Abstract
This document describes identification, installation, and setup for the HPE Synergy System. This guide is for an experienced service technician. Hewlett Packard Enterprise assumes you are qualified in the servicing of the HPE Synergy components and overall solution.
Notices

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Planning the installation

Safety and regulatory compliance


Site requirements

Select an installation site that meets the detailed installation site requirements described in the site planning guide on the Hewlett Packard Enterprise website (http://www.hpe.com/info/synergy-docs).

Warning, caution, and important messages

⚠️ WARNING: To reduce the risk of personal injury or damage to equipment, heed all warnings and cautions throughout the installation instructions.

⚠️ WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:
- The leveling feet are extended to the floor.
- The full weight of the rack rests on the leveling feet.
- The stabilizing feet are attached to the rack if it is a single-rack installation.
- The racks are coupled together in multiple-rack installations.
- Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.

⚠️ WARNING: The frame is very heavy. To reduce the risk of personal injury or damage to the equipment:
- Observe local occupational health and safety requirements and guidelines for manual material handling.
- Remove all installed components from the frame before installing or moving the frame.
- Use caution and get help to lift and stabilize the frame during installation or removal, especially when the frame is not fastened to the rack.

⚠️ WARNING: When lifting the frame with the optional removable handles, always use at least four people to lift the frame into the rack. If the frame is being loaded into the rack above chest level, a fifth person must assist with aligning the frame with the rails while the other four people support the weight of the frame. If you are using a mechanical lift to install the frame, two people are required to install the frame into the rack.

⚠️ WARNING: Install the frame starting from the bottom of the rack and work your way up the rack.
These symbols, on power supplies or systems, indicate that the equipment is supplied by multiple sources of power.

**NOTE:** To reduce the risk of injury from electric shock, remove all power cords to completely disconnect power from the system.

- Each frame has two or more power supply cords. A single rack or cabinet may contain more than one frame. Power may be supplied in a redundant fashion. Removing any single source of power does not necessarily remove power from any portion of the system. When performing any service other than hot-plug module replacement, you must completely disconnect all power to that portion of the system.
- When performing service procedures on frames, shut off the circuit breakers to both A and B AC power feeds and then disconnect all power cords from the outlets before servicing.

**WARNING:** To reduce the risk of electric shock or damage to the equipment, enter a frame or perform service on system components only as instructed in the user documentation.

**WARNING:** A risk of electric shock from high leakage current exists. Before connecting the AC supply to the power enclosure, be sure that the electrical outlets are properly grounded (earthed).

**CAUTION:** Always be sure that equipment is properly grounded and that you follow proper grounding procedures before beginning any installation procedure. Improper grounding can result in ESD damage to electronic components. For more information, see "Electrostatic discharge."

**CAUTION:** Protect the storage module from power fluctuations and temporary interruptions with a regulating UPS. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the storage module in operation during a power failure.

### Determine power and cooling configurations

Validate power and cooling requirements based on location and installed components.

For more information, see the *HPE Synergy Configuration and Compatibility Guide* on the Hewlett Packard Enterprise website ([http://www.hpe.com/info/synergy-docs](http://www.hpe.com/info/synergy-docs)).

### Power supply calculations

For hot-plug power supply specifications, see the *HPE Synergy QuickSpecs* on the Hewlett Packard Enterprise website ([http://www.hpe.com/info/synergy-docs](http://www.hpe.com/info/synergy-docs)). There is also the Synergy Planning Tool for download. The Synergy Planning Tool helps plan and organize all Synergy options to build a single frame, multiple frame, or racks for a complete solution ready to order from HPE using a simple BOM from the tool. The Synergy Planning Tool can be found on the Hewlett Packard Enterprise Sales Portal website in the Tools section.

### Power requirements

Installation of this equipment must comply with local and regional electrical regulations governing the installation of IT equipment by licensed electricians. This equipment is designed to operate in installations covered by NFPA 70, 1999 Edition (National Electric Code) and NFPA-75, 1992 (code for Protection of
Electronic Computer/Data Processing Equipment). For electrical power ratings on options, refer to the product rating label or the user documentation supplied with that option.

⚠️ **WARNING:** To reduce the risk of personal injury, fire, or damage to the equipment, do not overload the AC supply branch circuit that provides power to the rack. Consult the electrical authority having jurisdiction over wiring and installation requirements of your facility.

⚠️ **CAUTION:** Protect the storage module from power fluctuations and temporary interruptions with a regulating UPS. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the storage module in operation during a power failure.

### Space and airflow requirements

⚠️ **CAUTION:** In high-density configurations, the HPE 11000 G2 Series Rack Airflow Optimization Kit (BW930A) should be installed to prevent airflow from the rear of the rack to the front the rack via gaps in the rack frame.

To enable servicing and ensure adequate airflow, observe the following spatial requirements when deciding where to install a Hewlett Packard Enterprise-branded, Compaq-branded, Telco, or third-party rack:

- Leave a minimum clearance of 63.5 cm (25 in) in front of the rack.
- Leave a minimum clearance of 76.2 cm (30 in) in back of the rack.
- Leave a minimum clearance of 121.9 cm (48 in) from the back of the rack to the rear of another rack or row of racks.

Compute modules draw cool air in through the front and expel warm air through the rear of the frame. Therefore, the front of the frame must be adequately ventilated to enable ambient room air to enter the frame, and the rear of the frame must be adequately ventilated to enable the warm air to escape from the frame.

Hewlett Packard Enterprise Advanced Series Racks, Hewlett Packard Enterprise Series Racks, and Hewlett Packard Enterprise Standard Series Racks provide proper compute module cooling through flow-through perforations in the front and rear doors that provide 65 percent open area for ventilation.

If the front of the rack is not completely filled with components, the remaining gaps between the components can cause changes in the airflow, which can adversely affect cooling within the rack. Cover these gaps with blanking panels.

⚠️ **IMPORTANT:** Do not block the ventilation openings.

⚠️ **CAUTION:** Always use blanking panels to fill empty vertical spaces in the rack. This arrangement ensures proper airflow. Using a rack without blanking panels results in improper cooling that can lead to thermal damage.

### Temperature requirements

To ensure continued safe and reliable equipment operation, install or position the rack in a well-ventilated, climate-controlled environment.

The operating temperature inside the rack is always higher than the room temperature and is dependent on the configuration of equipment in the rack. Check the TMRA for each piece of equipment before installation.
CAUTION: To reduce the risk of damage to the equipment when installing third-party options:

- Do not permit optional equipment to impede airflow around the frame or to increase the internal rack temperature beyond the maximum allowable limits.
- Do not exceed the manufacturer’s TMRA.

Grounding requirements

This equipment must be grounded properly for proper operation and safety. In the United States, you must install the equipment in accordance with NFPA 70, 1999 Edition (National Electric Code), Article 250, as well as any local and regional building codes.

In Canada, you must install the equipment in accordance with Canadian Standards Association, CSA C22.1, Canadian Electrical Code.

In all other countries, you must install the equipment in accordance with any regional or national electrical wiring codes, such as the International Electrotechnical Commission (IEC) Code 364, parts 1 through 7. Furthermore, you must be sure that all power distribution devices used in the installation, such as branch wiring and receptacles, are listed or certified grounding-type devices.

Because of the high ground-leakage currents associated with this equipment, Hewlett Packard Enterprise recommends the use of a PDU that is either permanently wired to the building’s branch circuit or includes a nondetachable cord that is wired to an industrial-style plug. NEMA locking-style plugs or those complying with IEC 60309 are considered suitable for this purpose. Using common power outlet strips to supply power to this equipment is not recommended.

Supported racks and rack options

The frame and support rails are engineered for mounting into a 19” wide front panel, 4-post cabinets, and racks that have been designed according to the EIA-310-D standard.

Hewlett Packard Enterprise rails are not compatible with tapped holes. There are two types of supported rail sets for the frame:

- A set for square-hole front and rear mounting flanges
- A set for round-hole flanges

The rails are compatible with a nominal rack-mounting depth of 29 1/8”, with an adjustability range of plus ½” to minus 1 ½”. The rails will work in both a 1075 mm and a 1200 mm deep rack.

A 42U/47U rack supports up to four frames.

While the square-hole rack set is the standard option, either rail set supports a fully loaded frame weighing 550 pounds. Four of these frames together approach the 2,250 pound internal IT equipment limit of both the HPE 42U x 600 mm x 1075 mm and the 42U 600 mm x 1200 mm 11000G2 Series QS racks.

NOTE: The HPE Synergy 12000 Frame is deeper than the c7000 enclosure by approximately 3.5 inches. 1075 racks with side facing PDUs may interfere with the frame. Hewlett Packard Enterprise recommends using 1200 mm racks.

Cables, PDUs, and other cable management hardware could increase the weight sufficiently to require the use of the HPE 42U x 600 mm x 1200 mm Intelligent Series QS rack, which supports 2,750 pound internal IT equipment.
Rack-free environment requirements

The HPE Synergy 12000 Frame (referred to as the frame) can be used in a rack-free environment. The following conditions must be met when performing a rack-free installation:

- A fully-populated frame can weigh up to 249.50 kg (550.00 lb). The object supporting the frame must be able to withstand this weight.
- The frame should be supported by a sturdy, flat surface.

