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Enterprise

# **Best Practices for HPE Synergy Image Streamer Network Configuration**

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# Abstract

This document provides important considerations for HPE Synergy Composer and HPE Synergy Image Streamer users in planning how networks are configured in HPE OneView. Correct network configuration is important to optimize compute module connection use, prepare for future needs, and avoid future issues. Configuring the data center management network is of special concern since it is difficult to make configuration changes after setup is complete.

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# Overview of Image Streamer Networks

HPE Image Streamer uses two networks:

- Management Network – is used for:
  - Deployment control and artifact communication between Image Streamers
  - Control of Image Streamers from HPE Synergy Composer OneView
  - Image Streamer UI and API access
- Deployment Network – is used for:
  - Compute module access to OS Volumes hosted on Image Streamer
  - RAID traffic between Image Streamers for OS Volume storage

These networks must be defined in HPE OneView to enable Image Streamer configuration. The network definitions need to include IP pools with a sufficient number of IP addresses on each network.

Image Streamers are not able to reconfigure management network settings once OneView Deployment Server create is complete. Thus, it is important that effective planning for the these networks is done.

## Configuring the Image Streamer Management Network

It is extremely important to consider current and possible future needs related to the management network. Choices made during setup will be very difficult to change later. Changing the HPE Image Streamer management network configuration is only possible by deleting and recreating the Deployment Server, which requires all OS Volumes to be deleted, and no Logical Enclosures to be configured to use HPE Image Streamer. This generally means those Logical Enclosures must be deleted.

Image Streamer connects to the HPE OneView management network used for UI and API access to HPE OneView via Frame Link Module MGMT ports. The subnet defined in HPE OneView settings for addresses and identifiers for the management network must match the HPE OneView UI / API network settings.

During Deployment Server creation, HPE OneView will verify that the network settings used for the Deployment Server management network. If there is no network available for management network selection in the Deployment Server create dialog, it indicates the management has not yet been defined or it has been defined with incorrect subnet details.

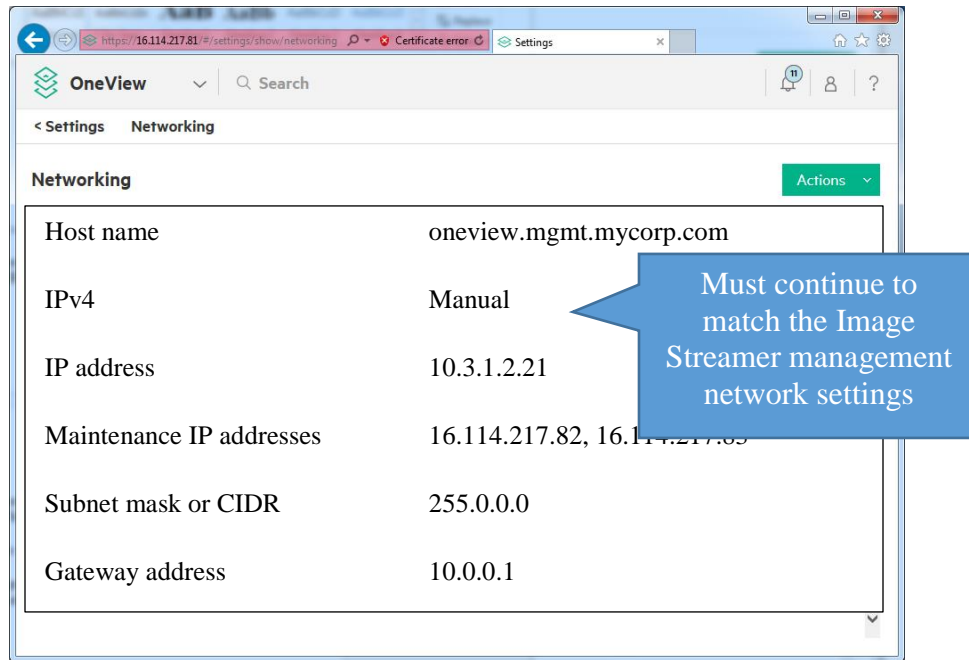
The screenshot shows a web browser window with the URL <https://16.114.217.81/#/settings/edit/guid>. The page title is 'Settings'. The main content area is titled 'Add IPv4 subnet and address range'. It contains a 'Subnet' section with the following fields:

Subnet ID	10.0.0.0	
Subnet mask	255.0.0.0	
Gateway	10.0.0.1	
Domain	mgmt.mycorp.com	
DNS	10.1.0.1	optional
	10.1.0.2	optional
	DNS	optional

Below the Subnet section is an 'Address Ranges' section with a green 'Add address range' button. At the bottom of the dialog are 'Add', 'Add +', and 'Cancel' buttons. The main page has 'OK' and 'Cancel' buttons at the bottom right.

A blue callout bubble points to the 'Subnet ID' field with the text: **Must match the OneView network settings**

After the Deployment Server is created, the HPE OneView network configuration in the Settings panel must not be modified to place the UI / API interface on a different subnet. Such a change would allow OneView access via the new settings, but the HPE Image Streamer will no longer be accessible from OneView and HPE Image Streamer will no longer function correctly. If OneView UI / API are mistakenly changed, the OneView UI / API network settings should be restored.



