



Configuring the Fabric Interconnects

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Initial System Setup

The first time that you access a fabric interconnect in a Cisco UCS domain, a setup wizard prompts you for the following information required to configure the system:

- Installation method (GUI or CLI)
- Setup mode (restore from full system backup or initial setup)
- System configuration type (standalone or cluster configuration)
- System name
- Admin password
- Management port IP address and subnet mask
- Default gateway IP address
- DNS Server IP address

- Default domain name

Setup Mode

You can choose to either restore the system configuration from an existing backup file, or manually set up the system by going through the Setup wizard. If you choose to restore the system, the backup file must be reachable from the management network.

System Configuration Type

You can configure a Cisco UCS domain to use a single fabric interconnect in a standalone configuration or to use a redundant pair of fabric interconnects in a cluster configuration.

A cluster configuration provides high availability. If one fabric interconnect becomes unavailable, the other takes over. Only one management port (Mgmt0) connection is required to support a cluster configuration; however, both Mgmt0 ports should be connected to provide link-level redundancy.

In addition, a cluster configuration actively enhances failover recovery time for redundant virtual interface (VIF) connections. When an adapter has an active VIF connection to one fabric interconnect and a standby VIF connection to the second, the learned MAC addresses of the active VIF are replicated but not installed on the second fabric interconnect. If the active VIF fails, the second fabric interconnect installs the replicated MAC addresses and broadcasts them to the network through gratuitous ARP messages, shortening the switchover time.

**Note**

The cluster configuration provides redundancy only for the management plane. Data redundancy is dependent on the user configuration and might require a third-party tool to support data redundancy.

To use the cluster configuration, you must directly connect the two fabric interconnects together using Ethernet cables between the L1 (L1-to-L1) and L2 (L2-to-L2) high-availability ports, with no other fabric interconnects in between. Also you can connect the fabric interconnects directly through a patch panel to allow the two fabric interconnects to continuously monitor the status of each other and quickly know when one has failed.

Both fabric interconnects in a cluster configuration must go through the initial setup process. You must enable the first fabric interconnect that you set up for a cluster configuration. When you set up the second fabric interconnect, it detects the first fabric interconnect as a peer fabric interconnect in the cluster.

For more information, see to the *Cisco UCS 6100 Series Fabric Interconnect Hardware Installation Guide*.

Management Port IP Address

In a standalone configuration, you must specify only one IP address and the subnet mask for the single management port on the fabric interconnect.

In a cluster configuration, you must specify the following three IP addresses in the same subnet:

- Management port IP address for fabric interconnect A
- Management port IP address for fabric interconnect B
- Cluster IP address

Performing an Initial System Setup for a Standalone Configuration

Before You Begin

- 1 Verify the following physical connections on the fabric interconnect:

- The console port is physically connected to a computer terminal or console server
- The management Ethernet port (mgmt0) is connected to an external hub, switch, or router

For more information, refer to the *Cisco UCS Hardware Installation Guide* for your fabric interconnect.

- 2 Verify that the console port parameters on the computer terminal (or console server) attached to the console port are as follows:

- 9600 baud
- 8 data bits
- No parity
- 1 stop bit

- 3 Collect the following information that you will need to supply during the initial setup:

- System name.
- Password for the admin account. Choose a strong password that meets the guidelines for Cisco UCS Manager passwords. This password cannot be blank.
- Management port IP address and subnet mask.
- Default gateway IP address.
- DNS server IP address (optional).
- Domain name for the system (optional).

Procedure

-
- Step 1** Connect to the console port.
 - Step 2** Power on the fabric interconnect.

You will see the power on self-test messages as the fabric interconnect boots.

- Step 3** When the unconfigured system boots, it prompts you for the setup method to be used. Enter **console** to continue the initial setup using the console CLI.
- Step 4** Enter **setup** to continue as an initial system setup.
- Step 5** Enter **y** to confirm that you want to continue the initial setup.
- Step 6** Enter the password for the admin account.
- Step 7** To confirm, re-enter the password for the admin account.
- Step 8** Enter **no** to continue the initial setup for a standalone configuration.
- Step 9** Enter the system name.
- Step 10** Enter the IP address for the management port on the fabric interconnect.
- Step 11** Enter the subnet mask for the management port on the fabric interconnect.
- Step 12** Enter the IP address for the default gateway.
- Step 13** Enter **yes** if you want to specify the IP address for the DNS server, or **no** if you do not.
- Step 14** (Optional) Enter the IP address for the DNS server.
- Step 15** Enter **yes** if you want to specify the default domain name, or **no** if you do not.
- Step 16** (Optional) Enter the default domain name.
- Step 17** Review the setup summary and enter **yes** to save and apply the settings, or enter **no** to go through the Setup wizard again to change some of the settings.
If you choose to go through the Setup wizard again, it provides the values you previously entered, and the values appear in brackets. To accept previously entered values, press Enter.