⚠️ WARNING: To reduce the risk of personal injury or damage to the equipment in a rack-free environment:
  - Never stack the frame on top of another frame.
  - Never place equipment on top of the frame.
  - Never place the frame on a surface that cannot support up to 249.50 kg (550.00 lb).

HPE Synergy configuration

An initial setup for HPE Synergy requires planning the location for each component. To ensure a proper configuration, review the information in the following documents on the Hewlett Packard Enterprise website (http://www.hpe.com/info/synergy-docs):

- **HPE Synergy Configuration and Compatibility Guide**—This document helps to understand more about each component and the configuration requirements for installing each component. It provides the following:
  - An overview of HPE Synergy management and fabric architecture
  - Detailed hardware component identification
  - Hardware configuration guidelines
  - Interconnect, power, and HPE Synergy Console cabling information

- **HPE Synergy Cabling Guide**—This document provides detailed information and diagrams on how to cable HPE Synergy.
## Pallet contents

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HPE Synergy 12000 Frame</td>
<td>The frame for installing Synergy components</td>
</tr>
<tr>
<td>2</td>
<td>Front panel</td>
<td>The front panel ports of the frame for KVM connection</td>
</tr>
<tr>
<td>3</td>
<td>Appliance module blank</td>
<td>A mandatory insert installed in any unused appliance module bay.</td>
</tr>
<tr>
<td>4</td>
<td>Appliance module¹</td>
<td>A hardware appliance for embedded management</td>
</tr>
<tr>
<td>5</td>
<td>Compute module blank</td>
<td>A mandatory insert installed in any unused compute module bay.</td>
</tr>
<tr>
<td>6</td>
<td>Full-height module¹</td>
<td>The full-height compute module</td>
</tr>
<tr>
<td>7</td>
<td>Half-height module¹</td>
<td>The half-height compute module</td>
</tr>
<tr>
<td>8</td>
<td>Power supply blank</td>
<td>A mandatory insert installed in any unused power supply bay</td>
</tr>
<tr>
<td>9</td>
<td>Hot-plug power supply¹</td>
<td>The power supply for the frame</td>
</tr>
<tr>
<td>10</td>
<td>Fan</td>
<td>A fan used to cool the components installed in the frame</td>
</tr>
</tbody>
</table>

*Table Continued*
<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Frame link module&lt;sup&gt;1&lt;/sup&gt;</td>
<td>The frame link module auto-discovers resources in the frame, has a redundant option, and provides links for scaling of frames.</td>
</tr>
<tr>
<td>12</td>
<td>Interconnect blank</td>
<td>A mandatory insert installed in any unused interconnect bay</td>
</tr>
<tr>
<td>13</td>
<td>Interconnect module&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Any of several fabric or networking components, such as switches or interconnect link modules, that enable networking communication.</td>
</tr>
<tr>
<td>14&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Lift handles (optional)</td>
<td>The lift handles can be used to lift a frame into or out of a rack.</td>
</tr>
<tr>
<td>15&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Removable device bay shelves</td>
<td>The removable device bay shelves can be used to partition the device bays for full or half-height components</td>
</tr>
<tr>
<td>16&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Reusable zip ties for power supplies (single-phase frames only)</td>
<td>Reusable zip ties that help prevent single-phase power cables from disconnecting from the power connectors</td>
</tr>
<tr>
<td>17&lt;sup&gt;3&lt;/sup&gt;</td>
<td>CAT6A cable&lt;sup&gt;1&lt;/sup&gt;</td>
<td>CAT6A cable for cabling frames  &lt;br&gt;• 2-ft cable—Used for cabling two consecutive frames  &lt;br&gt;• 10-ft cable—Used for cabling the top frame to the bottom frame in a rack  &lt;br&gt;• 21-ft cable—Used for cabling management links requiring long runs to TOR</td>
</tr>
<tr>
<td>18&lt;sup&gt;3&lt;/sup&gt;</td>
<td>HPE Synergy Start Here poster</td>
<td>The quick setup poster provides an overview of the installation process.</td>
</tr>
<tr>
<td>19&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Installation instructions for compute modules, options, and interconnects</td>
<td>The printed installation instructions for Synergy components</td>
</tr>
<tr>
<td>20&lt;sup&gt;3&lt;/sup&gt;</td>
<td>HPE Synergy 12000 Frame Rack Template</td>
<td>The printed template for locating the positions of frames, rack rails, and cage nuts in a rack.</td>
</tr>
</tbody>
</table>

<sup>1</sup> Quantity as ordered  
<sup>2</sup> Quantity and type as ordered  
<sup>3</sup> Not shown
Component and LED identification

Information pull tabs

Pull tabs on the HPE Synergy frame front and rear provide system information.

![Diagram of HPE Synergy frame showing pull tab locations]

Figure 1: Information pull tab locations

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The front pull tab (top left) has the frame product ID, serial number, and the device bay numbering for the frame front bays.</td>
</tr>
<tr>
<td>2</td>
<td>The rear pull tab (top left) has the bay numbering for the frame rear bays.</td>
</tr>
</tbody>
</table>
| 3    | The serial label pull tab is on each compute module and provides the following information:  
  • Product serial number  
  • iLO information  
  • QR code that points to mobile-friendly documentation |
Mobile-ready content

The HPE Synergy 12000 Frame includes QR codes that point directly to the mobile-ready documentation from your mobile device.

To access the mobile-ready content, such as setup, installation, user, or troubleshooting documentation, use your mobile device to scan the product-specific QR code.

Mobile QR code locations

Mobile QR codes are located on HPE Synergy components and pull tabs and provide quick and efficient access to product specific content for the component. The QR codes takes you to a page that allows you to browse to the online documentation by choosing an HPE Synergy component.

Frame front components and device bays
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Device bays—Compute modules and storage modules</td>
</tr>
<tr>
<td>2</td>
<td>Front panel—Provides access to the HPE Synergy console, via KVM or laptop.</td>
</tr>
<tr>
<td>3</td>
<td>Appliance bays</td>
</tr>
</tbody>
</table>

**Device bay numbering**

All device bays in the frame are numbered in consecutive order from lowest to highest, from left to right from top to bottom, as observed by a user looking directly at the frame.

Devices larger than half-height (multi-bay devices) are numbered according to the lowest device bay number that the multi-bay device occupies.

For an even number of device modules, they must be installed next to each other between sets of vertical partitions if all device bays in the frame are to be used.

For an odd number of single-wide full-height device modules, an even number must be installed next to each other between each vertical partition, and the odd module must be installed in device bay 2 if all device bays in the frame are to be used.

The device bay numbering is available on the Information pull tabs.

<table>
<thead>
<tr>
<th>Device bay type</th>
<th>Device bay numbering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-wide, full-height</td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>Single-wide, half-height</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12</td>
</tr>
<tr>
<td>Single-wide, mixed-height</td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>Double-wide, full-height</td>
<td>1 3 5</td>
</tr>
<tr>
<td>Double-wide, half-height</td>
<td>1 3 5 7 9 11</td>
</tr>
<tr>
<td>Double-wide, mixed-height</td>
<td>1 3 5 7 9 11</td>
</tr>
</tbody>
</table>
Device bay partitions

Vertical frame partitions

There are two vertical partitions between device bays in the frame. These nonremovable partitions provide structural integrity to the frame as well as mechanical attach points for the horizontal shelf that divide a full-height bay into two half-height bays.

Up to six full-height device modules can be installed in a frame.

![Figure 3: Vertical partitions](image)

Horizontal frame partitions

The horizontal frame partitions are removable shelves that divide a full-height device bay into a half-height device bay.

Up to 12 half-height device modules can be installed in a frame.

![Figure 4: Horizontal partitions](image)

An optional horizontal half shelf can be installed between bay 1 and bay 7 to enable those bays to be used by half-height device modules when a full-height module is installed in bay 2.
Figure 5: Optional horizontal half-shelf

Front panel components

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UID button</td>
<td>Toggles the frame UID on or off.</td>
</tr>
<tr>
<td>2</td>
<td>Frame Health LED</td>
<td>Indicates the highest severity health status of all components within the frame.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solid green—Normal operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Flashing amber—Warning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Flashing red—Critical error</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To resolve critical errors, connect to HPE OneView or to the HPE Synergy Console.</td>
</tr>
</tbody>
</table>

Table Continued
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Laptop port</td>
<td>Provides single laptop access to the frame link module using an RJ-45 Ethernet 100BASE-TX connection.</td>
</tr>
<tr>
<td>4</td>
<td>Monitor port</td>
<td>Provides connectivity for a monitor or an active monitor port adapter to access the HPE Synergy Console.</td>
</tr>
</tbody>
</table>
| 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 blinks 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. |