The management network is used to configure the Image Streamers during HPE OneView Deployment Server creation. Once the Deployment Server is created, it is not possible to make management network VLAN and subnet changes for the management network.

**Hewlett Packard Enterprise recommends that the management network be created with a VLAN. This may seem counterintuitive. It is vital to carefully consider the future consequences of not using a VLAN.**

The screenshot shows the HPE OneView interface for managing networks. On the left, a table lists several networks, with 'is-mgmt-net' highlighted. On the right, the configuration details for 'is-mgmt-net' are shown under the 'General' tab. A blue callout box points to the 'VLAN' field, which is set to 283.

Name	VLAN	Type
dc-external1	501	Ethernet
dc-internal1	401	Ethernet
i3s-deploy-net	111	Ethernet
is-mgmt-net	283	Ethernet

**is-mgmt-net**

**General**

- Type: Ethernet
- VLAN: 283
- Associated with subnet ID: [16.114.208.0](#)
- Purpose: Management
- Preferred bandwidth: 2.5 Gb/s
- Maximum bandwidth: 20 Gb/s
- Uplink set: [datacenter-us](#)
- Used by: [1 server profile](#), [1 os deployment server](#)
- Member of: [1 network set](#)

Should be created with a VLAN ID in nearly all cases. Failure to use a VLAN ID can limit configuration choices for interconnects and compute modules later.

Defining the management network with a VLAN will facilitate connection to the management network via interconnect module uplinks and compute module connections in the future. It may not seem necessary to have servers connect to the management network during HPE Image Streamer setup. However, such connections may be wanted if software on compute module applications need access to the HPE OneView API, or if compute modules are used to run hypervisors which may be managed via the management network.

**Create Network**

Name: is-seperate-mgmt-net

Type: ☒ Ethernet ☐ Fibre Channel ☐ FCoE

VLAN: Untagged

Associate with subnet ID: 10.10.0

Purpose: General

Preferred bandwidth: 2.5 Gb/s

Maximum bandwidth: 20 Gb/s

Changed: Associate with subnet ID to "10.10.0"

**Create** **Create +** **Cancel**

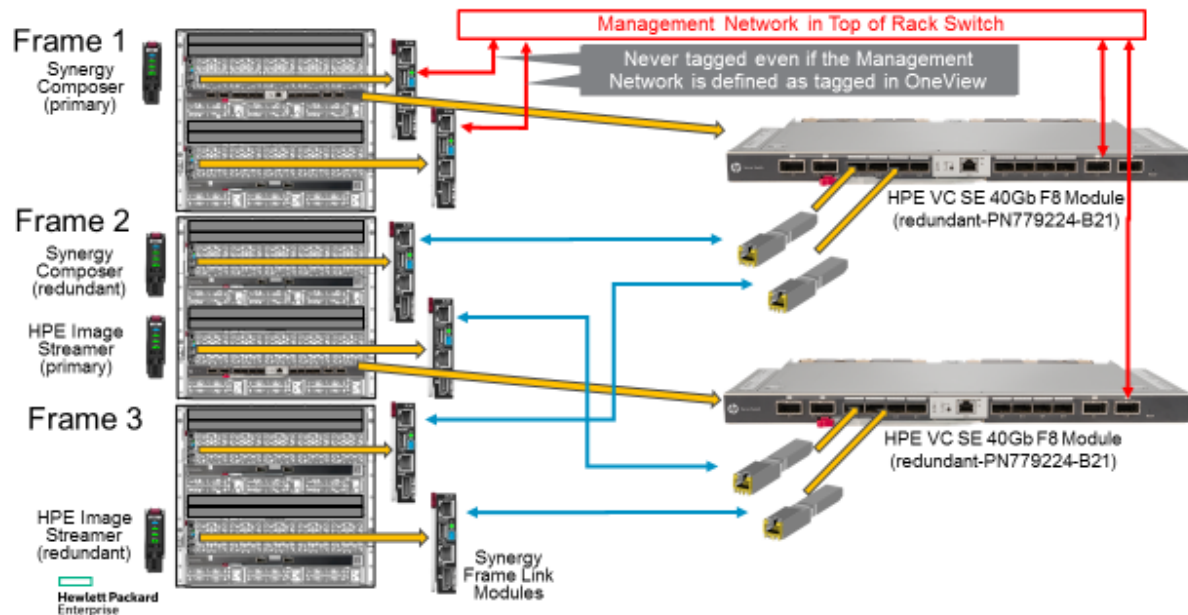
Untagged is rarely the correct choice.

If some need for connecting interconnects and compute modules to the management network is discovered later, it will be very difficult to change the configuration of the management network in OneView. Once the Deployment Server has been created the management network is in use and the VLAN setting cannot be changed.

This may seem confusing since the connection between Top of Rack ports and the HPE Synergy Frame Link Module MGMT ports is always untagged. Configuring tagging for the management network in HPE OneView does not influence the Synergy Frame Link Module MGMT port configuration. MGMT port traffic will always be untagged.



