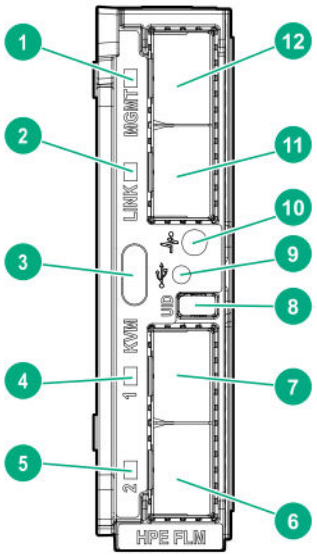
Component identification

HPE Synergy 4-Port Frame Link Module components and LEDs

NOTE: HPE Synergy 4-Port Frame Link Modules require supported SFP+ DAC cables or SFP+ transceivers for cabling. For more information, see the product QuickSpecs on the **Hewlett Packard Enterprise website**.



Item	Description	Function
1	MGMT port activity LED	Reports MGMT port activity: • Flashing green = Activity on the MGMT port • Off = No activity on the MGMT port
2	LINK port activity LED	Reports LINK port activity: • Flashing green = Activity on the LINK port • Off = No activity on the LINK port

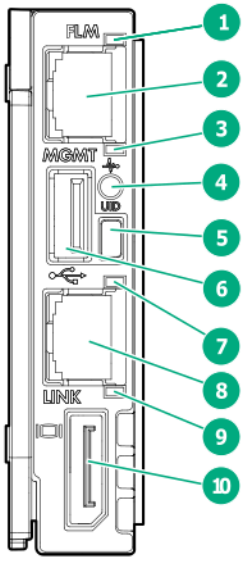
Table Continued

Item	Description	Function
3	KVM port	**NOTE:** Connection to the KVM port requires an HPE Synergy 4-Port Frame Link Module USB Adapter. **NOTE:** Supports storage devices that are USB 2.0 compatible. When an HPE Synergy 4-Port Frame Link Module USB Adapter is installed, the HPE Synergy 4-Port Frame Link Module: • Allows connection to the frame using a supported USB device. Devices include a keyboard or mouse for connecting to the HPE Synergy Console. To connect multiple devices, a USB hub (not included) is required. • Allows connection to the frame using a monitor device or an active monitor port adapter. Used for performing a USB recovery frame link module firmware update.
4	Appliance port 1 connectivity LED	Reserved for future use.
5	Appliance port 2 connectivity LED	Reserved for future use.
6	Appliance port 2	Reserved for future use.
7	Appliance port 1	Reserved for future use.
8	UID button	Toggles the UID LED on or off. • Solid blue = Activated • Off = Deactivated • Flashing blue = Firmware upgrade is in progress on the frame link module. Do not remove either frame link module while the UID LED is flashing.
9	USB adapter thumbscrew connection	For securing an HPE Synergy 4-Port Frame Link Module USB Adapter to the HPE Synergy 4-Port Frame Link Module.

Table Continued

Item	Description	Function
10	Health LED	Provides the health status of the frame link module. • Solid green = Normal operation • Flashing amber = Warning • Flashing red = Critical error If the Health LED indicates a warning or a critical error, connect to HPE OneView or to the HPE Synergy Console for more information and troubleshooting assistance.
11	LINK port	SFP+ connector that provides the following functions: **IMPORTANT:** Use supported SFP+ 10GbE DAC cables or transceivers for LINK port connections. For more information, see the product QuickSpecs on the **Hewlett Packard Enterprise website**. • Provides high availability management network connectivity between: ◦ LINK ports on two frame link modules in the same frame for a single frame configuration ◦ Frame link modules in different frames as part of a management network ring in a multiframe configuration • Provides management ring (frame link topology) connectivity for automatic frame discovery by HPE OneView.
12	MGMT port	SFP+ connector that provides the following functions: **IMPORTANT:** Use supported SFP+ DAC cables or transceivers for MGMT port connections. For more information, see the product QuickSpecs on the **Hewlett Packard Enterprise website**. **IMPORTANT:** The transceiver or cable used must match the port speed of the switch used for management network connectivity. • Provides a management uplink to the management network. • 10GbE or 1GbE based on the cable or transceiver used.