**Appliance module LEDs and components**

Appliance module LEDs and components are the same for both an HPE Synergy Composer or an HPE Synergy Image Streamer.
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UID LED</td>
<td>Press the UID button to turn on the blue locator LED.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solid blue—Illuminates to locate the appliance module</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Flashing blue—Indicates appliance module firmware update. Do not power off or remove appliance module when the UID LED is flashing.</td>
</tr>
<tr>
<td>2</td>
<td>Health LED</td>
<td>Indicates the health of the appliance module</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solid green—Normal operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Flashing amber—Warning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Flashing red—Critical error</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The appliance Health LED provides health status of the appliance. If the Health LED indicates a warning or a critical error, connect to the Synergy console to troubleshoot.</td>
</tr>
<tr>
<td>3</td>
<td>Activity LED</td>
<td>Indicates which appliance module is active</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Off—Indicates that the appliance module is the standby in a Highly Available configuration or HPE OneView is in an error state.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solid green—Indicates that the appliance module is active.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Flashing green—Indicates that the reset button has been pressed and held for greater than 10 seconds, which initiates a reimaging of the appliance module. The active LED does not continue to flash green during the reimaging process.</td>
</tr>
<tr>
<td>4</td>
<td>Power LED</td>
<td>Indicates power to the appliance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Off—No power. Verify that the appliance module is fully inserted into the frame link module.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Flashing amber—Appliance module is initializing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solid amber—Appliance module is powered off.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solid green—Appliance module is powered on.</td>
</tr>
<tr>
<td>5</td>
<td>Reset button</td>
<td>Using an applicator such as a paper clip, press the recessed button to reset the appliance module.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Press and release—Resets the appliance module.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Press and hold until activity LED is flashing green—Initiates reimaging of the appliance module from files on the USB flash drive plugged into the appliance module.</td>
</tr>
<tr>
<td>6</td>
<td>USB port</td>
<td>USB 3.0 port for connecting a USB drive to flash a USB recovery image.</td>
</tr>
</tbody>
</table>
### Appliance bay numbering

#### Frame rear components

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fans (10)</td>
</tr>
<tr>
<td>2</td>
<td>Interconnect modules (up to 6)</td>
</tr>
<tr>
<td>3</td>
<td>Power supplies (6)</td>
</tr>
<tr>
<td>4</td>
<td>Frame link modules (2)</td>
</tr>
</tbody>
</table>
## Rear component bay numbering

<table>
<thead>
<tr>
<th>Components</th>
<th>Bays</th>
<th>Labels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame link modules</td>
<td>1 and 2</td>
<td></td>
</tr>
<tr>
<td>Interconnect modules</td>
<td>1 and 4</td>
<td></td>
</tr>
<tr>
<td>These interconnect modules are redundant pairs on fabric 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interconnect modules</td>
<td>2 and 5</td>
<td></td>
</tr>
<tr>
<td>These interconnect modules are redundant pairs on fabric 2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interconnect modules</td>
<td>3 and 6</td>
<td></td>
</tr>
<tr>
<td>These interconnect modules are redundant pairs on fabric 3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fans</td>
<td>1 through 10</td>
<td></td>
</tr>
<tr>
<td>Power supplies</td>
<td>1 though 6</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** The arrow direction on each of the power supply icons indicates the recommended power routing to either A-side or B-side. For more information about A-side and B-side power distribution, see "Power cabling."
# Frame link module components and LEDs

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

Table Continued
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>UID button</td>
<td>Toggles the UID LED on or off.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solid blue = Activated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Off = Deactivated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Flashing blue = Firmware upgrade is in progress on the frame link module.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do not remove either frame link module while the UID LED is flashing.</td>
</tr>
<tr>
<td>6</td>
<td>USB</td>
<td>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.</td>
</tr>
<tr>
<td>7</td>
<td>LINK port activity LED</td>
<td>Reports LINK port activity:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Flashing green = Activity on the LINK port</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Off = No activity on the LINK port</td>
</tr>
<tr>
<td>8</td>
<td>LINK port</td>
<td>A 10GBASE-T RJ45 connector that provides two functions:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provides high availability management network connectivity between:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>◦ LINK ports on two frame link modules in the same frame for a single frame configuration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>◦ Frame link modules in different frames as part of a management network ring in a multiframe configuration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provides connectivity as part of a management network ring which connects multiple frames for automatic discovery by HPE OneView.</td>
</tr>
<tr>
<td>9</td>
<td>LINK port connectivity LED</td>
<td>Reports LINK port connectivity:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solid green = LINK port is connected.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Off = LINK port is not connected.</td>
</tr>
<tr>
<td>10</td>
<td>Monitor port</td>
<td>Allows connection to the frame using a monitor device or an active monitor port adapter.</td>
</tr>
</tbody>
</table>

1 The 10GBASE-T MGMT port automatically negotiates speed to 10GbE or 1GbE based on the connection.
Power supply LED

<table>
<thead>
<tr>
<th>Power LED</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>No input power to the power supply or power supply failure. Connect to the HPE Synergy console and check for power supply error messages.</td>
</tr>
<tr>
<td>Solid green</td>
<td>Normal operation</td>
</tr>
<tr>
<td>Flashing amber</td>
<td>Warning. Connect to HPE OneView Hardware Setup to troubleshoot.</td>
</tr>
</tbody>
</table>

Fan LED

<table>
<thead>
<tr>
<th>LED color</th>
<th>Fan status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid green</td>
<td>Normal operation</td>
</tr>
<tr>
<td>Flashing red</td>
<td>Critical. Connect to HPE OneView Hardware Setup to troubleshoot.</td>
</tr>
</tbody>
</table>
Installation

Installing the Synergy system components

Procedure

1. Unpack the system.
2. **Remove components from the frame.**
3. For rack-free installations, set up the frame on an appropriate surface, and then install the frame options.
4. For rack installations, **install the frame into the rack**, and then install the frame options.
5. **Install the frame components** into the frame.
6. Connect the frame components in the frame.
7. Connect the AC power cables and power up the frame.
8. **Configure the frame** using the Composer.

Removing components from the frame

Before installing the frame into the rack, you must remove all of the pre-installed components from the front and rear of the frame. Since a fully-populated frame can weigh up to 249.50 kg (550.00 lb), removing the components from the frame makes moving and installing the frame easier.

With the frame still on the pallet, remove all components from the front and rear of the frame.

**IMPORTANT:** To ensure the correct configuration when installing components, be sure to note the location of each component before removing it from the frame.
Installing the frame in a rack-free environment

⚠️ **WARNING:** To reduce the risk of personal injury or damage to the equipment in a rack-free environment:

- Never stack the frame on top of another frame.
- Never place equipment on top of the frame.
- Never place the frame on a surface that cannot support up to 249.50 kg (550.00 lb).

**Procedure**

1. Select the location for the frame. For more information, see "Rack-free environment requirements."

2. **Remove components from the frame.**

3. Place the frame on a flat, sturdy surface to support the frame.

4. Complete the component installation for your configuration.

Installing the frame in a rack

⚠️ **CAUTION:** Always plan the rack installation so that the heaviest item is on the bottom of the rack. Install the heaviest item first, and continue to populate the rack from the bottom to the top.

**NOTE:** Up to four 10U frames can be installed in a 42U rack. If you are installing more than one frame, install the first frame in the bottom of the rack, and then install additional frames by moving up the rack with each subsequent frame. Plan rack installation carefully because it is difficult to change the location of components after they are installed.
Procedure

1. **Remove components from the frame.**
2. Use the rack template to mark the locations for the rack rails.
3. Install the rack rails and cage nuts for each frame.
   For more information, see the appropriate section according to the type of rack being used.
4. **Install the frame into the rack.**
5. Complete the **component installation** for your configuration.

**Measuring with the rack template**

The *HP Synergy 12000 Frame Rack Template* ships with the frame and provides detailed instructions on where to position the frame and rack rails, and where to install the cage or clip nuts. Each frame kit includes the rack rails recommended for that frame.

**NOTE:** Four cage nuts and four clip nuts are included with the frame. Cage nuts should be used in racks with square holes. Clip nuts should be used in racks with round holes.

When installing multiple frames, install the rack rails and cage nuts for one frame, and then install the frame. Repeat for each additional frame.

**Procedure**

1. Install lower cage nuts (left and right) in the front of the rack at the bottom of the fourth U (10 holes up on the template).
2. Install the upper cage nuts (left and right) in the front of the rack at the bottom of the tenth U (28 holes up on the template).

3. Install the rack rails.

**Installing the rack rails for a square-hole rack**

Rack rails are marked "LEFT" and "RIGHT" for identification. The rail release levers are used only when removing the rail from the rack.
Procedure

1. Begin with the left rack rail. Shorten the rail.

2. Align the rear end of the rail with the rack rear column.

3. Position the rail tabs next to the square openings in the rack rear column.

4. Keeping the rail level, insert the rear rail tabs into the rack rear column, and push the tabs down into place.

5. Extend the front of the rack rail to the rack front column.

6. Position the rail tabs next to the square openings in the rack front column.

7. Insert the front rail tabs into the rack front column and push the tabs down into place.
8. Repeat the procedure for the right rack rail.

The installation is complete.

**Installing the rack rails for a round-hole rack**

**Procedure**

1. Align and install the rails in the rack.

2. Repeat the procedure for the other rail.

To remove the rails, reverse the installation procedure.
Installing the frame into the rack

⚠️ **WARNING:** When lifting the frame with the optional removable handles, always use at least four people to lift the frame into the rack. If the frame is being loaded into the rack above chest level, a fifth person must assist with aligning the frame with the rails while the other four people support the weight of the frame.

**NOTE:** You can install the frame into the rack using a mechanical lift. When using a mechanical lift, two people are required for the frame installation. If you choose the mechanical lift installation, resume the frame installation at step 5.

**Procedure**

1. Attach the lift handles to the frame.
   
   a. Align each lift handle to the frame spools.
   
   b. Press the release button, and then pull the lift handle up until it locks in place.