## HPE Image Streamer Cabling for Compute Module access to Management Network



If there is no need for interconnects and compute modules to connect to the management network, the management network should not be included in the Logical Interconnect Group configuration for the Enclosure Group. If at some point in the future, a need to connect servers to the management network is discovered, a VLAN tagged management network may be easily added to the Logical Interconnect Group at that time.

If the management network is created as untagged, adding that network to a Logical Interconnect Group may be more difficult.

Note that it is not possible to edit the management network to switch from untagged to VLAN tagged when the Deployment Server has been created. Deleting the Deployment Server requires removing Image Streamer deployment from each Logical Enclosure or deleting those Logical Enclosures.

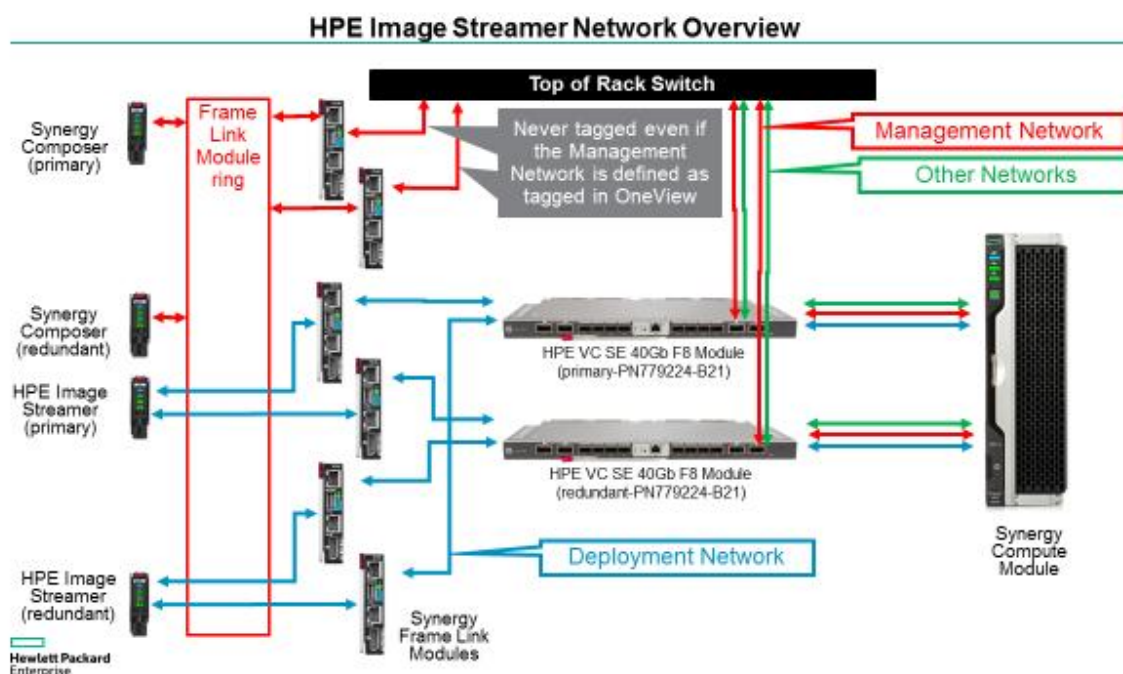
There are exceptions where using untagged may make sense. If your data center uses a flat networking design with no use of VLAN tagging, creating the management network as untagged would be appropriate. If you have an extremely strict policy prohibiting servers from connection to the management network, creating the management network as untagged may make sense. Even in these cases, you should consider if possible future data center changes would benefit from creating the management network as tagged.

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The management network subnet needs to be configured with a pool of IP ranges having a sufficient number of IP addresses to configure all of the Image Streamers. Each Image Streamer needs several IP addresses to configure internal elements of the appliance design. Consult product documentation and online help for details. If additional Image Streamers are added later to support additional Logical Enclosures, it may be necessary to add more IP addresses to the subnet IP range pool.

## Configuring the Image Streamer Deployment Network

The deployment network is used by compute modules to connect to Image Streamer OS Volumes created during deployment. The compute modules will continue to boot and run from these OS Volumes for the life of the server as controlled by the Server Profile.



The deployment network must be tagged to facilitate configuring interconnects and compute module access to OS Volumes. Configuration of Server Profile connections for OS Volumes is automatically done as part of the OS deployment process for provisioning a server profile.

The deployment network is dedicated for Image Streamer use and is not configured for external access.

The specific VLAN ID does not matter to Image Streamer. You should choose a VLAN ID which will not conflict with a VLAN ID used by any other data center network which exists or is planned in the future.

The deployment network subnet and the size of the IP pool should be configured considering the total number of compute modules which may be used in the future. The deployment network is selected as part of the Enclosure Group configuration which means that all of the compute modules in each of the Logical Enclosures associated with the Enclosure Group may need IP addresses. If your HPE Synergy configuration grows, a class C subnet with around 250 IP addresses may not be large enough. A class B subnet with a large pool of IP addresses should be sufficient. A class C subnet may be used if you know the future scale of the Enclosure Group will not require more IP addresses

The subnet and VLAN ID of the deployment network specified in an Enclosure Group cannot be modified while the deployment network is in use. All Logical Enclosures associated the Enclosure Group having Image Streamers use that network.