HPE Synergy Frame Link Module components and LEDs

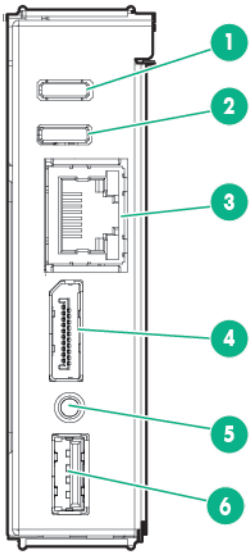


Item	Description	Function
1	MGMT port activity LED	Reports MGMT port activity: • Flashing green = Activity on the MGMT port • Off = No activity on the MGMT port
2	MGMT port	A 10GBASE-T RJ45 connector that provides the following functions: • Provides a management uplink to the management network. • Automatically negotiates speed to 10GbE or 1GbE based on the connection. • Provides a data connection to the data network when an Image Streamer management appliance is installed in the frame.
3	MGMT port connectivity LED	Reports MGMT port connectivity: • Solid green = MGMT port is connected. • Off = MGMT port is not connected.
4	Health LED	Provides the health status of the frame link module. • Solid green = Normal operation • Flashing amber = Warning • Flashing red = Critical error If the Health LED indicates a warning or a critical error, connect to HPE OneView or to the HPE Synergy Console for more information and troubleshooting assistance.

Table Continued

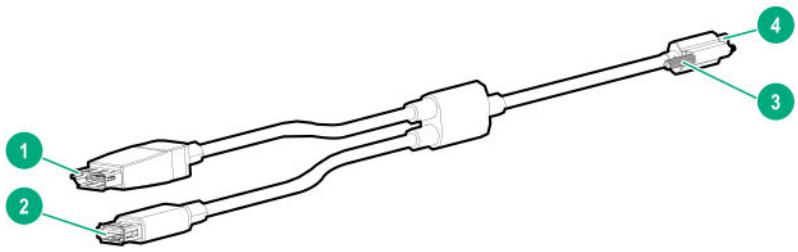
Item	Description	Function
5	UID button	Toggles the UID LED on or off. • Solid blue = Activated • Off = Deactivated • Flashing blue = Firmware upgrade is in progress on the frame link module. Do not remove either frame link module while the UID LED is flashing.
6	USB port	Allows connection to the frame using a supported USB device. Devices include a keyboard or mouse for connecting to the HPE Synergy Console. To connect multiple devices, a USB hub (not included) is required. Used for performing a USB recovery frame link module firmware update.
7	LINK port activity LED	Reports LINK port activity: • Flashing green = Activity on the LINK port • Off = No activity on the LINK port
8	LINK port	A 10GBASE-T RJ45 connector that provides two functions: • Provides high-availability management network connectivity between: ◦ LINK ports on two frame link modules in the same frame for a single frame configuration. ◦ Frame link modules in different frames as part of a management network ring in a multiframe configuration. • Provides management ring (frame link topology) connectivity for automatic frame discovery by HPE OneView.
9	LINK port connectivity LED	Reports LINK port connectivity: • Solid green = LINK port is connected. • Off = LINK port is not connected.
10	Monitor port	Allows connection to the frame using a monitor device or an active monitor port adapter.

Front panel components



Item	Description	Function
1	UID button	Toggles the frame UID on or off.
2	Frame Health LED	Indicates the highest severity health status of all components within the frame. • Solid green—Normal operation • Flashing amber—Warning • Flashing red—Critical error To resolve critical errors and warnings, connect to HPE OneView or to the HPE Synergy Console.
3	Laptop port	Provides single laptop access to the frame link module using an RJ-45 Ethernet 100BASE-TX connection.
4	Monitor port	Provides connectivity for a monitor or an active monitor port adapter to access the HPE Synergy Console.
5	Reset button	Provides two functions: • Resets the Active frame link module - momentary press. • Factory resets both frame link modules - press and hold until UID LED flashes blue. **NOTE:** The reset button does not reset any other component in the frame.
6	USB	Provides a connection for supported USB devices such as a keyboard or mouse for HPE Synergy Console use. To connect multiple devices, a USB hub (not included) is required.

HPE Synergy 4-Port Frame Link Module USB Adapter components



Item	Description	Function
1	Monitor connection	Allows connection to the frame using a monitor device or an active monitor port adapter.
2	USB connector	Allows connection to the frame using a supported USB device. Devices include a keyboard or mouse for connecting to the HPE Synergy Console. To connect multiple devices, a USB hub (not included) is required.
3	Thumb screw	Secures the HPE Synergy 4-Port Frame Link Module USB Adapter to the HPE Synergy 4-Port Frame Link Module.
4	USB-C type connector	Connects to the HPE Synergy 4-Port Frame Link Module KVM port. **NOTE:** Supports storage devices that are USB 2.0 compatible.