![Diagram of lift handles being attached](image)

2. Line up the frame with the rack, set the back end of the frame on the rack rails and slide it in.
3. Slide the frame into the rack until the rear lift handles are close to the rack. While still supporting the frame with the front lift handles, remove the rear lift handles from each side of the frame, and then slide the frame halfway into the rack.

4. Slide the frame into the rack until the front lift handles are close to the rack. Remove the front lift handles from each side of the frame, and then slide the frame fully into the rack.
5. Remove the left and right frame bezels from front of the frame by inserting your finger in the hole at the bottom of the frame bezel and pull out and up, then pull the top of the frame bezel away from the frame.

6. Tighten the thumbscrews with a T-25 Torx screwdriver to secure the frame to the rack.
7. Repeat the procedure for the remaining frames.

**NOTE:** Up to four 10U frames can be installed in a 42U rack. If you are installing more than one frame, install the first frame in the bottom of the rack, and then install additional frames by moving up the rack with each subsequent frame. Plan rack installation carefully because it is difficult to change the location of components after they are installed.

---

**Component installation**

The following sections contain installation instructions for the individual frame components. The images included in these instructions are intended to illustrate how the components are installed. These images are not intended to indicate the location for installation. Install the component in the bay from which it was removed earlier in this document.

There is no specific installation order requirement for the frame components, however Hewlett Packard Enterprise recommends installing all front components first, followed by all rear components.

All components must be installed and cabled before you power up the frame.

The frame and components automatically power on when power is connected.

**Installing an appliance module**

The appliance modules have specific population guidelines based on the appliance module and the system configuration. As a best practice, if two appliance modules of the same type exist in any group of linked frames, install the appliance modules in separate frames.

After all components are installed and cabled, be sure to reimage the appliance module before bringing the appliance module into your HPE Synergy configuration. Updating the firmware, ensures that the appliance module is compatible with the HPE Synergy Software Release installed on HPE Synergy. For more information, see Firmware.

**Procedure**

1. If installed, remove the appliance module blank from the appliance bay.
2. Install the first appliance into appliance bay 1. When the appliance is fully seated, it locks into place.

Installing compute modules

Depending on the compute modules for your frame:

- Install **device bay partitions**
- Install a full-height compute module
- Install a half-height compute module

Installing a full-height compute module

The HPE Synergy 12000 Frame ships with three device bay shelves installed to support a 12 half-height compute module configuration. To install a full-height compute module, remove the device bay shelves and corresponding blanks.
Procedure

1. Remove the blanks.

2. **Remove the device bay shelf.**

   **NOTE:** Keep the compute module end caps, blanks, and device bay shelves for future use.

3. Remove the compute module end cap.

4. Prepare the compute module for installation.

5. Prepare the compute module for installation by opening the compute module handle.
6. Install the compute module. Press the compute module handle near each release button to completely close the handle.

**CAUTION:** To prevent improper cooling and thermal damage, do not operate the compute module or the frame unless all device bays are populated with either a component or a blank.

7. Install blanks in any empty bays.

**Removing a device bay shelf**

**Procedure**

1. Press and hold the release latches to release the locking mechanism.
2. Slide the removable shelf out of the frame.
Creating a full-height module bay blank

Procedure

1. Obtain the coupler plate:
   - If you are using a module bay blank that came with the frame, the coupler plate can be found with the contents of the full-height device shipping box.
   - If you are using a device bay blank that you purchased as an option, remove the coupler plate from inside the blank.

2. Fit the coupler plate into the slots on top of the blank, and then slide the coupler plate back until it snaps into place.

3. Fit the slots on the bottom of the second blank on to the coupler plate tabs, and then slide the second blank forward until it snaps in place.
4. Install the full-height blank into the device bay.

Installing a half-height compute module

Procedure

1. Remove the blank.

2. If required, install the device bay shelf.

   **NOTE:** Keep the compute module end caps, blanks, and device bay shelves for future use.

3. Remove the compute module end cap.
4. Prepare the compute module for installation by opening the compute module handle.

5. Install the compute module. Press the compute module handle near the release button to completely close the handle.
Installing a device bay shelf

The frame has a slot and notch on the device bay walls that is used to guide the shelf when inserted.

Procedure

1. Locate the slot and notch shelf guides.

2. Press and hold the latches of the removable shelf and insert into the device bay using the shelf guides.
3. Once fully inserted, release the latches to lock in place.

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. Remove the frame link module end cap.

3. Insert the frame link module into the frame.

4. Close the frame link module latch.
Installing the storage module

Procedure

1. Prepare the storage module for installation by pressing down on the storage module handle release latch, which opens the storage module handle.

   NOTE: The storage module handle arrives packaged in the closed position and must be opened prior to inserting into the frame.

2. Install a storage module by sliding it into the frame. Push the storage module handle to the closed position until it clicks into place.

3. Press the driver drawer release latch and pull out the drawer with the driver drawer release handle.

4. Install a replacement/new drive, and then close the drive drawer.
Installing fans

All ten fans must be populated at all times. There is no required installation order for installing the fans. To install a fan, insert the fan into the frame until it locks into place.

⚠️ **CAUTION:** Use caution to avoid hitting the PCA card edge against the frame. Damage to the fan PCA could result in malfunction of the fan or the frame.

After power is applied to the frame, verify each **fan LED** is green.

Installing interconnect modules

There are six single-wide interconnect bays in the frame. Installation in the interconnect bays depends on the type of mezzanine card installed in the compute module and in which mezzanine slot the mezzanine card was installed.

⚠️ **IMPORTANT:** If the mezzanine card is not installed properly or the interconnect module installation does not coincide with the mezzanine card installation, the ports on the interconnect module will not function.

**NOTE:** For more information on how and where to install mezzanine cards, see the compute module user guide or the system configuration guide.

**Procedure**

1. Review the **interconnect mapping** before selecting the ICM bay to install the interconnect module.
2. If installed, remove the interconnect blank.
3. Remove the interconnect module end cap.

4. Install the interconnect module, and close the release lever.
Interconnect module configurations

The HPE Synergy 12000 Frame supports a pair of redundant interconnect modules for each of the three fabrics. Hewlett Packard Enterprise recommends the following best practices:

- Fabric 1 primary use—Storage
- Fabric 2 primary use—Storage or networking
- Fabric 3 primary use—Networking

**NOTE:** Though each fabric has a recommended primary use, it is not required to use the primary use case. If a fabric is not being used for its primary use, it can still be used for another purpose, within the allowances.

<table>
<thead>
<tr>
<th>Fabric</th>
<th>Usage</th>
<th>ICM description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fabric 1</td>
<td>Storage</td>
<td>HPE Synergy 12Gb SAS Connection Module</td>
</tr>
<tr>
<td>ICM Bays 1 and 4</td>
<td>Storage (Primary)</td>
<td>Brocade 16 Gb/12 Fibre Channel SAN Switch Module for HPE Synergy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fabric 2</td>
<td>Storage</td>
<td>Brocade 16 Gb/12 Fibre Channel SAN Switch Module for HPE Synergy</td>
</tr>
<tr>
<td>ICM Bays 2 and 5</td>
<td>Storage</td>
<td>Brocade 16 Gb/24 Fibre Channel SAN Switch Module for HPE Synergy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table Continued*
<table>
<thead>
<tr>
<th>Fabric</th>
<th>Usage</th>
<th>ICM description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fabric 2</td>
<td>Networking</td>
<td>HPE Synergy 40Gb F8 Switch Module</td>
</tr>
<tr>
<td>ICM Bays 2 and 5</td>
<td></td>
<td>HPE Virtual Connect SE 40Gb F8 Module for HPE Synergy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HPE Synergy 20Gb Interconnect Link Module</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HPE Synergy 10Gb Interconnect Link Module</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HPE Synergy 10Gb Pass-Thru Module</td>
</tr>
<tr>
<td>Fabric 3</td>
<td>Networking</td>
<td>HPE Synergy 40Gb F8 Switch Module</td>
</tr>
<tr>
<td>ICM Bays 3 and 6</td>
<td></td>
<td>HPE Virtual Connect SE 40Gb F8 Module for HPE Synergy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HPE Synergy 20Gb Interconnect Link Module</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HPE Synergy 10Gb Interconnect Link Module</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HPE Synergy 10Gb Pass-Thru Module</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brocade 16 Gb/12 Fibre Channel SAN Switch Module for HPE Synergy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brocade 16 Gb/24 Fibre Channel SAN Switch Module for HPE Synergy</td>
</tr>
</tbody>
</table>

Always adhere to the following guidelines when planning and installing the interconnect modules in HPE Synergy frames:

- The interconnect modules are listed in order of priority from top to bottom within a fabric. For example, if the HPE Synergy 12Gb SAS Connection Module is installed, it is only supported in fabric 1 and therefore, that fabric solution is the first priority for fabric 1. If the HPE Synergy 12Gb SAS Connection Module is not used, then fabric 1 is available to be used by one of the supported HPE Synergy Fibre Channel interconnect modules. For more information about HPE Synergy 12Gb SAS Connection Module configuration, see the HPE Synergy Configuration and Compatibility Guide on the Hewlett Packard Enterprise website ([http://www.hpe.com/info/synergy-docs](http://www.hpe.com/info/synergy-docs)).