## Configuring Other Networks

Server Profiles for Compute Modules using Image Streamer will typically have connections to other networks defined in HPE OneView. These networks are unrelated to Image Streamer configuration.

During OS Deployment the NICs for these connections may be configured by Deployment Plan Build Plans and Plan Scripts.

## HPE Synergy Networking Redundancy

HPE Synergy is designed to facilitate redundant network connectivity for servers, storage, and data center networks. Use of these redundancy features is vital for correct operation. HPE Synergy management software relies on this redundancy being correctly configured so that maintenance operations like firmware update for interconnect modules, and other Synergy hardware, may be done without service interruption.

The compute module OS is an important element in ensuring correct configuration. Server Profiles should include redundant connections for networks. OS deployment should include appropriate teaming or other redundant configuration for network connectivity.

# Overview of Server Profile Connections

Server Profiles define compute module connections to networks. These details are used to control configuration of compute module network adapters. Adapter ports provide connection to network interconnects. Adapter port FlexNICs provide network connection into OS NICs.

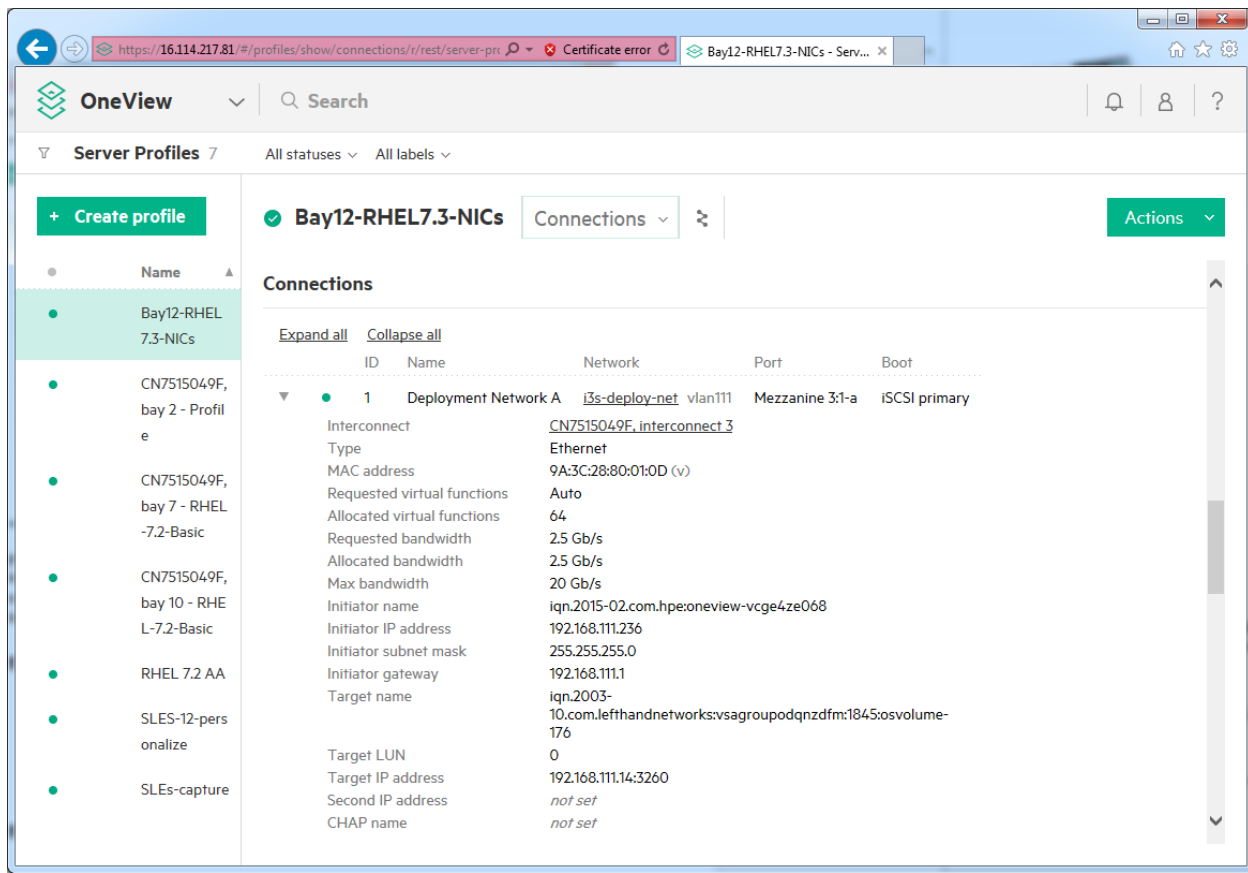
Image Streamer uses one FlexNIC on each of the redundant network adapters, which provides redundant network connectivity.

You can place a Server Profile connection on:

- A specific FlexNIC
- Any FlexNIC of a specific adapter port
- An automatically selected FlexNIC

## Server Profile Connections to the Deployment Network

HPE OneView will automatically configure network connections needed for Image Streamer OS Volume access. The “a” FlexNIC of the port will be used for the connection to the deployment network. The “b” FlexNIC generally includes hardware offload for I/O protocols. The “b” FlexNIC may be used for access to application storage. A consequence of this design is that access to OS volumes requires the deployed OS using software iSCSI device drivers.