Setup

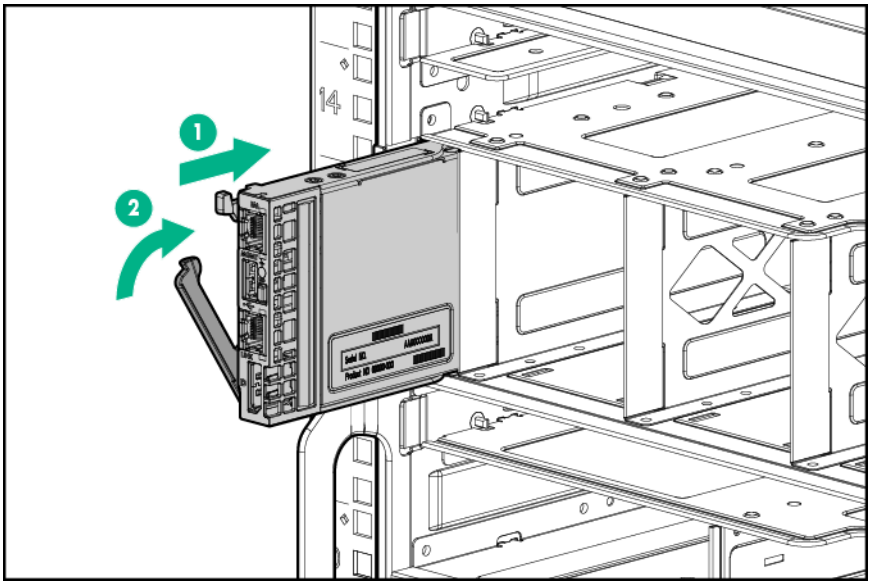
Installing a frame link module

Procedure

1. If installed, remove the frame link module blank from the frame link module bay in the rear of the frame.

   CAUTION: Use caution when installing the frame link module into the frame to avoid damage to the connector. Installing a frame link module with a damaged connector can result in damage to the midplane.

2. Open the frame link module latch.
3. Remove the frame link module end cap.
4. Install the frame link module into the frame.
5. Close the frame link module latch.



HPE Synergy Cabling Guide

For additional cabling scenarios and diagrams, see the *HPE Synergy Cabling Guide* (**http://www.hpe.com/info/synergy-cabling-guide**).

The *HPE Synergy Cabling Guide* includes:

- Multiframe cabling
- HPE Synergy Frame Link Module to HPE Synergy 4-Port Frame Link Module cabling
- Patch panel LINK port cabling for HPE Synergy Frame Link Module
- HPE Synergy Image Streamer cabling
- Master to satellite Interconnect cabling

- Power cabling
- HPE Synergy Console cabling

HPE Synergy 4-Port Frame Link Module single-frame management network cabling example

NOTE: This cabling example does not cover power or production network cabling.

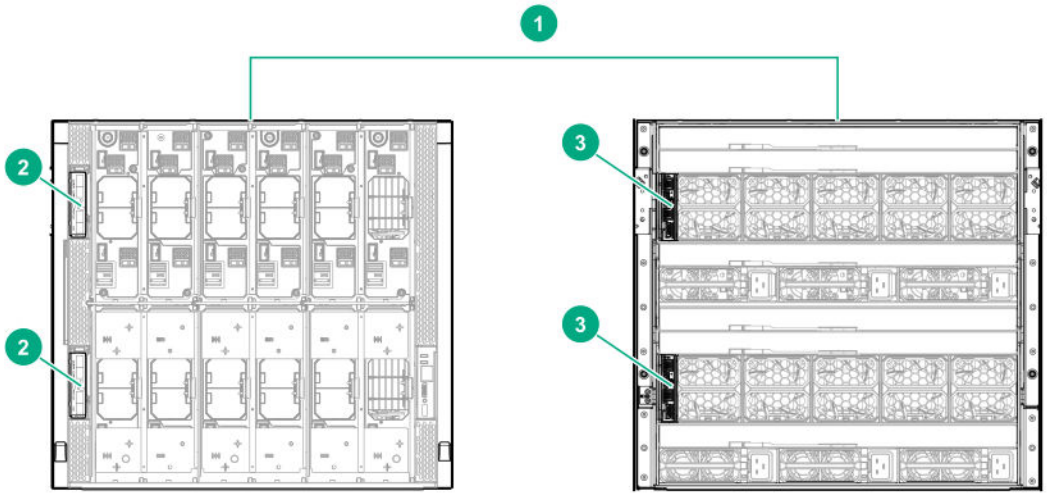
NOTE: HPE Synergy 4-Port Frame Link Modules require supported SFP+ DAC cables or SFP+ transceivers for cabling. For more information, see the product QuickSpecs on the **Hewlett Packard Enterprise website**.

NOTE: This cabling example uses DAC cables. For a complete list of supported cables, see the product on the **Hewlett Packard Enterprise website**.