- Both ICM bays within a fabric must contain the same interconnect module, unless the fabric is a Master/Satellite fabric. In a Master/Satellite fabric, one or more satellite modules can be used along with a master module to form a fabric.

- All interconnect link modules that comprise a Master/Satellite fabric must be installed in the same interconnect bay number as the corresponding master interconnect module. For example, given a three-frame configuration where the master interconnect module is installed in ICM bay 3 in one frame, the two satellite interconnect link modules in the second and third frames must also be installed in ICM bay 3.

**Master interconnect module with interconnect link module configurations**

The HPE Synergy Virtual Connect SE 40 Gb F8 Module or the HPE Synergy 40Gb F8 Switch Module can be configured as the master switch, with interconnect link modules to support the master interconnect module. For the HPE Synergy 10Gb Interconnect Link Module, from one to four interconnect link modules...
are required to support the master interconnect module. For the HPE Synergy 20Gb Interconnect Link Module, from one to two interconnect link modules are required to support the master interconnect module.

If redundancy is required, then two master switches are required per fabric. For the best availability with two or more frames, the two switches or VC modules should be installed in different frames.

As an example of a redundant fabric 3 solution, one interconnect module or VC module would be installed in ICM bay 3 in one frame and the second interconnect module or VC module would be installed in ICM bay 6 in another frame. ICM bays for the particular fabric that do not contain the interconnect modules or VC modules would contain the interconnect link modules, providing redundancy for either a interconnect module failure or frame failure.

Use one interconnect link cable to connect a 10 Gb interconnect link modules to the switch interconnect. Use two interconnect link cables to connect 20 Gb interconnect link modules to the switch interconnect.

**Mezzanine to frame signal routing**

![Diagram showing mezzanine to frame signal routing]

The HPE Synergy 12000 Frame midplane provides 4-lane high speed signal routing from all 12 device bays to the 6 interconnect module bays. A pair of interconnects installed in an interconnect bay set provide redundant connectivity for each connected mezzanine card. When a device bay contains a compute module, then each of the installed mezzanine cards connect to the corresponding interconnect bay sets.

Usage of these interconnections is dependent on the type of fabric chosen to be installed. For example, a 10Gb Ethernet mezzanine card uses only a single lane of each four-lane group. The SAS fabric uses all four lanes.
Interconnect port mapping

The following compute module device bays map to the interconnect module fabrics. This information is located on the frame pull tabs.

The location of a mezzanine option in the compute module dictates the location of the corresponding interconnect module in the rear of the frame.

Half-height compute module mezzanine connector definitions

NOTE: The compute module hood label includes the exact mezzanine card locations.
### Full-height compute module mezzanine connector definitions

**NOTE:** The compute module hood label includes the exact mezzanine card locations.

<table>
<thead>
<tr>
<th>Item</th>
<th>Mezz slot connector identification</th>
<th>Supported card types</th>
<th>Fabric</th>
<th>Interconnect bay sets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mezzanine slot 1 (M1)</td>
<td>Type C and Type D</td>
<td>1</td>
<td>ICM 1 and 4</td>
</tr>
</tbody>
</table>
| 2    | Mezzanine slot 2 (M2)
|      |                                    | Type C and Type D     | 2      | ICM 2 and 5           |
| 3    | Mezzanine slot 3 (M3)              | Type C only           | 3      | ICM 3 and 6           |
| 4    | Mezzanine slot 4 (M4)              | Type C and Type D     | 1      | ICM 1 and 4           |
| 5    | Mezzanine slot 5 (M5)
|      |                                    | Type C and Type D     | 2      | ICM 2 and 5           |
| 6    | Mezzanine slot 6 (M6)              | Type C                | 3      | ICM 3 and 6           |

1 When installing a mezzanine option in mezzanine slot 2, processor 2 must be installed.

The symbols in the image correspond with symbols on the rear of the frame.

### Installing power supplies

**WARNING:** To reduce the risk of personal injury from hot surfaces, allow the power supply or power supply blank to cool before touching it.
WARNING: To reduce the risk of electric shock or damage to the equipment, do not connect the power cord to the power supply until the power supply is installed.

Procedure

1. Remove the power supply blank, or unplug the power cord and remove the power supply from the frame.

2. Remove the output connector cover from the new power supply.

3. Insert the power supply into the frame until it locks into place. The power supply is marked with TOP to ensure proper orientation during installation.

4. Connect the power cord to the power supply.

5. Secure the power cord using the reusable zip tie attached to the power supply.
6. Connect the power cord to the power source.

7. Check the **power supply LEDs** to determine the status of the power supply.

**Power supply configurations**

Sufficient power supplies must be installed to support the installed devices and interconnect modules. Power estimates for HPE Synergy can be provided using either the HPE Synergy Planning Tool or the HPE Power Advisor. For more information about the HPE Power Advisor or the HPE Synergy Planning Tool, see the Data Center Infrastructure Advisor page ([https://dcia.itcs.hpe.com/](https://dcia.itcs.hpe.com/)).

The number of supported power supplies in the frame range from a minimum of two to a maximum of six power supplies. There are no power supply bay placement restrictions of power supplies in the frame. However, for best cooling and power distribution, Hewlett Packard Enterprise recommends the following best practice for power supply usage.

---

**NOTE:** The default power mode is Redundant power feed mode.

<table>
<thead>
<tr>
<th>Number of power supplies</th>
<th>Power modes</th>
<th>Power supply bay (Power feed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not supported</td>
<td>—</td>
</tr>
<tr>
<td>2</td>
<td>Redundant power supply mode</td>
<td>1(A) and 3(A)</td>
</tr>
<tr>
<td></td>
<td>Redundant power feed mode</td>
<td>1(A) and 3(B)</td>
</tr>
<tr>
<td>3</td>
<td>Redundant power supply mode</td>
<td>1(A), 3(A), and 5(A)</td>
</tr>
<tr>
<td>4</td>
<td>Redundant power supply mode</td>
<td>1(A), 3(A), 4(A), and 6(A)</td>
</tr>
<tr>
<td></td>
<td>Redundant power feed mode</td>
<td>1(A), 3(B), 4(A), and 6(B)</td>
</tr>
<tr>
<td>5</td>
<td>Redundant power supply mode</td>
<td>1(A), 2(A), 3(A), 4(A), and 6(A)</td>
</tr>
<tr>
<td>6</td>
<td>Redundant power supply mode</td>
<td>1(A), 2(A), 3(A), 4(A), 5(A), and 6(A)</td>
</tr>
<tr>
<td></td>
<td>Redundant power feed mode</td>
<td>1(A), 2(A), 3(B), 4(A), 5(B), and 6(B)</td>
</tr>
</tbody>
</table>
If an odd number of power supplies are installed in a frame that is configured for redundant power feed mode, all power supplies are providing power to the frame, but the capacity of the odd power supply is not used to determine the overall power capacity of the frame.

To enhance cooling, populate all power supply bays with either a power supply blank or a power supply. Power supply configuration recommendations for the frame do not depend on the type of power supply being used. However, all power supplies must be of the same type. Mixed-type power supply configurations are not supported.

Installing a DC power supply

⚠️ **WARNING:** To reduce the risk of electric shock, be sure that the cable grounding kit is properly installed and connected to a suitable protective earth terminal before connecting the power source to the frame.

**Prerequisites**

- Be sure that a ground connection to the HPE Synergy 12000 Frame has been properly installed. See Installing the DC power grounding kit or the document that ships with the kit.
- Gather the following tools:
  - Torx T25 screwdriver
  - Crimper

**Procedure**

1. Place the power supply on a flat, level surface.
2. Open the input connector on the new power supply by lifting the input connector cover.
3. Crimp a two-hole lug onto the -48V DC cable.
4. Insert the two-hole lug through the aperture labeled “-48V” on the power supply input connector.
5. Secure the two-hole lug to the -48V DC input connector terminal with two screws.

6. Using a torque-controlled T25 screwdriver, tighten both screws to 15lb-in of torque.
7. Crimp a two-hole lug onto the return cable.
8. Insert the two-hole lug through the aperture labeled "RTN" on the power supply input connector.
9. Secure the two-hole lug to the RTN input connector terminal with two screws.

10. Using a torque-controlled T25 screwdriver, tighten both screws to 15lb-in of torque.
11. Close the input connector cover.
12. Remove the output connector cover from the new power supply.

13. Insert the power supply into the frame until it locks into place. The power supply is marked with TOP to ensure proper orientation during installation.
14. Connect the power cables to the -48V DC power source.

15. Turn on or enable the -48V DC power source.

16. Verify that the power supply LED is green.

Warnings and cautions

⚠️ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the power supply or power supply blank to cool before touching it.

⚠️ **WARNING:** To reduce the risk of electric shock or damage to the equipment, do not connect the power cord to the power supply until the power supply is installed.

⚠️ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the frame unless all bays are populated with either a component or a blank.

Installing the DC power grounding kit (no bracket)

For clarity, the rack is not shown in the images of this procedure.

**Prerequisites**

The following tools are required to complete this procedure:

- T-30 Torx screwdriver
- 8 mm socket wrench

**Procedure**

1. Using one hex thread-forming screw and lock washer, connect the grounding cable to the frame. Tighten the screw to 15lb-in of torque.
2. Using the screw supplied with the rack, connect the grounding cable to the grounding rail.