The following example sets up a standalone configuration using the console:

```

Enter the installation method (console/gui)? console
Enter the setup mode (restore from backup or initial setup) [restore/setup]? setup
You have chosen to setup a new switch. Continue? (y/n): y
Enter the password for "admin": adminpassword%958
Confirm the password for "admin": adminpassword%958
Do you want to create a new cluster on this switch (select 'no' for standalone setup or if
you want this switch to be added to an existing cluster)? (yes/no) [n]: no
Enter the system name: foo
Mgmt0 IPv4 address: 192.168.10.10
Mgmt0 IPv4 netmask: 255.255.255.0
IPv4 address of the default gateway: 192.168.10.1
Configure the DNS Server IPv4 address? (yes/no) [n]: yes
  DNS IPv4 address: 20.10.20.10
Configure the default domain name? (yes/no) [n]: yes
  Default domain name: domainname.com
Following configurations will be applied:
  Switch Fabric=A
  System Name=foo
  Management IP Address=192.168.10.10
  Management IP Netmask=255.255.255.0
  Default Gateway=192.168.10.1
  DNS Server=20.10.20.10
  Domain Name=domainname.com
Apply and save the configuration (select 'no' if you want to re-enter)? (yes/no): yes

```

Initial System Setup for a Cluster Configuration

Performing an Initial System Setup for the First Fabric Interconnect

Before You Begin

1 Verify the following physical connections on the fabric interconnect:

- A console port on the first fabric interconnect is physically connected to a computer terminal or console server
- The management Ethernet port (mgmt0) is connected to an external hub, switch, or router
- The L1 ports on both fabric interconnects are directly connected to each other
- The L2 ports on both fabric interconnects are directly connected to each other

For more information, refer to the *Cisco UCS Hardware Installation Guide* for your fabric interconnect.

2 Verify that the console port parameters on the computer terminal (or console server) attached to the console port are as follows:

- 9600 baud
- 8 data bits
- No parity
- 1 stop bit

3 Collect the following information that you will need to supply during the initial setup:

- System name.
- Password for the admin account. Choose a strong password that meets the guidelines for Cisco UCS Manager passwords. This password cannot be blank.
- Three static IP addresses: two for the management port on both fabric interconnects (one per fabric interconnect) and one for the cluster IP address used by Cisco UCS Manager.
- Subnet mask for the three static IP addresses.
- Default gateway IP address.
- DNS server IP address (optional).
- Domain name for the system (optional).

Procedure

Step 1 Connect to the console port.

Step 2 Power on the fabric interconnect.

You will see the power on self-test messages as the fabric interconnect boots.

- Step 3** When the unconfigured system boots, it prompts you for the setup method to be used. Enter **console** to continue the initial setup using the console CLI.
 - Step 4** Enter **setup** to continue as an initial system setup.
 - Step 5** Enter **y** to confirm that you want to continue the initial setup.
 - Step 6** Enter the password for the admin account.
 - Step 7** To confirm, re-enter the password for the admin account.
 - Step 8** Enter **yes** to continue the initial setup for a cluster configuration.
 - Step 9** Enter the fabric interconnect fabric (either **A** or **B**).
 - Step 10** Enter the system name.
 - Step 11** Enter the IP address for the management port on the fabric interconnect.
 - Step 12** Enter the subnet mask for the management port on the fabric interconnect.
 - Step 13** Enter the IP address for the default gateway.
 - Step 14** Enter the virtual IP address.
 - Step 15** Enter **yes** if you want to specify the IP address for the DNS server, or **no** if you do not.
 - Step 16** (Optional) Enter the IP address for the DNS server.
 - Step 17** Enter **yes** if you want to specify the default domain name, or **no** if you do not.
 - Step 18** (Optional) Enter the default domain name.
 - Step 19** Review the setup summary and enter **yes** to save and apply the settings, or enter **no** to go through the Setup wizard again to change some of the settings.
- If you choose to go through the Setup wizard again, it provides the values you previously entered, and the values appear in brackets. To accept previously entered values, press **Enter**.