This example shows cabling a single frame with two HPE Synergy Composer2 and two HPE Synergy 4-Port Frame Link Modules installed in the frame.

Prerequisites

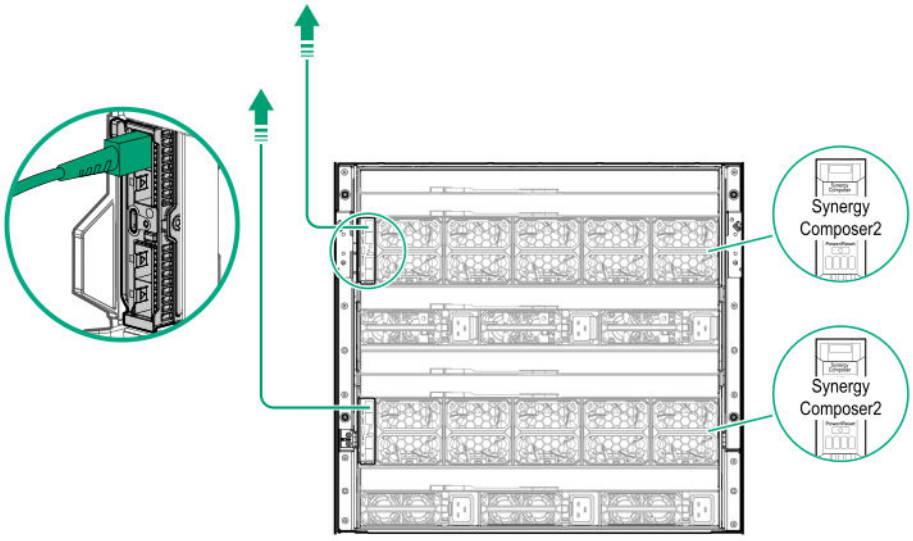
Figure 1: Required components



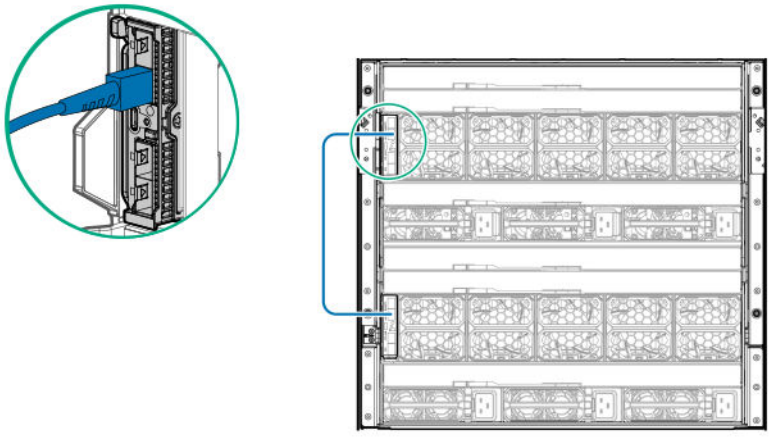
Item	Description	Amount
1	HPE Synergy 12000 Frame	1
2	HPE Synergy Composer2	2
3	HPE Synergy 4-Port Frame Link Module	2

Procedure

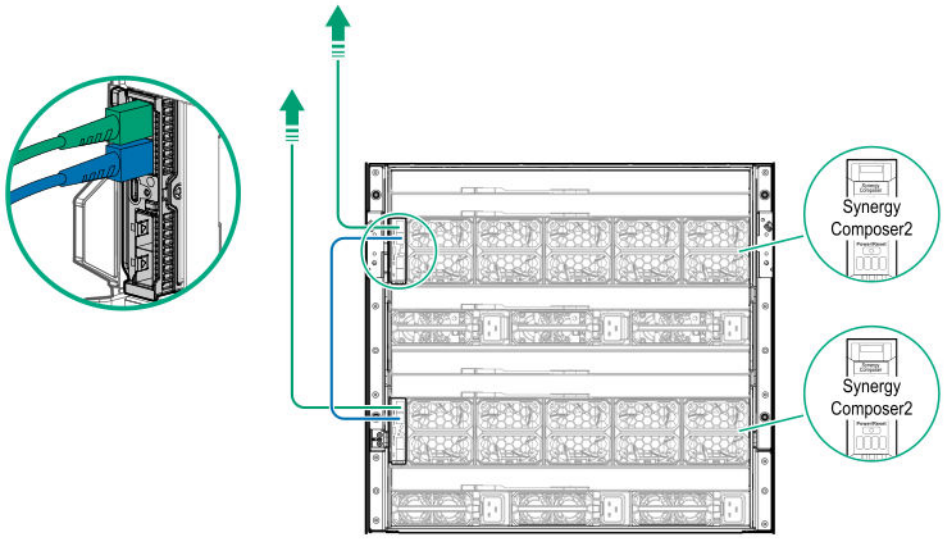
1. Using DAC cables, connect each frame link module **MGMT** port to the management network.



