We can use 15kVA single or three-phase PDU, a 22kVA single phase, and a 24kVA three phase PDU. Each PCA X9-2 will have two of these PDUs included in the base rack to provide redundant power to the components.

It is critical to complete the PCA X9-2 Initial Installation Checklist, which is found in the PCA documentation library. The link to the PCA X9-2 Initial Installation Checklist can be found here:

<https://docs.oracle.com/en/engineered-systems/private-cloud-appliance/3.0/install-3.0.1/install-checklists.html#install-interview-worksheet>

There are key functional decision points that need to be made for the installation and having them well thought out based on the target environment is a key factor in having a smooth installation. We will review some of those decision points later in this document.

DELIVERY AND SETUP

For those who have worked with previous generations of PCA, another point of familiarity will be the physical network cabling. As with previous generations, the PCA X9-2 needs cabling to be done prior to system power-up. We make these connections prior to powering up the rack for a number of reasons, but one of the key reasons is that this is a security feature of the system. By shutting down any ports that are not connected, it prevents an intruder from simply walking up and plugging into one of the open ports.

The Cabling Requirements table below illustrates the options that the customer have for connecting their PCA X9-2 to a network. It is organized by minimum configuration to maximum configuration, and then sorted by the desired network speed. There are four more options than what is covered here, but those are for customers that do not want a dedicated administrative network. In that scenario, the data path and management path for the rack will be on the same physical connections. This is not recommended for production installations. The complete version of this table is located in Section 4.4 of the PCA X9-2 Installation Guide in the documentation library as Table 4.1. This document is located here:

<https://docs.oracle.com/en/engineered-systems/private-cloud-appliance/3.0/install-3.0.1/install-hardware.html#install-network-connect>

Use Case	Network Speed	Cables Required	Ports	Administration Network Port
Minimum Configuration with Administration Network	10Gbit or 25Gbit	4 splitter cables	Port 1 on each spine switch	Port 5 on each spine switch
Minimum Configuration with Administration Network	40Gbit or 100Gbit	4 direct cables	Port 1 on each spine switch	Port 5 on each spine switch
Maximum Configuration with Administration Network	10Gbit or 25Gbit	10 splitter cables	Ports 1-4 on each spine switch	Port 5 on each spine switch
Maximum Configuration with Administration Network	40Gbit or 100Gbit	10 direct cables	Ports 1-4 on each spine switch	Port 5 on each spine switch

Table 1: Cabling Requirements

It is critical that BOTH spine switches are cabled into the customer's data center switches – this ensures proper system redundancy. It is also important to note that we use LACP on these up-links, and that customer switches should explicitly specify the intended connection speed. Finally, the use of vPC will be determined by whether a customer uses Static or Dynamic routing for the rack, which we will discuss more in the Initial Configuration section of this document.

POWER ON

Initial system power up is also similar to the process followed with earlier generations of the PCA. It is critical to make sure that the switches, disk enclosures (DEs) and Oracle ZFS Storage Appliance ZS9-2 heads are powered on first, because without the ZFS appliance, the services on the management nodes (MNs) that depend on that ZFS storage being available will fail. Once the ZFS appliance is up, it is safe to proceed with the powering up the management nodes. Finally, like current PCA generations, the compute nodes (CNs) are not powered up manually - they are turned on automatically by the MNs through their hardware discovery processes.

Also similar to previous PCA generations, a bastion laptop is needed to connect to the rack on port 2 of the Cisco 9348 management switch. Note that the IP address of the bastion has changed from previous generations and is now 100.96.3.254. Once that connection has been made, open up a browser and point it to <https://100.96.2.32:30099>, which is the primary Management Node virtual IP address (VIP). Initial configuration of the system can now begin.

INITIAL CONFIGURATION

There are two options for initial configurations. Either the browser can be used to make use of the PCA First Boot Wizard, or the PCA-ADMIN CLI can be used to complete initial configuration. It is generally recommended that customers use the First Boot Wizard, so we will now review what information is required to complete that.

Previously in this brief, it was mentioned that it was important for the customer to complete the [PCA X9-2 Initial Installation Checklist](#), which is found here:

<https://docs.oracle.com/en/engineered-systems/private-cloud-appliance/3.0/install-3.0.1/install-checklists.html#install-checklist-components>

We are now at the point where we need the information from that checklist to continue with the installation.

NOTE: It is important to have a well thought out plan for this part of the installation because there are some things in this process that are very difficult to change once they're initially configured.

Placeholders should never be used for unknown values in the PCA First Boot process with the intention of coming back and re-configuring them later.

After connecting a laptop or workstation to Port 2 on the management switch and configuring the IP address on the laptop to be 100.96.3.254, point the browser to <https://100.96.2.32:30099> to get to the PCA First Boot wizard.