Installing the DC power grounding kit (with bracket)

For clarity, the rack is not shown in the images of this procedure.

Prerequisites
The following tools are required to complete this procedure:

- T-15 Torx screwdriver
- 8 mm socket wrench

Procedure

1. Using the 2 hex thread-forming screws, install the bracket on the frame.
   Tighten the screws to 15lb-in of torque.
2. Use two nuts to connect the cable to the bracket.

3. Using the screw supplied with the rack, connect the cable to the grounding rail.
Cabling the frame

⚠️ **WARNING:** To reduce the risk of electric shock or injury due to high-current electrical energy, be sure that all power is completely disconnected at the source before beginning any power connections to the power bus bars or power bus box.

⚠️ **WARNING:** Be sure that all circuit breakers are locked in the off position before connecting any power components.

**Procedure**

1. Connect the power cables. Connect to the power source in your facility to each of the installed power supplies, and power up the frame.
   
   For more information, see [Power cabling](#) on page 66.

2. Connect the network cables.
   
   For more information, see [Network cabling](#) on page 58.

3. Connect to the Synergy console.
   
   For more information, see [Connect to the HPE Synergy Console](#) on page 68.
Cabling

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 Image Streamer cabling
- CAT6A patch panel LINK port cabling
- Master to satellite Interconnect cabling
- Power cabling
- HPE Synergy Console cabling

Network cabling

To ensure the frame and installed components are connected to the network, the following connections are required:

- Single-frame management network cabling example on page 58
- Master and satellite interconnect module cabling on page 59

Single-frame management network cabling example

This example shows cabling a single frame with two HPE Synergy Composers and two frame link modules installed in the frame.

NOTE: For high availability, Hewlett Packard Enterprise recommends installing two HPE Synergy Composers.

NOTE: Use a minimum of CAT6A patch cables for LINK port cabling.

NOTE: Do not connect frame link module LINK ports to a data center switch.

Procedure

1. Connect the MGMT ports on both frame link modules to the external management network.
2. Connect the LINK ports together.
Master and satellite interconnect module cabling

HPE Synergy supports a composable fabric that spans multiple frames and includes master interconnect modules (switches) and satellite modules (links). If your HPE Synergy configuration has a composable fabric, Hewlett Packard Enterprise recommends cabling the HPE Synergy Ethernet interconnect modules in a master switch configuration, so that multiple interconnect link modules can support the master interconnect module.

HPE OneView considers all Synergy frames that share the Virtual Connect connectivity through satellite interconnect link modules to be a single Logical Enclosure.

To cable switch modules to interconnect link modules, use the examples that follow or see the installation instructions provided with the interconnect link module.

Master interconnect module with 10G interconnect link module cabling example

1. In a multiframe system, connect either the HPE Synergy 40Gb F8 Switch Module or the HPE Virtual Connect SE 40Gb F8 Module for HPE Synergy as the master to a satellite HPE Synergy 10Gb Interconnect Link Module in a different frame.

Using interconnect link cables, connect the L1, L2, L3, or L4 ports on the master to the L1 port on each satellite.
Figure 7: Cabling the interconnect modules in a five-frame system

2. In a single-frame or multiframe system, connect both masters with two stacking cables:
   a. Connect a stacking cable from port Q7 on the first master to port Q7 on the second module.
   b. Connect a stacking cable from port Q8 on the first master to port Q8 on the second module.

The examples shown use the HPE Virtual Connect SE 40Gb F8 Module for HPE Synergy. The cabling varies depending on the modules being stacked.
Figure 8: Multi-frame stacking example
Figure 9: Single-frame stacking example

Master interconnect module with 10G interconnect link module configuration

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum compute modules</td>
<td>5</td>
<td>Each network is a single physical switch/hop</td>
</tr>
<tr>
<td>Maximum half-height compute modules</td>
<td>60</td>
<td>Each network has 1:1 OSR between servers</td>
</tr>
<tr>
<td>Satellite links (CXP) per interconnect module</td>
<td>1</td>
<td>Each switch can connect to four 10G interconnect link modules</td>
</tr>
<tr>
<td>Stacking ports (QSFP+)</td>
<td>4</td>
<td>Can also be used for non-Flex uplinks</td>
</tr>
<tr>
<td>Uplink ports (QSFP+)</td>
<td>12</td>
<td>Flexports: 4 x 10G, 1 x 40G, 4 x 2/4/8G FC</td>
</tr>
<tr>
<td>Uplink oversubscription</td>
<td>2.25:1</td>
<td>2.25:1 if using only Flexport uplinks</td>
</tr>
<tr>
<td></td>
<td>1.88:1</td>
<td>1.88:1 if also using non-Flex stacking ports as uplinks</td>
</tr>
</tbody>
</table>

Table Continued
### Attribute | Value | Description
---|---|---
Maximum stacked switches | 8 | # of switches (interconnect modules do not count towards limit)

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
</table>
Maximum redundant fabrics per frame | 3 | Redundant fabrics 1, 2, and 3 (A and B)

### Components:¹

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
</table>
Number of switches | 2 |  
Number of 10 G interconnect modules | 8 |  
Number of interconnect link cables | 8 | Cable lengths allow frames to be in different racks  
Number of QSFP+ stacking cables | 2 | In this use case, QSFP+ ports are used for stacking  
Number of 10 G mezzanine cards | 60 | Maximum for 60 compute module (five frame) deployment

¹ Double component counts for two redundant fabrics, and triple component counts for three redundant fabrics.

### Master interconnect module with 20G interconnect link module cabling example

1. **In a multiframe system, connect either the HPE Synergy 40Gb F8 Switch Module or the HPE Virtual Connect SE 40Gb F8 Module for HPE Synergy as the master to a satellite HPE Synergy 20Gb Interconnect Link Module in a different frame:**
   
   a. Using interconnect link cables, connect one of the L1 and L4 ports on the master to the L1 and L2 ports on one satellite.
   
   b. For a three-frame system, use interconnect link cables to connect the L2 and L3 ports on the same master to the L1 and L2 ports on the other satellite.
In a single-frame or multiframe system, connect both masters with two stacking cables:

a. Connect a stacking cable from port Q7 on the first master to port Q7 on the second module.

b. Connect a stacking cable from port Q8 on the first master to port Q8 on the second module.

The examples shown in this section use the HPE Virtual Connect SE 40Gb F8 Module for HPE Synergy. The cabling varies depending on the modules being stacked.
**Figure 12: Single-frame stacking example**

**Master interconnect module with 20G interconnect link module configuration**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum compute modules</td>
<td>3</td>
<td>Each network is a single physical switch/hop</td>
</tr>
<tr>
<td>Maximum half-height compute modules</td>
<td>36</td>
<td>Each network has 1:1 OSR between servers</td>
</tr>
<tr>
<td>Satellite links (CXP) per interconnect module</td>
<td>2</td>
<td>Each switch can connect to two 20 G interconnect link modules</td>
</tr>
<tr>
<td>Stacking ports (QSFP+)</td>
<td>4</td>
<td>Can also be used for non-Flex uplinks</td>
</tr>
<tr>
<td>Uplink ports (QSFP+)</td>
<td>12</td>
<td>Flexports: 4 x 10G, 1 x 40 G, 4 x 2/4/8G FC</td>
</tr>
<tr>
<td>Uplink oversubscription</td>
<td>3:2</td>
<td>3:2 if using only Flexport uplinks</td>
</tr>
<tr>
<td></td>
<td>3:2</td>
<td>3:2 if also using non-Flex stacking ports as uplinks</td>
</tr>
</tbody>
</table>

*Table Continued*
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum stacked switches</td>
<td>8</td>
<td># of switches (interconnect modules do not count towards limit)</td>
</tr>
<tr>
<td>Maximum redundant fabrics per frame</td>
<td>3</td>
<td>Redundant fabrics 1, 2, and 3 (A and B)</td>
</tr>
</tbody>
</table>

**Components:**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of switches</td>
<td>2</td>
</tr>
<tr>
<td>Number of 20 G interconnect modules</td>
<td>4</td>
</tr>
<tr>
<td>Number of interconnect link cables</td>
<td>8</td>
</tr>
<tr>
<td>Number of QSFP+ stacking cables</td>
<td>2</td>
</tr>
<tr>
<td>Number of 20 G mezzanine cards</td>
<td>36</td>
</tr>
</tbody>
</table>

1 Double component counts for two redundant fabrics, and triple component counts for three redundant fabrics

**Power cabling**

The frame can be cabled for power feed redundancy or power supply redundancy.

**Cabling power supplies for power feed redundancy**

Power feed redundancy may be achieved by connecting 1+1, 2+2, or 3+3 power supplies to Phase A+B. To cable a frame for power feed redundancy, use the following recommendation as a best practice:

1. Connect power supplies 1, 2, and 4 to the A-side power distribution unit.
2. Connect power supplies 3, 5, and 6 to the B-side power distribution unit.
3. Verify that the power supply cords are securely connected using the reusable cable tie wraps.

![Cabling Diagram]
After power is supplied to the frame, it powers up automatically. The power and health LEDs on the front panel, Composer appliance, and frame link modules illuminate green to indicate that there are no errors or alert conditions.

**Cabling multiple frames for power feed redundant power**

To cable multiple frames for redundancy using best practices, review the following example of a redundant power feed configuration.