2. Using 10Gb DAC cables, connect the **LINK** ports together.



Cabling is complete. The following diagram shows the complete cabling diagram.



Single-frame management network cabling example with HPE Synergy Frame Link Modules

NOTE: This cabling example does not cover power or production network cabling.

Prerequisites

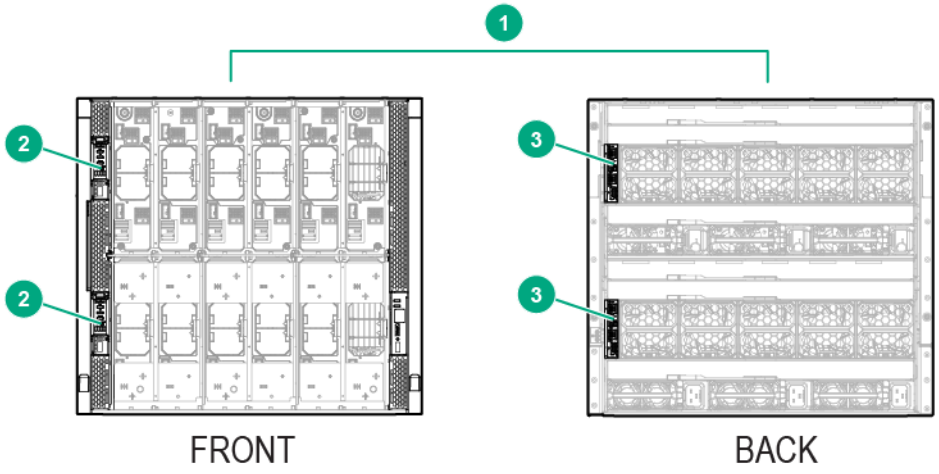


Figure 2: Required components

Item	Description	Amount
1	HPE Synergy 12000 Frame	1
2	HPE Synergy Composer	2
3	HPE Synergy Frame Link Module (2-Port FLM)	2

Procedure

1. Connect Ethernet cables from each **MGMT** port to the management network.

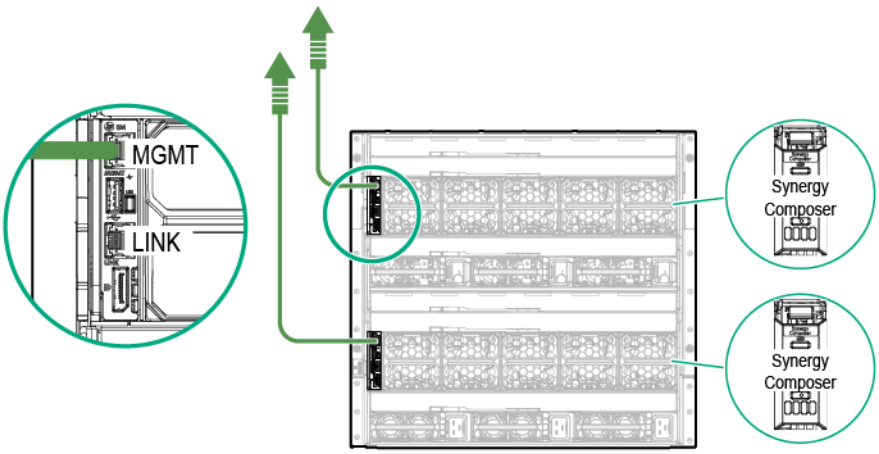


Figure 3: MGMT port to management network cabling

2. Using CAT6A cables, connect the **LINK** ports together.

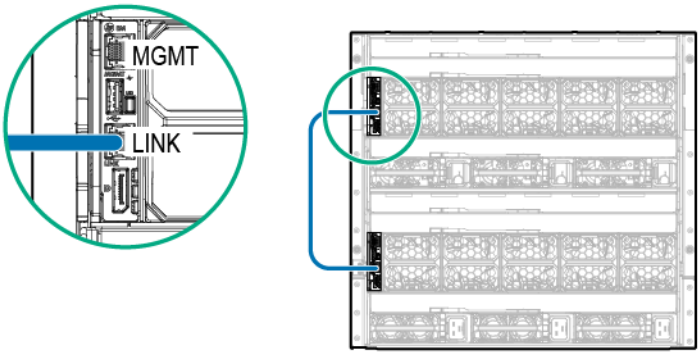


Figure 4: LINK port cabling

Cabling is complete. The following diagram shows the complete cabling diagram.