The following example sets up the first fabric interconnect for a cluster configuration using the console:

```

Enter the installation method (console/gui)? console
Enter the setup mode (restore from backup or initial setup) [restore/setup]? setup
You have chosen to setup a new switch. Continue? (y/n): y
Enter the password for "admin": adminpassword%958
Confirm the password for "admin": adminpassword%958
Do you want to create a new cluster on this switch (select 'no' for standalone setup or if
you want this switch to be added to an existing cluster)? (yes/no) [n]: yes
Enter the switch fabric (A/B): A
Enter the system name: foo
Mgmt0 IPv4 address: 192.168.10.10
Mgmt0 IPv4 netmask: 255.255.255.0
IPv4 address of the default gateway: 192.168.10.1
Virtual IPv4 address : 192.168.10.12
Configure the DNS Server IPv4 address? (yes/no) [n]: yes
DNS IPv4 address: 20.10.20.10
Configure the default domain name? (yes/no) [n]: yes
Default domain name: domainname.com
Following configurations will be applied:
Switch Fabric=A
System Name=foo
Management IP Address=192.168.10.10
Management IP Netmask=255.255.255.0
Default Gateway=192.168.10.1
Cluster Enabled=yes
Virtual Ip Address=192.168.10.12
DNS Server=20.10.20.10
Domain Name=domainname.com
Apply and save the configuration (select 'no' if you want to re-enter)? (yes/no): yes

```

Performing an Initial System Setup for the Second Fabric Interconnect

Before You Begin

- 1 Verify the following physical connections on the fabric interconnect:

- A console port on the second fabric interconnect is physically connected to a computer terminal or console server
- The management Ethernet port (mgmt0) is connected to an external hub, switch, or router
- The L1 ports on both fabric interconnects are directly connected to each other
- The L2 ports on both fabric interconnects are directly connected to each other

For more information, refer to the *Cisco UCS Hardware Installation Guide* for your fabric interconnect.

- 2 Verify that the console port parameters on the computer terminal (or console server) attached to the console port are as follows:

- 9600 baud
- 8 data bits
- No parity
- 1 stop bit

- 3 Collect the following information that you will need to supply during the initial setup:

- Password for the admin account of the peer fabric interconnect. Choose a strong password that meets the guidelines for Cisco UCS Manager passwords. This password cannot be blank.
- Management port IP address in the same subnet as the peer fabric interconnect.

Procedure

Step 1 Connect to the console port.

Step 2 Power on the fabric interconnect.
You will see the power on self-test messages as the fabric interconnect boots.

Step 3 When the unconfigured system boots, it prompts you for the setup method to be used. Enter **console** to continue the initial setup using the console CLI.

Note The fabric interconnect should detect the peer fabric interconnect in the cluster. If it does not, check the physical connections between the L1 and L2 ports, and verify that the peer fabric interconnect has been enabled for a cluster configuration.

Step 4 Enter **y** to add the subordinate fabric interconnect to the cluster.

Step 5 Enter the admin password of the peer fabric interconnect.

Step 6 Enter the IP address for the management port on the subordinate fabric interconnect.

Step 7 Review the setup summary and enter **yes** to save and apply the settings, or enter **no** to go through the Setup wizard again to change some of the settings.

If you choose to go through the Setup wizard again, it provides the values you previously entered, and the values appear in brackets. To accept previously entered values, press **Enter**.

The following example sets up the second fabric interconnect for a cluster configuration using the console:

```
Enter the installation method (console/gui)? console
Installer has detected the presence of a peer switch. This switch will be added to the
cluster. Continue?[y/n] y
Enter the admin password of the peer switch: adminpassword%958
Mgmt0 IPv4 address: 192.168.10.11
Management Ip Address=192.168.10.11
Apply and save the configuration (select 'no' if you want to re-enter)? (yes/no): yes
```

Enabling a Standalone Fabric Interconnect for Cluster Configuration

You can add a second fabric interconnect to an existing Cisco UCS domain that uses a single standalone fabric interconnect. To do this, you must enable the standalone fabric interconnect for cluster operation by configuring it with the virtual IP address of the cluster, and then add the second fabric interconnect to the cluster.

Procedure

	Command or Action	Purpose
Step 1	UCS-A# connect local-mgmt	Enters local management mode.
Step 2	UCS-A(local-mgmt) # enable cluster virtual-ip-addr	Enables cluster operation on the standalone fabric interconnect with the specified IP address. When you enter this command, you are prompted to confirm that you want to enable cluster operation. Type yes to confirm. The IP address must be the virtual IP address for the cluster configuration, not the IP address assigned to the fabric interconnect that you are adding to the cluster.