This initial setup process does several things, including creation the System Enclave administrator account and the configuration of IP routing and networking options for the rack. The first step that you will be presented with is the creation of the System Enclave administrative account.

ORACLE Private Cloud Appliance

Private Cloud Appliance First Boot

Create Your Administrative Account

Administrative Username *

admin

Administrative Password *

Confirm Administrative Password *

The password entered must be 12 or more characters, and must contain at least one uppercase and one lowercase character, a number and a symbol.

Required

The password created here must conform to the system standards. Oracle PCA X9-2 passwords must contain at least 12 characters with at least one of each: uppercase character, lowercase character, digit, punctuation character, and no double quote (""). When this step is complete, you will be logged out of the system and will need to log in again with the credentials that were just created. The next step is the collection of the system's identification details.

One Time Setup of Appliance Details

Important
Once System Name and Domain are set, they CANNOT BE CHANGED.
Please enter and check these details carefully

Availability Domain
sd1

System Name *
I Required

Domain *
I Required

Rack Name
pca

Description

Save Changes

Image 1: Appliance Details

Completion of this step includes specifying the system name, the DNS domain used, and an optional system description. When this step is completed, there is a waiting period where the system is initialized with these identity changes.

Please wait while the Private Cloud Appliance initializes. This page will refresh every 30 seconds until initialization is complete, or to manually refresh the page click the "Refresh" button below.

Initialization may take 15 minutes or longer. Once the PCA has initialized then the networking parameters may be tested.

Please do not close this window while the PCA is going through the setup process.

Refresh

Image 2: Identity Initialization Message

NOTE: Initialization may take up to 15 minutes. During this time, it is imperative that the browser window be left open. It will refresh every 30 seconds until initialization is complete.

After the services are restarted, a new certificate is generated for the system. When this happens, the servers will restart and the end user will need to reload their browser window, accept the new HTTPS certificate, and log in again.

Server Restarting

This window will be reloaded. You may need to accept the self-signed SSL certificate before signing in again.

Reload

Please do not close this window while the PCA is going through the setup process.

Refresh

Image 3: Server Restart Message

The next step is the start of the networking section. The main decision specified here is if the system is going to use Static Routing or Dynamic BGP routing, which is a new option for the PCA X9. If we choose Static Routing, enter the up-link gateway's IP and VLAN, the Spine VIP, and the Uplink's HSRP group, if that is used.

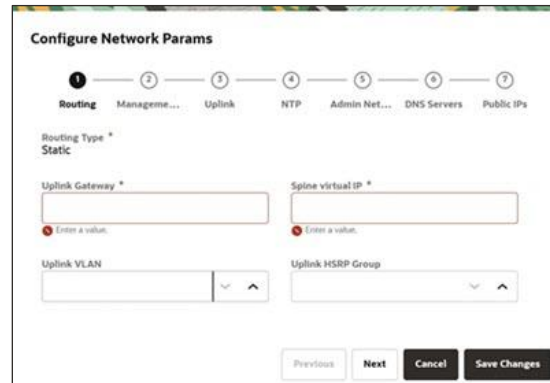


Image 4: Static Routing Network Parameters

Dynamic BGP routing is a new feature of the PCA X9. Since it is based on BGP, the options here will be familiar to those of that have worked with this routing protocol before.

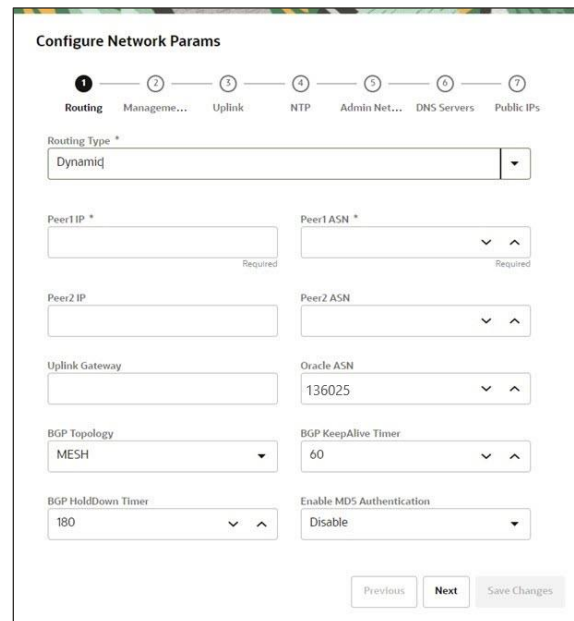


Image 5: Dynamic Routing Parameters

In this dialog, we will first put several parameters including the IP and ASNs (Autonomous System Numbers) for both peers, the gateway used. There are also some BGP configuration options, which include the topology used, and whether MD5 authentication is used. The Oracle ASN and the BGP keep-alive timers are both pre-populated.