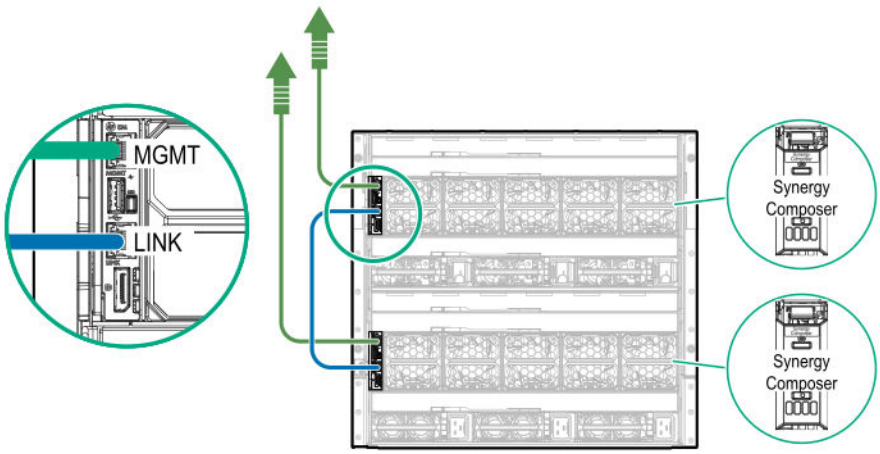


Figure 5: Complete cabling for a single-frame configuration

Operations

Considerations for removing and replacing a frame link module

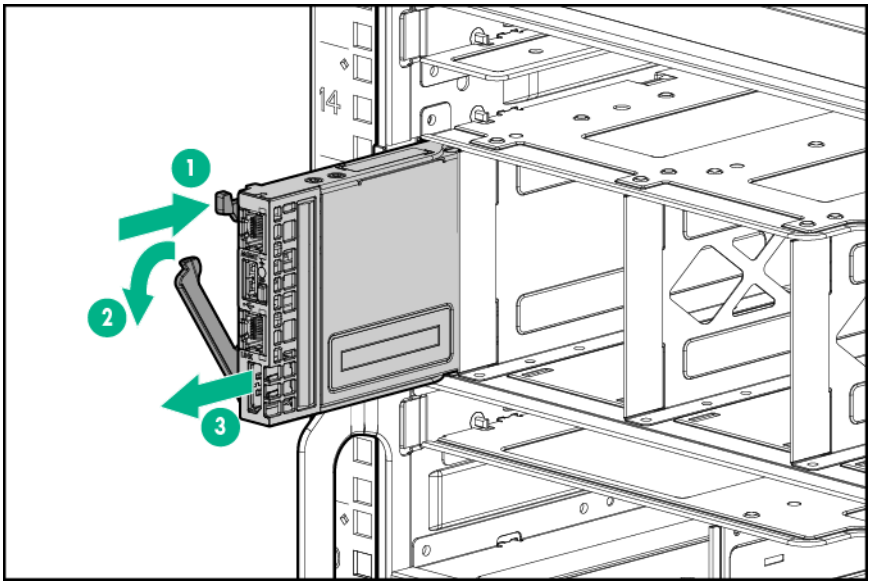
- In a high availability configuration, removing a frame link module will result in a brief, less than 30 second, disruption in the Synergy management ring network. The management ring network will no longer be highly available until the frame link module is reinstalled or replaced.
- Installing a new frame link module in a frame will automatically perform a factory reset of the newly installed frame link module. If another frame link module is already installed in the frame, the new frame link module will automatically update to match the firmware and configuration of the installed frame link module.
- When installed in a frame managed by HPE OneView, the frame link module is automatically claimed by HPE OneView. The frame link module is claimed once it is online and available.

Removing and replacing a frame link module

Procedure

1. Push the top tab in.

   The release lever pops open.
2. Open the release lever.
3. Remove the frame link module.



To replace the component, reverse the removal procedure.

Updating the frame link module firmware using the frame link module USB port

IMPORTANT: Only use this firmware update procedure if the firmware cannot be updated using HPE OneView. For more information on updating firmware with HPE OneView, see the *HPE OneView for Synergy User Guide* (**http://www.hpe.com/info/synergy-docs**).

NOTE: Connecting a USB-A storage device to an HPE Synergy 4-Port Frame Link Module requires an HPE Synergy 4-Port Frame Link Module USB Adapter. For more information, see **Connecting the HPE Synergy 4-Port Frame Link Module USB Adapter** on page 30.

NOTE: This procedure performs a factory reset of the frame link module and will delete all previous frame link module configuration and log data.

NOTE: This procedure must be performed on one frame link module at a time with the second frame link module removed from the frame.