Your configuration can vary depending on the PDUs installed.
Figure 13: Multiframe redundant power feed configuration

Connect to the HPE Synergy Console

You can connect to the HPE Synergy console using a notebook computer or a keyboard, video monitor, and mouse.

The HPE Synergy console provides access to HPE OneView running on an HPE Synergy Composer appliance.

The HPE Synergy console also provides access to the serial console for modules installed within a frame, including management appliances, interconnects, or compute modules. To access the serial console for a module, connect to the HPE Synergy console via ports in the same frame as the module.

When installing an HPE Synergy system, to access HPE OneView, connect to the HPE Synergy console via ports in a frame that has an HPE Synergy Composer appliance. After all frames in an HPE Synergy system have been claimed during hardware setup, you can connect to any frame to access HPE OneView through the HPE Synergy console.
Connecting to the HPE Synergy Console using a keyboard, video monitor, and mouse

**NOTE:** This procedure describes connecting a keyboard and mouse to a monitor with an integrated USB hub. Alternatively, you can use a standalone USB hub to connect a keyboard and mouse.

**Prerequisites**

A frame link module is installed in a frame link module bay.

**Procedure**

1. Connect a monitor cable to the monitor port and connect a USB cable to the USB port on either:
   - The Front panel module on the front of the frame.
   - One of the Frame Link Modules on the rear of the frame.
2. Connect a monitor to the frame with the monitor cable.

3. Connect a USB keyboard and mouse to the USB ports on the monitor, and connect the monitor USB to the frame with the USB cable.
   An alternative is to connect the USB keyboard and mouse to a USB hub connected to the frame.

Connecting to the HPE Synergy Console using a laptop computer

NOTE: Do not plug the front panel laptop port into a switch. The front panel laptop port is designed to provide a single laptop access to HPE Synergy Console.

Prerequisites
At least one frame link module is installed in one of the frame link module bays.

Procedure
1. Ensure that the Ethernet port of the laptop computer is configured for DHCP.
   Alternatively, you can configure the laptop Ethernet port to the IP address: 192.168.10.2 with the subnet mask 255.255.255.0.

2. Use a CAT5 cable to connect the laptop computer Ethernet port to the laptop port on a front panel module.
3. Wait for the laptop computer to be assigned an IP address from the frame link module.

4. Access the HPE Synergy Console using either a VNC client or web browser.
   a. Web browser: Open a web browser and enter "http://192.168.10.1:5800".
   b. VNC client: Open a VNC client and connect to 192.168.10.1 port 5900.

A VNC client will load to the web browser and open the HPE Synergy Console.
Firmware

Reimage the appliance module

Before performing a first-time setup of an HPE Synergy appliance module, you must update the appliance module firmware. By updating the firmware on the appliance module, you ensure that it is compatible with the HPE Synergy software release.

When setting up HPE Synergy for the first time, the appliance firmware must be compatible with the HPE Synergy software release that is selected. When installing an appliance module in an existing HPE Synergy, then the following must be true:

• The appliance module firmware is compatible with the HPE Synergy software release on HPE Synergy.
• The appliance module firmware is the same version installed on other appliance modules of the same type installed in HPE Synergy.

For more information, see Validating HPE Synergy appliance firmware on the Hewlett Packard Enterprise website (http://www.hpe.com/info/synergy-fw-validation).

Updating the firmware for the frame components

After all the hardware components are installed and connected to power, update the firmware on all components as required. Some components, such as appliance modules and compute modules, have specific requirements to ensure compatibility.

When installing new appliance modules in a frame that will be added to an existing management ring, always update the appliance module firmware to match the firmware version of the other appliance modules in the management ring. For more information, see Validating HPE Synergy appliance firmware on the Hewlett Packard Enterprise website (http://www.hpe.com/info/synergy-fw-validation).

For more information about updating the firmware for HPE Synergy, see the Best Practices for HPE Synergy Firmware and Driver Updates on the Hewlett Packard Enterprise website (http://www.hpe.com/info/synergy-docs).
Configuring HPE Synergy

Configuring the frame overview

Procedure

1. Verify the component installation is complete.
   Review the component health on the Synergy Console Frame Health & Inventory screen.

2. Verify the frame is cabled.
   For more information, see "Cabling the frame on page 57."
   To test management port connections in the a ring, perform a MGMT Port Test. For more information, see the HPE Synergy Frame Link Module User Guide at http://www.hpe.com/info/synergy-docs.

3. Verify the frame is powered up.

4. Connect to HPE OneView through the HPE Synergy console.
   To access the Synergy console, you must connect locally to a frame with a Composer installed. For more information, see "Connect to the HPE Synergy Console on page 68."

5. Use HPE OneView to verify the hardware installation.
   For more information, see "Verifying installation using HPE OneView on page 75."

6. Complete the hardware setup in HPE OneView.

Synergy Console Frame Health & Inventory screen

The Frame Health & Inventory screen displays the health status of all components in a frame.
1. Navigation menu - Breadcrumb navigation menu.

2. **Frame Health** - Provides the overall frame health status. Statuses include:
   - OK
   - Warning
   - Critical

3. **Information** - Provides detailed frame information including real-time power and temperature readings.

4. **Network** - Provides the network address for a connected frame.

5. **Frame Link Module Ports** - Displays the frame link module MGMT and LINK port information for the Active and Standby frame link modules.

6. **FLM Certificates** - Displays the frame link module public certificates and keys.
### Item Description

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td><strong>Frame rear view</strong> - Displays the components installed in the rear of the frame and the health status of each component. Each component can be clicked to view individual component health and information screens.</td>
</tr>
<tr>
<td>8</td>
<td><strong>Frame front view</strong> - Displays the components installed in the front of the frame and the health status of each component. Each component can be clicked to view individual component health and information screens.</td>
</tr>
<tr>
<td>9</td>
<td><strong>Actions menu</strong> - provides access to management and diagnostic actions.</td>
</tr>
<tr>
<td>10</td>
<td><strong>Help screen</strong> - Provides a description of the HPE Synergy Console icons and access to the frame link module end-user license agreement.</td>
</tr>
</tbody>
</table>

### Verifying installation using HPE OneView

**Procedure**

1. From the Synergy Console, click **Connect** to start HPE OneView.

2. To connect with install technician user privileges, click **Hardware Setup**.
   To connect as Administrator, select the **Administrator access** check box.

3. Review the hardware inventory.

   - **NOTE**: A spinning icon at the top of the inventory section indicates when HPE OneView is bringing the enclosures and the devices within them under management. Devices might not be listed until the discovery process is complete.
Wait for HPE OneView to complete the add operation.

b. Confirm that the inventory includes all installed components.

c. For any hardware not discovered by HPE OneView, look for problems with frame link module cabling, hardware not fully inserted, or other hardware issues.

4. Review and correct any issues listed in the Hardware Setup Checklist.

a. To troubleshoot all issues, follow corrective actions in HPE OneView.

b. Return to the Hardware Setup screen and check for additional issues until the Checklist indicates Setup complete.

For more information about using HPE OneView, see the online help by clicking the question mark on the top bar of the Synergy console.

5. (Optional) Select Edit networking from the Hardware Setup screen.

Edit the HPE OneView networking settings and click OK. The Maintenance IP address fields are required unless you have disabled service console access.

6. To add a remote enclosure, select Actions > Add remote enclosures from the Hardware Setup screen.

Enter the IPv6 address of a frame link module that is connected to a frame in the remote frame link topology. The remote frame link topology must be in the same subnet as the primary frame link topology.

7. Unmanaged interconnect modules require console access for initial setup. Click the Actions menu on the top bar of the Synergy console and select the module from the Serial Consoles > Interconnects menu. Press the Enter key to begin the serial console session with that interconnect module. Configure the interconnect module using the instructions provided with the module. To close the session, click the X in the top right corner.

NOTE: To access the serial console for an interconnect module, connect to the Synergy console through ports in the same frame as the module. For more information, see the procedures for connecting to the Synergy console.

8. Log out from the HPE OneView Hardware Setup session.

To close the session, click the X in the top right corner of the Synergy console.

After hardware setup is complete, the system is ready to be configured for a production environment. An HPE OneView administrator can perform configuration tasks with an account that provides additional user privileges.

For more information about HPE OneView administration, see the HPE OneView online help or the HPE OneView User Guide for Synergy.

For operating system deployment options on HPE Synergy, see the HPE Synergy 12000 Frame Setup and Installation Guide.

Configure HPE Synergy Image Streamer

HPE Synergy Image Streamer can be used to deploy OS build artifacts to the Synergy compute modules. However, it must be installed and configured within HPE OneView.
**Procedure**

1. Create a management network that is consistent with the HPE OneView management network.

2. Add an IPv4 subnet and address range.
   - Define the range of IPv4 addresses and subnets to set aside for each Image Streamer appliance in the frame link topology, plus the number of operating system servers expected to be deployed.

3. Add an OS deployment server for use in HPE OneView to deploy operating systems to managed servers.

4. Create a deployment network to enable operating system deployment to servers using Image Streamer.

5. Create one or more logical interconnect groups to define the connections between Image Streamer appliances and the servers they will support.

6. Create an enclosure group that includes the Image Streamer configuration.

7. Create a logical enclosure to define the set of frames to which to apply the Image Streamer enclosure group.

For more information about configuring HPE Image Streamer, see the HPE OneView online help or the [HPE OneView User Guide](http://www.hpe.com/info/synergy-docs) on the Hewlett Packard Enterprise website.