The following example enables a standalone fabric interconnect with a virtual IP address of 192.168.1.101 for cluster operation:

```
UCS-A# connect local-mgmt
UCS-A(local-mgmt) # enable cluster 192.168.1.101
This command will enable cluster mode on this setup. You cannot change it
back to stand-alone. Are you sure you want to continue? (yes/no): yes
UCS-A(local-mgmt) #
```

What to Do Next

Add the second fabric interconnect to the cluster.

Changing the System Name

Procedure

	Command or Action	Purpose
Step 1	UCS-A # scope system	Enters system mode.
Step 2	UCS-A /system # set name <i>name</i>	Sets the system name.
Step 3	UCS-A /system # commit-buffer	Commits the transaction to the system configuration.

The name is updated on both fabric interconnects within about 30 seconds after the transaction is committed.

The following example changes the system name and commits the transaction:

```
UCS-A# scope system
UCS-A /system* # set name SanJose5
UCS-A /system* # commit-buffer
UCS-A /system #
```

Changing the Management Subnet of a Cluster

When changing the management subnet in a cluster configuration, you must change the following three IP addresses simultaneously and you must configure all three in the same subnet:

- Management port IP address for fabric interconnect A
- Management port IP address for fabric interconnect B
- Cluster IP (virtual IP) address

Procedure

	Command or Action	Purpose
Step 1	UCS-A# scope fabric-interconnect a	Enters fabric interconnect mode for fabric A.
Step 2	UCS-A /fabric-interconnect # set out-of-band ip <i>ip-address netmask netmask gw gateway-ip-address</i>	Sets the IP address, netmask, and gateway IP address of the fabric interconnect.
Step 3	UCS-A /fabric-interconnect # scope fabric-interconnect b	Enters fabric interconnect mode for fabric B.
Step 4	UCS-A /fabric-interconnect # set out-of-band ip <i>ip-address netmask netmask gw gateway-ip-address</i>	Sets the IP address, netmask, and gateway IP address of the fabric interconnect.

	Command or Action	Purpose
Step 5	UCS-A /fabric-interconnect # scope system	Enters system mode.
Step 6	UCS-A /system # set virtual-ip vip-address	Sets the virtual IP address for the cluster.
Step 7	UCS-A /system # commit-buffer	Commits the transaction to the system configuration.

When you commit the transaction, you are disconnected from the management session. Reconnect at the new management IP address.

This example changes both fabric-interconnect IP addresses, changes the virtual IP address, and commits the transaction, disconnecting the session:

```
UCS-A# scope fabric-interconnect a
UCS-A /fabric-interconnect # set out-of-band ip 192.0.2.111 netmask 255.255.255.0 gw 192.0.2.1
UCS-A /fabric-interconnect* # scope fabric-interconnect b
UCS-A /fabric-interconnect* # set out-of-band ip 192.0.2.112 netmask 255.255.255.0 gw
192.0.2.1
UCS-A /fabric-interconnect* # scope system
UCS-A /system* # set virtual-ip 192.0.2.113
UCS-A /system* # commit-buffer
```

Ethernet Switching Mode

The Ethernet switching mode determines how the fabric interconnect behaves as a switching device between the servers and the network. The fabric interconnect operates in either of the following Ethernet switching modes:

End-Host Mode

End-host mode allows the fabric interconnect to act as an end host to the network, representing all server (hosts) connected to it through vNICs. This behavior is achieved by pinning (either dynamically pinned or hard pinned) vNICs to uplink ports, which provides redundancy to the network, and makes the uplink ports appear as server ports to the rest of the fabric. In end-host mode, the fabric interconnect does not run the Spanning Tree Protocol (STP) but it avoids loops by denying uplink ports from forwarding traffic to each other and by denying egress server traffic on more than one uplink port at a time. End-host mode is the default Ethernet switching mode and should be used if either of the following are used upstream:

- Layer 2 switching for Layer 2 aggregation
- Virtual Switching System (VSS) aggregation layer



Note

When you enable end-host mode, if a vNIC is hard pinned to an uplink port and this uplink port goes down, the system cannot repin the vNIC, and the vNIC remains down.