The Synergy management network will be disrupted until:

- The firmware update is complete.
- The frame link modules are reinstalled.
- HPE OneView has reclaimed the frame link modules.

Procedure

1. Download the frame link module firmware file from the Hewlett Packard Enterprise Support Center.

   If necessary, rename the file to "FLM.tars".
2. Copy the file to a USB storage device formatted to FAT32.
3. Remove all frame link modules installed in the frame.
4. Connect the USB storage device into the first frame link module and install the frame link module back into the frame.

   NOTE: Connecting a USB storage device to an HPE Synergy 4-Port Frame Link Module requires an HPE Synergy 4-Port Frame Link Module USB Adapter. For more information, see the product QuickSpecs (**http://www.hpe.com/info/qs**).

   The firmware update will take approximately 2 minutes.

   The frame link module Health LED and UID LED states indicate the status of the firmware update process.

   The UID LED will flash to indicate that the firmware process is in progress.
5. When complete, observe the following frame link module and UID LED states:

   Health LED = solid green

   UID LED = solid blue
6. Remove the USB storage device from the frame link module.

   Removing the USB storage device will cause the frame link module to reboot.
7. If the frame has two frame link modules, connect the USB storage device into the second frame link module, install it into the frame, then repeat steps 5 and 6.

HPE Synergy 12000 Frame management network

HPE Synergy 12000 Frame internal management network

Each frame link module contains an Ethernet switch that manages all HPE Synergy internal frame management network connections. Frame link modules also manage management ring (frame link topology) connections. The frame link module Ethernet switch ports connect to every appliance, device, and interconnect bay within the frame. Independent midplane signal connections and independent bay connections provide fault tolerance.

Frame link module Ethernet ports supporting the appliance bays run at 10Gb. Ethernet ports supporting the device and interconnect bays run at 1Gb. Appliance bay management Ethernet connections to both frame link modules are always active. These Ethernet connections provide fault tolerant connectivity to the frame management network. Device and interconnect bay Ethernet ports are connected to the switch through the Active frame link module.

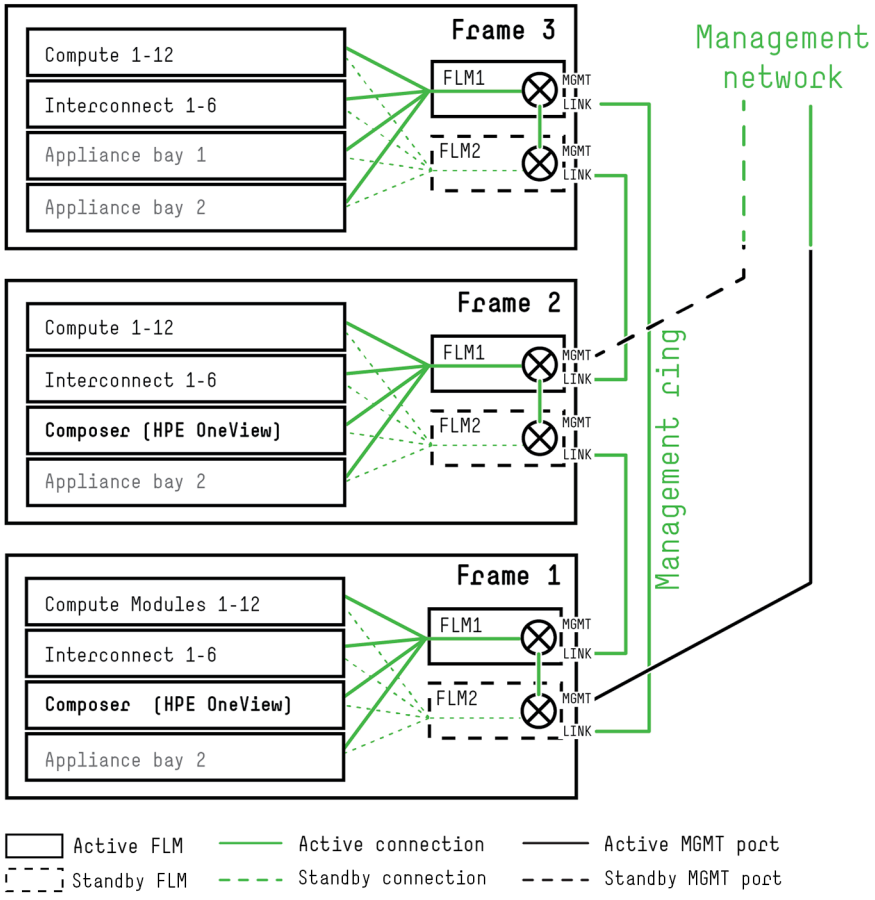


Figure 6: HPE Synergy Frame Link Module internal and external management network

HPE Synergy 12000 Frame external management ring network

IMPORTANT: All external rack switches used for the management network must be IEEE 802.1D compliant so that LLDP packets are not forwarded.