The compute module will be configured for iSCSI boot from the OS Volume with redundant boot entries for the redundant deployment network connections. While the compute module is able to boot via either path, the design of UEFI firmware may not handle failing over between paths during the actual boot process. Once a path is selected for boot, firmware and OS boot operations rely on the selected path continuing to operate.

## Server Profile Connections to Other Networks

The Server Profile should include connections to other networks for access to the deployed server and for use by applications.

For production solutions, redundant connections should always be used. During deployment, the OS should be configured for teaming or other failover functionality that will avoid interruption of network access during Synergy maintenance activity. This configuration is specific to the OS and must be done in Image Streamer Plan Scripts.

HPE Synergy Virtual Connect functionality will provide untagged traffic at FlexNICs even for connections to VLAN tagged networks when the Server Profile connection is to a network.

OneView connections to network sets will pass traffic to NICs using the various network VLAN IDs. In that case, the OS needs to be configured to handle tagged traffic.

## OS Configuration of NICs

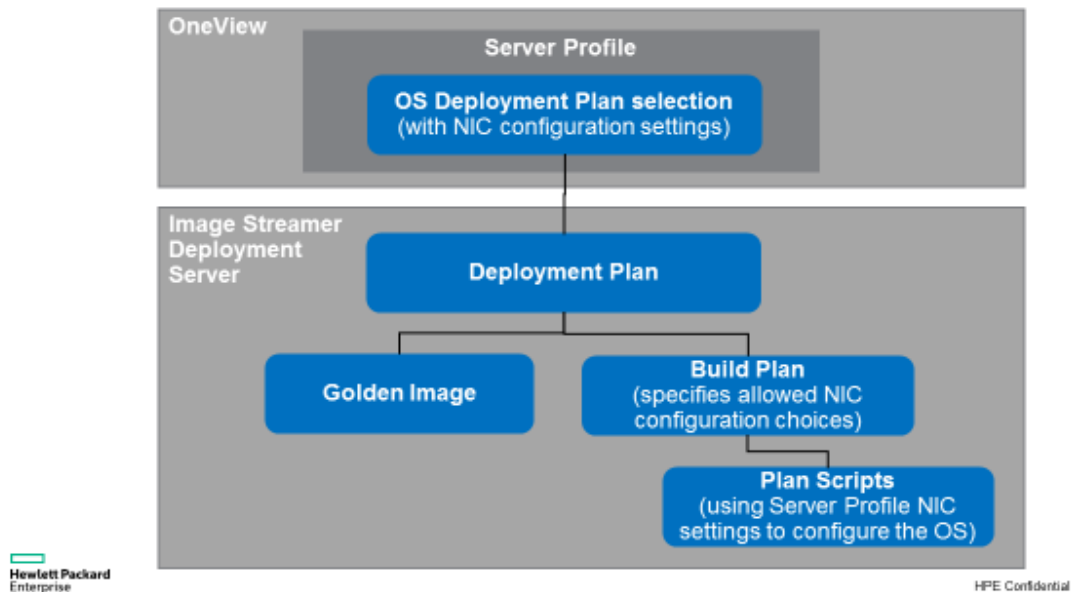
Server Profile connection details are provided to the OS deployment process via OS Deployment Plan NIC settings.

The Image Streamer Build Plan associated with the selected Deployment Plan will use the connection details provided by the Server Profile to configure the OS via Image Streamer Plan Scripts.

It is important to realize that having a Server Profile network connection is required for OS Deployment Plan configuration of the associated OS NIC network settings. However, it is not necessary for the OS Deployment Plan to configure all the Server Profile connections. A simple but powerful approach may be to configure a single NIC, or a teamed pair of NICs, for OS access, then complete OS configuration for other NICs via management software running on the deployed server or a cluster controller.



## HPE Image Streamer OS Configuration of NICs



The Image Streamer Build Plan associated with the selected Deployment Plan controls what choices that the Server Profile user is presented for configuration of network settings for the NIC.

The Build Plan author may decide which network configuration choices should be permitted. This also determines which will need to be handled by Plan Scripts. The choices:

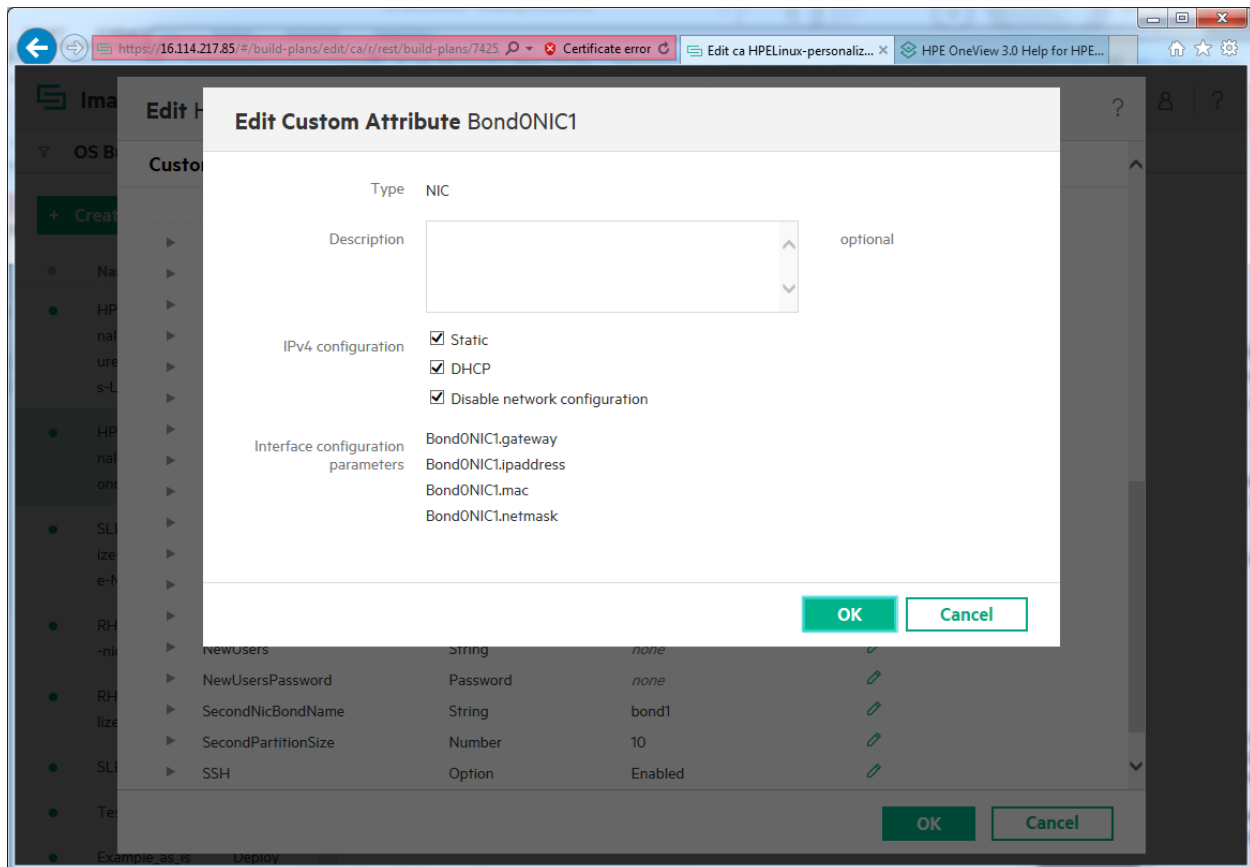
**Static** – The Server Profile may provide static networking configuration settings for a NIC. The specific static network details which are expected is decided by the Plan Scripts in the Build Plan. The list of NIC parameters used is then given in the Build Plan.

**DHCP** – The Server Profile may indicate that the OS is responsible for generating the network configuration settings for a NIC. Normally the OS generates these settings via DHCP. However, the OS may not require network setting because the NIC is being used for teaming.

**Disable** – The Server Profile is not required to provide network configuration details for the NIC. In this case the Server Profile user is given the option of not

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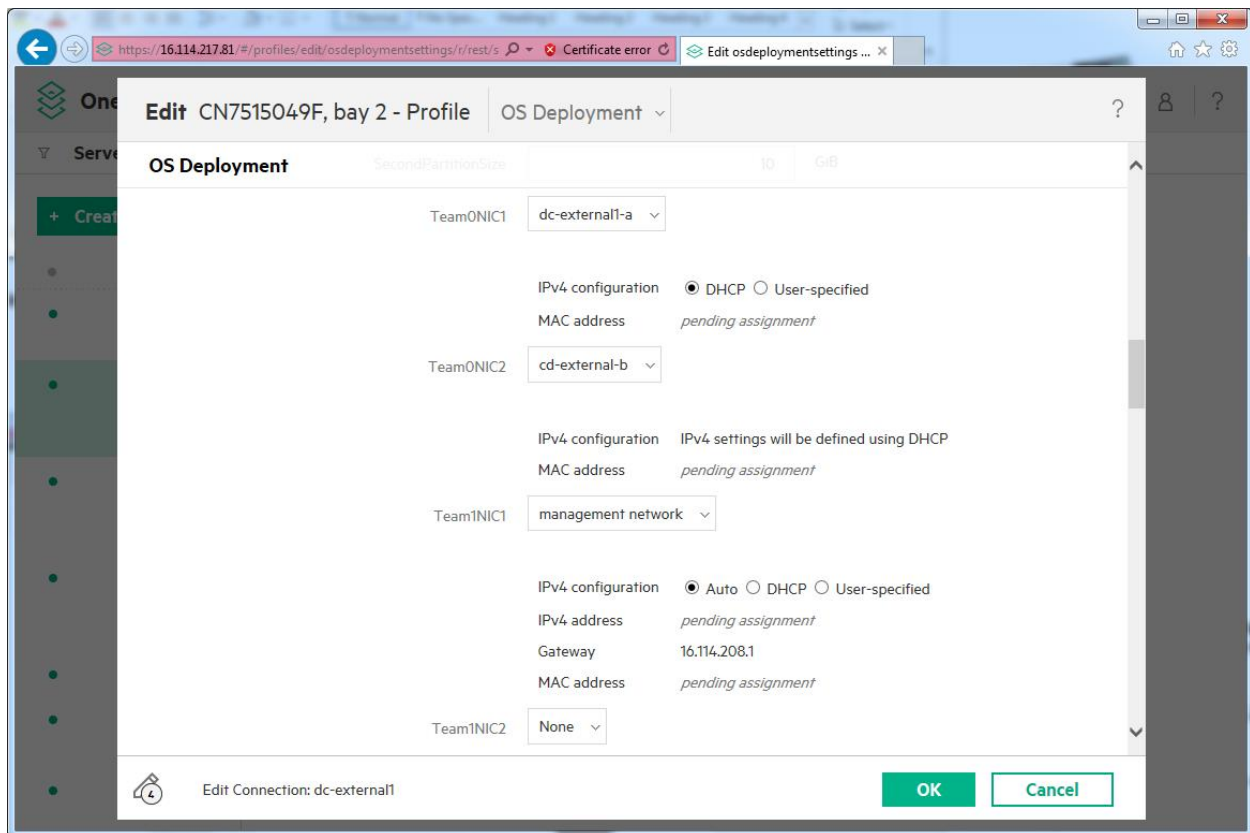
providing a connection for the OS Deployment Plan NIC setting. If this choice is not enabled, the Server Profile user will be required to provide a connection for the NIC setting.