Switch Mode

Switch mode is the traditional Ethernet switching mode. The fabric interconnect runs STP to avoid loops, and broadcast and multicast packets are handled in the traditional way. Switch mode is not the default Ethernet switching mode, and should be used only if the fabric interconnect is directly connected to a router, or if either of the following are used upstream:

- Layer 3 aggregation
- VLAN in a box



Note

For both Ethernet switching modes, even when vNICs are hard pinned to uplink ports, all server-to-server unicast traffic in the server array is sent only through the fabric interconnect and is never sent through uplink ports. Server-to-server multicast and broadcast traffic is sent through all uplink ports in the same VLAN.

Configuring Ethernet Switching Mode



Important

When you change the Ethernet switching mode, Cisco UCS Manager logs you out and restarts the fabric interconnect. For a cluster configuration, Cisco UCS Manager restarts both fabric interconnects. The second fabric interconnect can take several minutes to complete the change in Ethernet switching mode and become system ready. The configuration is retained.

While the fabric interconnects are rebooting, all blade servers will lose all LAN and SAN connectivity, causing a complete outage of all services on the blades. This may cause the operating system to crash.

Procedure

	Command or Action	Purpose
Step 1	UCS-A# scope eth-uplink	Enters Ethernet uplink mode.
Step 2	UCS-A /eth-uplink # set mode {end-host switch}	Sets the fabric interconnect to the specified switching mode.
Step 3	UCS-A /eth-uplink # commit-buffer	Commits the transaction to the system configuration. Cisco UCS Manager restarts the fabric interconnect, logs you out, and disconnects Cisco UCS Manager CLI.

The following example sets the fabric interconnect to end-host mode and commits the transaction:

```
UCS-A# scope eth-uplink
UCS-A /eth-uplink # set mode end-host
Warning: When committed, this change will cause the switch to reboot
UCS-A /eth-uplink* # commit-buffer
UCS-A /eth-uplink #
```

Fibre Channel Switching Mode

The Fibre Channel switching mode determines how the fabric interconnect behaves as a switching device between the servers and storage devices. The fabric interconnect operates in either of the following Fibre Channel switching modes:

End-Host Mode

End-host mode allows the fabric interconnect to act as an end host to the connected fibre channel networks, representing all server (hosts) connected to it through virtual host bus adapters (vHBAs). This behavior is achieved by pinning (either dynamically pinned or hard pinned) vHBAs to Fibre Channel uplink ports, which makes the Fibre Channel ports appear as server ports (N-ports) to the rest of the fabric. When in end-host mode, the fabric interconnect avoids loops by denying uplink ports from receiving traffic from one another.

End-host mode is synonymous with NPV mode. This mode is the default Fibre Channel Switching mode.



Note

When you enable end-host mode, if a vHBA is hard pinned to a uplink Fibre Channel port and this uplink port goes down, the system cannot repin the vHBA, and the vHBA remains down.

Switch Mode

Switch mode is the traditional Fibre Channel switching mode. Switch mode allows the fabric interconnect to connect directly to a storage device. Enabling Fibre Channel switch mode is useful in Pod models where there is no SAN (for example, a single Cisco UCS domain that is connected directly to storage), or where a SAN exists (with an upstream MDS).

Switch mode is not the default Fibre Channel switching mode.



Note

In Fibre Channel switch mode, SAN pin groups are irrelevant. Any existing SAN pin groups are ignored.

Configuring Fibre Channel Switching Mode



Important

When you change the Fibre Channel switching mode, Cisco UCS Manager logs you out and restarts the fabric interconnect. For a cluster configuration, Cisco UCS Manager restarts both fabric interconnects sequentially. The second fabric interconnect can take several minutes to complete the change in Fibre Channel switching mode and become system ready.

Procedure

	Command or Action	Purpose
Step 1	UCS-A# <code>scope fc-uplink</code>	Enters Fibre Channel uplink mode.

	Command or Action	Purpose
Step 2	UCS-A /fc-uplink # set mode { end-host switch }	Sets the fabric interconnect to the specified switching mode.
Step 3	UCS-A /fc-uplink # commit-buffer	Commits the transaction to the system configuration. Cisco UCS Manager restarts the fabric interconnect, logs you out, and disconnects Cisco UCS Manager CLI.

The following example shows how to set the fabric interconnect to end-host mode and commit the transaction:

```
UCS-A # scope fc-uplink  
UCS-A /fc-uplink # set mode end-host  
UCS-A /fc-uplink* # commit-buffer  
UCS-A /fc-uplink #
```

**Caution**

When the Fibre Channel switching mode is changed, both Cisco UCS fabric interconnects reload simultaneously. Reloading the fabric interconnects will cause a system-wide downtime for approximately 10 to 15 minutes.