Now we are getting into the standard networking configuration. Since the PCA X9-2 has three management nodes instead of the two that previous PCA systems had, we will need to put in the IP, the VIP, and the VIP hostname for all three of those here.

The screenshot shows the 'Configure Network Params' interface with a progress bar at the top. The progress bar has seven steps: 1. Routing (checked), 2. Management Parameters (active), 3. Uplink, 4. NTP, 5. Admin Net..., 6. DNS Servers, and 7. Public IPs. The 'Management Parameters' section contains the following fields:

- Management Node Virtual IP *
- Management Node VIP Hostname *
- Management Node 1 IP
- Management Node 1 Hostname
- Management Node 2 IP
- Management Node 2 Hostname
- Management Node 3 IP
- Management Node 3 Hostname

At the bottom, there are four buttons: 'Previous', 'Next', 'Cancel', and 'Save Changes'.

Image 6: Network Management Parameters

Next, we configure the up-link information for the switches. We will need the customer's IP and netmask that will be used for both Spine switches, the up-link port speed (which defaults to 100 Gb), how many of them will be used, the MTU (which defaults to a jumbo frame of 9216), and finally FEC, which defaults to Auto.

The screenshot shows the 'Configure Network Params' interface with a progress bar at the top. The progress bar has seven steps: 1. Routing (checked), 2. Management Parameters (checked), 3. Uplink (active), 4. NTP, 5. Admin Net..., 6. DNS Servers, and 7. Public IPs. The 'Uplink' section contains the following fields:

- Spine1 IP [comma-separated list, no spaces] *
- Spine2 IP [comma-separated list, no spaces] *
- Uplink Port Speed * (dropdown menu, value: 100)
- Uplink Port Count * (dropdown menu, value: 1)
- Uplink VLAN MTU * (dropdown menu, value: 9,216)
- Uplink Netmask [comma-separated list, no spaces] *
- Uplink Port FEC (dropdown menu, value: AUTO)

At the bottom, there are four buttons: 'Previous', 'Next', 'Cancel', and 'Save Changes'.

Image 7: Network Uplink Parameters

Here we set up the NTP servers that the system will use. You can configure up to seven of them here and can enter them via IP addresses or as fully qualified hostnames.

Configure Network Params

Routing Manageme... Uplink **NTP** Admin Net... DNS Servers Public IPs

NTP Servers (Enter up to 7 comma separated IP addresses or Fully Qualified Hostname) *

Previous Next Cancel Save Changes

Image 8: NTP Information

Earlier in this brief when cabling was discussed, it was mentioned that there is the option of whether or not you want to have a physically separately management network. It is highly recommend enabling the separate admin network. To do that select Enable, and then put in the speed and count of the admin ports you want to use. This is followed by the HSRP and VLAN info (if that is used), the MTU, whether FEC is used. Finally, specify the gateway IP, mask, and Spine IP addresses.

If a separate management network is not desired and the goal is to keep the data and management planes on the same physical path, simply select the Disable option.

Configure Network Params

Routing Manageme... Uplink NTP **Admin Net...** DNS Servers Public IPs

Admin Networking: Admin Port Speed:

Admin Port Count: Admin HSRP Group:

Admin VLAN: Admin VLAN MTU:

Admin Port FEC: Admin Gateway IP:

Admin Netmask: Admin CIDR:

Admin Spine1 IP: Admin Spine2 IP:

Admin Spine Virtual IP:

Previous Next Cancel Save Changes

Image 9: Administrative Network Parameters

One of the last steps is putting in the DNS servers that the system will use externally. To do that specify all three of them here.

Configure Network Params

Routing Management Uplink NTP Admin Net... DNS Servers Public IPs

DNS Server 1

DNS Server 2

DNS Server 3

Previous Next Cancel Save Changes

Image 10: DNS Information

Finally, we put in the public, or outside IP addresses that the system will use when VCNs are configured with an Internet Gateway later. Instances all have internal IP addresses, but for external access this is the pool from which those external IPs will come from.

Configure Network Params

Routing Management Uplink NTP Admin Net... DNS Servers Public IPs

Public IP Ranges [no spaces]
A comma-separated [no spaces], list of CIDRs, e.g. 10.10.0.0/16,192.168.8.0/24. These are the customer datacenter IPs ("Public IPs") that the PCA uses for OCI components that require Public IPs, for example OCI Gateways, Compute instances in Public subsets, etc. Note that they are not "Public" but instead represent IP addresses that have access in on premise networks.

Object Storage Public IP

Previous Next Cancel Save Changes

Image 11: Public IP Range

Actual public IP addresses can be used here, but these will usually be private IP address blocks from inside the customer's internal data center network. Since these will be used quite a bit, and it is recommended to not under-budget the size of the block used here – it is better to have too many here than not enough. If there is a good idea of the VMs that will be running on the system, then it can be estimated how many external addresses you will need, plus some additional for unforeseen use.