Editing the Custom Attribute in the Image Streamer Build Plan determines which choices are made available to the Server Profile user for the associated NIC in the Deployment Plan.

Note that it is up to the Server Profile to decide how static network settings are determined. The Server Profile users may choose the method to be used.

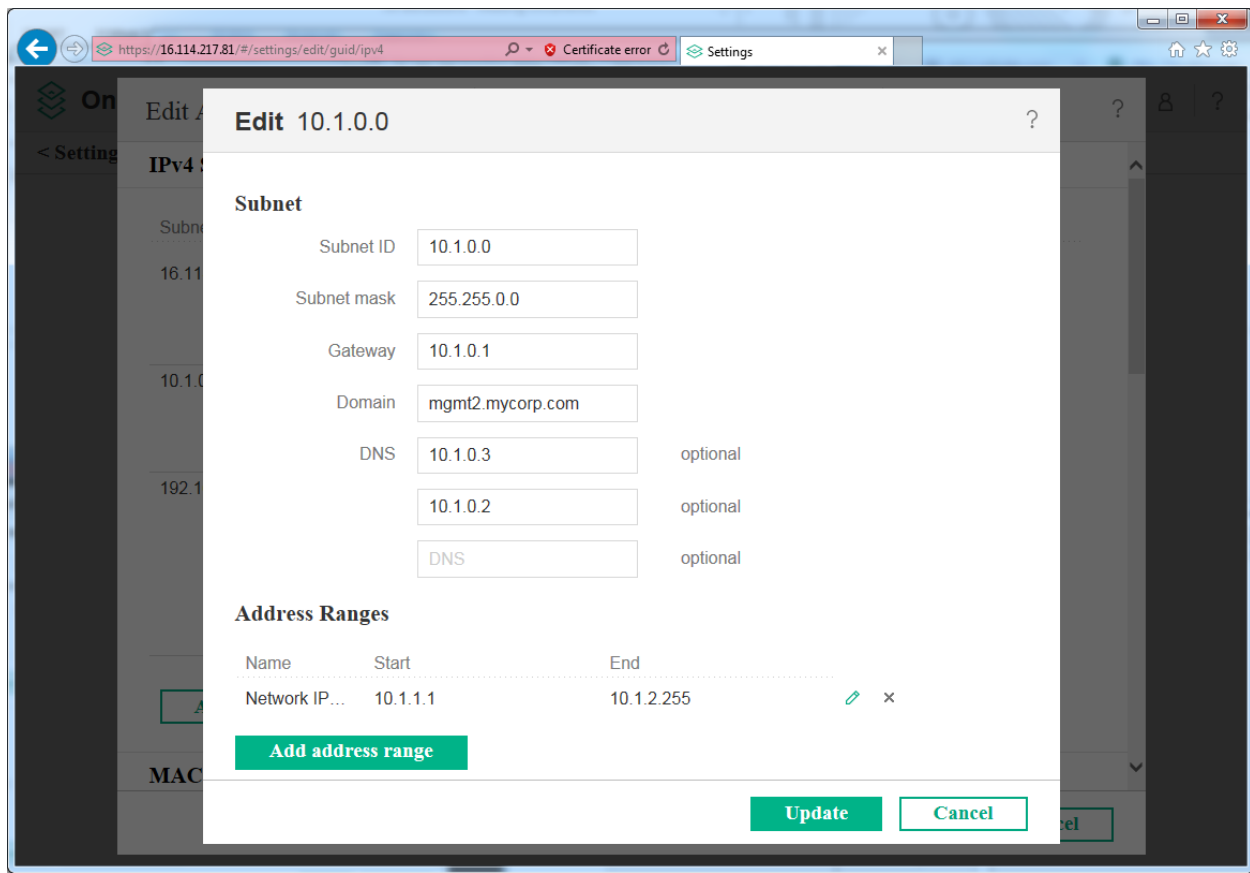




**User Specified** – The Server Profile user may enter the configuration details.

**User Specified, with Network Subnet** – If the network associated with the connection has a defined subnet, these subnet details will be used to provide most of the network configuration details. Remaining settings, typically those specific to the Server Profile, are then entered by the user. Note that if the subnet has an IP address pool, the user may not choose addresses from the pool. This restriction avoids the risk of IP address conflicts.