NOTE: The frame link topology (management ring) can be viewed in HPE OneView by navigating to **OneView** > **Enclosures** > **<enclosure>** > **Frame link topology**.

The frame link module LINK port provides a 10Gb redundant air-gapped fault tolerant network. Connected LINK ports create a management ring in single frame or multiframe configurations. Once the solution is cabled, management network connectivity does not require user or external rack switch configuration.

The frame link module MGMT port provides a 1Gb or 10Gb connection to the external management network. MGMT ports connected to the management network provide redundant management network uplink connectivity for all frames in a management ring. For high availability, in a multiframe HPE Synergy solution, cable a minimum of two MGMT ports from separate frames to the management network.

HPE Synergy Image Streamer

NOTE: HPE Synergy frames with HPE Synergy Image Streamer must have HPE Synergy Frame Link Module (2-Port) installed.

In frames with an HPE Synergy Image Streamer installed, the frame link module MGMT ports are both automatically configured for use by the installed HPE Synergy Image Streamer. MGMT ports in frames with HPE Synergy Image Streamer are exclusively dedicated for boot image deployment. These MGMT ports cannot be used for connection to the management network.

Frame link module configurations

NOTE: Both frame link modules in a frame must be the same type. HPE Synergy 4-Port Frame Link Modules cannot be mixed with HPE Synergy Frame Links Modules (2-Port) in a frame.

A single frame link module is the minimum required to manage a frame. For high availability, or to connect multiple frames together, each frame must have two frame link modules installed.

In a high availability configuration, one frame link module takes on the Active redundancy role and the second frame link module takes on the Standby redundancy role. The Active frame link module serves as the primary manager of the frame. Both the Active and the Standby frame link modules participate in providing connectivity for management traffic communications.

Frame link module management network ports

Frame link module MGMT port

NOTE: HPE Synergy frames with HPE Synergy Image Streamer must have HPE Synergy Frame Link Module (2-Port) installed.

Frame link module MGMT ports connect frames to the management network for remote administration. At least one MGMT port must be connected to the management network. Hewlett Packard Enterprise recommends connecting a minimum of two MGMT ports from separate frames in a management ring for high availability.

When an HPE Synergy Image Streamer appliance is installed in a frame, both MGMT ports are used to connect the HPE Synergy Image Streamer appliance to either an HPE Virtual Connect SE 100Gb F16 Module for HPE Synergy or an HPE Virtual Connect SE 40Gb F8 Module for HPE Synergy for compute module boot storage. When an HPE Synergy Image Streamer is installed in a frame, the MGMT ports are automatically dedicated to HPE Synergy Image Streamer for OS deployment.

In a management ring (frame link topology), with one or more frames, one frame link module connected to the management network is assigned the Active role and the second frame link module connected to the management network is assigned the Standby role. Only the Active frame link module connects the management ring (frame link topology) to the management network. The status of the Active frame link module is monitored by all frame link modules in a management ring (frame link topology). If the Active frame link module MGMT link is lost, the Active role is assigned to the Standby frame link module.

Frame link module LINK port

The frame link module LINK port provides a scalable fault tolerant management network backbone for connecting one or more frames.

Frame link module LINK ports carry all management traffic between linked frames. They also carry multiple private VLANs for HPE Synergy Composer and HPE Synergy Image Streamer redundancy.

Frame link module LINK ports are connected in a management ring (frame link topology)) for fault tolerance. The frame link modules in a management ring monitor the status of the ring and manage the LINK ports to provide fault tolerant connectivity around the ring while preventing network loops.

Frame link module IP address types

NOTE: When adding a remote enclosure to HPE OneView, use the **Frame Management Network IPv6 Link Local** address. Entering a frame link module module-specific IPv6 link-local address may result in loss of HPE OneView communication to the enclosure.

NOTE: The **Frame Management Network IPv6 Link Local** address is dynamically assigned and will change after a frame has been factory reset.

The frame link module has two types of IPv6 addresses:

Frame Management Network IPv6 Link Local address

The frame management IPv6 link-local address is an always configured and available IPv6 link-local address. The frame management IPv6 link-local address is a floating address assigned to the frame link module with the Active redundancy role.

Module-specific IPv6 link-local address

Frame link module module-specific IPv6 addresses are self-generated IPv6 addresses specific to each frame link module. The module-specific IPv6 link-local address is self-generated based on the frame link module MAC address.