INITIAL ADMINISTRATION

Now that the system has finished its initial configuration, we are ready to start some of the initial administrative tasks that are necessary to complete before a system is ready for use.

Since the networking tasks are now done, there are two main browser interfaces that are accessible - the Customer Enclave UI and the Service Enclave UI. The Customer Enclave is the PCA X9-2's equivalent of what a typical OCI user would use, so any familiarity with the OCI Cloud Console will allow users to navigate and recognize the options available here with ease.

The Service Enclave, however, is an area of administration that a user of OCI cloud services would never use. Since this is an on-prem solution, there are certain kinds of administrative tasks must be available for customers to use.

For these initial administration tasks, the first thing to do is go into the Service Enclave.

The URL for the Service Enclave is `https://adminconsole.pca-system.mydomain.com`, where `pca-system` is the name specified in Image 1 above, and `mydomain.com` is the domain specified on that same step of the First Boot Wizard.

The ASR (Auto Service Request) interface will be the first thing that comes up after your initial login, as a reminder to configure it. Once ASR is configured, on subsequent logins you will go straight to the Dashboard.

After configuring ASR, the next thing we have to take care of are the Compute Nodes. Until now, the CNs have been in a "Ready to Provision" state, and we are at the point where we need to actually provision them and put them into service. To do this, navigate to the "Rack Units" tile on the dashboard, and find the CNs listed in the list of system hardware listed there. For each CN entry there is an Action icon on the right-hand side - select that and then "Provision" for each CN. More details on Compute Node Provisioning can be found in Chapter 2 ("Hardware Administration") of the Oracle Private Cloud Appliance Administrator Guide for Release 3.0.1, which can be found here:

<https://docs.oracle.com/en/engineered-systems/private-cloud-appliance/3.0/admin-3.0.1/adm-hardware.html>

The next administrative item to attend to in the SEUI is tenancy creation. Up to 8 separate tenancies can be created on the system. Normally there will be only one or two tenancies configured for each PCA X9. Additional tenancies can be created at any time, but at this point I recommend just creating the first one. Compartments can also be created inside of each Tenancy later in the Customer Enclave UI, just like in the OCI Cloud Console. More details on Tenancy Creation can be found in Chapter 4 ("Tenancy Management") of the Oracle Private Cloud Appliance Administrator Guide for Release 3.0.1, which can be found here:

<https://docs.oracle.com/en/engineered-systems/private-cloud-appliance/3.0/admin-3.0.1/adm-hardware.html>

For each Tenancy, there must be at least one administrative account created. The steps on how to create administrative accounts can be found in Chapter 3 ("Administrator Account Management") of the Oracle Private Cloud Appliance Administrator Guide for Release 3.0.1, which can be found here:

<https://docs.oracle.com/en/engineered-systems/private-cloud-appliance/3.0/admin-3.0.1/adm-accountmgmt.html#adm-account-create>

Since one of the key design points of the PCA X9-2 is to achieve API parity with OCI, the OCI CLI can be used for all CLI operations in the Customer enclave. It is the same OCI CLI that is used with OCI. This can be installed on any system that can reach the management IP VIP of the PCA X9-2. Once installed, to test the OCI CLI with a PCA X9-2 the following statement can be used:

```
oci iam user list --compartment-id [TENANCY_OCID]
```

This statement is useful at this point not because of the information that it will return. It is useful because it touches all of the PCA X9's internal Service Endpoints. When it provides a successful return, in addition to the user list it is also telling you that all of the internal services on the PCA X9 are running correctly.

Finally, you will switch over to the Customer Enclave UI and move on to the first operational tasks.

The URL for the Customer Enclave is `https://console.pca-system.mydomain.com`, where `pca-system` is the name specified in Image 1 above, and `mydomain.com` is the domain specified on that same step of the First Boot Wizard.

The first operational tasks in the Customer Enclave will include:

- Creating the first VCNs
- Creating the first subnets
- Importing the compute images that you want to use for your instances

- Creating your first instances

It is recommended that your first instances be some test instances to make sure that everything is working as expected.

Details on how to complete these tasks are available in the Oracle Private Cloud Appliance User Guide for Release 3.0.1, which can be found here:

<https://docs.oracle.com/en/engineered-systems/private-cloud-appliance/3.0/user-3.0.1/index.html>

SUMMARY

In this technical document, we reviewed several very important steps to cover when planning and implementing a PCA X9-2 installation. For more information, please visit the Oracle PCA documentation, located at:

<https://docs.oracle.com/en/engineered-systems/private-cloud-appliance/index.html>

Here you will find the Concepts Guide, Installation Guide, Administrator's Guide, User Guide, Patching Guide, and many other extremely useful documents.

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