**Auto** – All network settings for the NIC should be automatically set. Needed static IP addresses are allocated from the subnet IP pool. To the Deployment Plan these are still static IP addresses, they are just values from the IP pool.



## Configuring OS Networking via Server Profile Settings

OS network configuration details for an OS deployment are specified via the Server Profile OS Deployment section. Once the OS Deployment Plan to be used is selected, NIC settings specific to the OS Deployment Plan will be revealed. A Server Profile connection may be associated with each NIC setting.

Server Profile OS Deployment NIC settings are provided to Image Streamer Build Plans and their Plan Scripts via custom attributes. A NIC type custom attribute handles the details of one standard Server Profile network connection.

The Image Streamer Plan Scripts include custom attributes which are expanded to the values provided from the Server Profile.

The following is a generic example, the actual configuration details needed will be specific to the particular OS:

Original Plan Script:

```
netcfg -m @NIC1.mac@ -i @NIC1.ipaddress@ -n @NIC1.netmask@
```

Expanded Plan Script:

```
netcfg -m 9A:3C:28:80:00:D6 -i 10.3.1.33 -m 255.255.0.0
```

OS deployment plan: HPE - Support 1.0 - network deployment test

Setting	Value
ExampleNumber	50 percent
ExampleOption	Option1
ExampleString	Hello World!
NIC1	dc-external1
IPv4 configuration	
IPv4 address	10.31.33
Netmask	255.255.0.0
Gateway	10.3.0.1
DNS 1	10.3.0.2
DNS 2	10.3.0.3
MAC address	pending assignment
NIC2	None

**Firmware**

Changed: This field is required, to "dc-external1"

Create Create + Cancel

## NIC Teaming for Server Profile Connections to OS Volumes

To ensure appropriate high availability to the OS Volume, the OS should be configured to have dual path iSCSI access to the OS Volume.

iSCSI Boot Firmware Table (iBFT) includes details regarding the primary and secondary boot details. However, an OS may or may not use the alternate path details. It may be necessary to use the Image Streamer special system custom attributes to fully configure the OS iSCSI driver even if the OS has basic iBFT support.

## **NIC Teaming for Networks Configured by OS Deployment**

Production workloads require high availability access from compute modules to networks. Note that HPE Synergy maintenance operations may temporarily interrupt traffic on one connection. Thus, these maintenance operations rely on this redundant connectivity to ensure compute modules have uninterrupted network access.

## **Server Profile Connections to Network Sets**

HPE Synergy compute module network adapters have a finite number of FlexNIC ports, and application solutions may want to connect to more networks than the number of ports.

Note that you should not compromise on availability to connect to more networks. Always use redundant network connections for production workloads.

Server Profile connections using network sets permits one FlexNIC to carry traffic for multiple networks from interconnects to the OS. The network traffic to the OS will include the VLAN tags. The OS is then responsible for handling VLAN tagging or untagging and directing traffic to application software.

The screenshot shows a web browser window with the URL <https://16.114.217.81/#/networkset/edit/general/r/rest/network-set>. The page title is 'Edit general dc-net-set - Ne...'. The interface has a sidebar on the left with a 'Networks' section and a '+ Create' button. The main content area is titled 'Edit dc-net-set' and has a 'General' tab selected. Below the tab, the 'General' section contains the following fields:

- Name:** dc-net-set (with a tooltip: 'A unique, descriptive name for the network set')
- Type:** Ethernet
- Preferred bandwidth:** 2.5 Gb/s
- Maximum bandwidth:** 20 Gb/s

Below the General section is the 'Networks' section, which contains a table with the following data:

Name	VLAN ID	Untagged
dc-external1	501	<input type="checkbox"/> x
dc-internal1	401	<input type="checkbox"/> x
is-mgmt-net	283	<input type="checkbox"/> x

At the bottom of the Networks section are two buttons: 'Add networks' and 'Remove all'. At the bottom of the entire form are 'OK' and 'Cancel' buttons.

## Server Profile Deployment Plan Settings for Network Sets

Server Profile network connection details are provided to the OS deployment process via NIC type attribute settings values in the OS Deployment section of the Server Profile.

One NIC type setting in the Server Profile OS Deployment section is associated with network (one VLAN) of one network set connection. If the network set has multiple networks (multiple VLANs) a separate NIC setting may be wanted for each

One NIC will need an IP address and other network settings. The second, redundant NIC, often will share the same networking details. The Build Plan may be configured to indicate this second NIC expects DHCP to be used so that no IP address needs to be

specified. The Plan Scripts would then configure the NIC for redundancy, rather than actually configure for DHCP.