**Configuring HPE OneView to deploy OS build artifacts to compute modules**

Once you add an Image Streamer OS deployment server in HPE OneView, you can launch the Image Streamer graphical user interface from the HPE OneView OS Deployment Servers screen.

**Procedure**

1. Upload artifacts from a bundle or create new artifacts.
   - From the Image Streamer interface, the software administrator can upload artifacts from a bundle for use in HPE OneView or use the Image Streamer interface to create golden images and other OS build artifacts.

2. Create or configure a server profile.
   - Create and apply a server profile which includes an OS deployment selection and values for the server-specific settings for the selected OS deployment.

3. Verify operating system deployment.
   - Review server profile screen details to view the operating system volume that has been created as a result of deployment.

4. Power on the compute module.
   - Power on server to boot from deployed operating system.

For more information about using Image Streamer to create and deploy OS build artifacts, see the Image Streamer online help or the [HPE Image Streamer User Guide](http://www.hpe.com/info/synergy-docs) on the Hewlett Packard Enterprise website.
Troubleshooting

Error screens when connecting to the Synergy console

The following are some basic errors screens that may be encountered when connecting to the Synergy console.

Synergy Composer not responding

If the frame Composers are detected but not responding after 20 minutes, the following Attention screen appears, and prompts a Reset.

Select Reset. HPE OneView resets and attempts again to boot the frame Composers.
Frame not claimed by a Synergy Composer

When the frame is not claimed by a Synergy Composer, the following Attention screen appears. To resolve, connect to the front panel display of a frame that contains a Synergy Composer.
Synergy console cannot connect to HPE OneView

If the Synergy console cannot connect to HPE OneView, the following Attention screen appears.
If you are unable to connect to HPE OneView, perform the following troubleshooting solutions.

Procedure

1. Connect to the Synergy console through a different frame.
2. Reconnect to HPE OneView.
3. Verify there are no more than three live HPE OneView sessions within the management network. Any initiated sessions after three will not be able to connect to HPE OneView.

Synergy console also has icons available for further navigation. For more information, see "Synergy console icons."

**Synergy console icons**

The icons in the top right help to navigate.

- **Question Mark** icon - Select this icon to access the basic Synergy console help screen.

  ![Synergy 12000 Frame](#)

  To hide or display the top caption bar, press F10

  For assistance in using OneView, see the OneView online help.

  **Buttons**

  - **Connect**
    - Click Connect to start OneView.
    - Use the Hardware Setup Button for installation & diagnostics.
  
  - **i**
    - Click to access the serial console menu. Select device type and bay. Press enter in terminal window to activate console. For device serial consoles, press <ESC> to access the iLO command line and <ESC>Q to exit.
  
  - **Link Module**
    - Click to view Link Module Firmware version & Device iLO IPv6 link-local addresses.

  - **Help**
    - Click to view Synergy Console Help, this page.
    - Click to close the current window.

  ![Copyright © 2016 Hewlett-Packard Development Company, L.P.](#)

- **i** icon - Select this icon to access the Information screen. The local frame information, including firmware version and discovered hardware components within the frame are displayed.
• **Screen** icon - Select this icon to access the hardware components discovered by the Synergy console, including Appliances, Interconnects, and Devices. Empty bays are represented by the grayed out "--" symbol, and components that are discovered but not managed by a serial port are grayed out and disabled.
• **Serial console** - To access the serial console:
  1. Select one of the hardware components from the Screen icon to access the serial console for that component.

Click "Connect" to start OneView.

Connect
2. Press Enter or another key on the keyboard to activate the console, if needed. Once activated, the console will begin to display data for the hardware component.

- Keyboard shortcuts - These include:

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<th>Action</th>
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</thead>
<tbody>
<tr>
<td>F10</td>
<td>Show or hide the top caption bar</td>
</tr>
<tr>
<td>Ctrl +</td>
<td>Zoom in</td>
</tr>
<tr>
<td>Ctrl -</td>
<td>Zoom out</td>
</tr>
<tr>
<td>Ctrl =</td>
<td>Zoom default settings</td>
</tr>
<tr>
<td>Ctrl Insert</td>
<td>Copy selected text</td>
</tr>
<tr>
<td>Shift Insert</td>
<td>Paste selected text</td>
</tr>
</tbody>
</table>

**Issues during installation**

During the hardware setup, any installation errors are returned on the final checklist. See the following image as an example:

- ⚠—Indicates a critical error that must be corrected.

- ⚠—Indicates a warning that can be corrected, but is not mandatory. For hardware issues, this warning could mean that redundancy has been lost and additional failures would cause a loss of service.
To correct the errors that appear, select the hyperlink to the right of the suggested corrective action, and then follow any additional steps suggested on the screen.

### HPE Synergy console

The HPE Synergy console is available from a direct connection to the frame if the HPE OneView user interface cannot be accessed. The functions available in the console might require specific user credentials.

The HPE Synergy console provides users the ability to troubleshoot issues within the frame and complete regular maintenance on the installed appliances. From the HPE Synergy console, you can:

- View appliance details
- Restart or shutdown an appliance
- Activate an offline appliance.
- **Create a support dump file.**
- Reset the appliance password.
- Factory reset the appliance.
- Launch service console.

For more information about the HPE Synergy console, see the HPE Synergy 12000 Frame Maintenance and Service Guide or the HPE OneView User Guide on the Hewlett Packard Enterprise website.

### Accessing the HPE OneView maintenance console from the frame link module

To access the HPE OneView maintenance console from the frame link module:

1. Open the HPE Synergy console.
2. Connect to the frame.
3. Select the HPE OneView maintenance console.
4. Follow the on-screen instructions to access the maintenance console.

Troubleshooting 85
Procedure

1. Connect locally to the HPE Synergy console.
2. Select the Screen icon at the top right of the page.
3. Select an HPE Synergy Composer appliance from the Appliances menu.
   A blank text window appears.
4. Press Enter.
5. At the login prompt, log in using the username: maintenance.
   The HPE OneView maintenance console opens.

For additional instructions on using the HPE OneView maintenance console, see the HPE OneView User Guide for HPE Synergy on the Hewlett Packard Enterprise website.

Connecting to the HPE OneView maintenance console using SSH

NOTE: Hewlett Packard Enterprise recommends the use of these tools for accessing the HPE OneView maintenance console through an SSH connection:

- PuTTY
- MTPuTTY
- vSphere/vCenter Console (HPE BladeSystem c7000)
- Hyper-V console (HPE BladeSystem c7000)

Access the appliance console using this procedure:

Procedure

1. Open one of the recommended tools on your local computer.
2. Access the appliance by specifying its fully qualified domain name or its IP address.
3. Enter the user name maintenance at the login prompt.
4. Log in to the HPE OneView maintenance console.
5. Provide the local administrator credentials when prompted.

Creating a support dump file

This procedure describes how to use the HPE Synergy maintenance console to create a support dump file from the local appliance (the appliance on which the HPE Synergy maintenance console runs) and store it on a USB drive.

If the local appliance is the active appliance in an appliance cluster and if the standby appliance is reachable, the support dump contains the data for both cluster members. Otherwise, a support dump is created with data for the local appliance only.

The support dump file is encrypted by default.
**CAUTION:** Creating the support dump file overwrites any existing backup file on the appliance. If possible, refrain from creating a support dump if you have not copied the backup file to an external location for safekeeping.

**Prerequisites**

- Minimum required privileges: Infrastructure administrator
- Use a USB 2.0 or 3.0 device drive, formatted as an NTFS or FAT32 file system and with only one partition. If necessary, use a computer to format the USB drive.
- The USB drive must have enough free space (typically 1 GB to 4 GB) to store the support dump file.

**Creating a support dump file from the HPE Synergy maintenance console**

**Procedure**

1. Ensure that the USB drive is installed in the USB port of the local appliance.

   **IMPORTANT:** Do not remove the USB drive until the operation is complete and the Synergy maintenance console advises that it is safe to remove the drive.

2. Use the appliance console to access the HPE Synergy maintenance console main menu.

3. Select **Support dump**.

   A new set of commands appears.

4. Do one of the following:
   - Select **Create support dump** to create a support dump and copy it to the USB drive.
   - Select **Download existing support dump** to copy a support dump from the appliance to the USB drive.

5. Wait until the support dump file is copied. There is a message on the screen stating that the support dump was successfully completed and that it is safe to remove the USB drive.

**Resetting to factory settings**

In the event that you need to reset settings to their original factory status, the following options are available:

- **Resetting the appliance to the original factory settings** on page 87
- **Performing a frame link module factory reset** on page 89

**Resetting the appliance to the original factory settings**

A factory reset restores the appliance to the original factory settings. It does not change the installed firmware version.

You have the option of preserving or erasing the appliance network settings. A factory reset with preserved network settings is necessary for recovering an HPE Synergy Composer from an unrecoverable error state. This option clears most faults so that you can restore the appliance from a backup file.
You might need to reset the appliance either to decommission it (so that you can migrate the hardware) or to return the appliance to a known state for reuse (for example, to restore the appliance from a backup file).

⚠️ **CAUTION:** This action erases appliance data including logs. REST API calls and GUI operations are not allowed during the reset action.

In an appliance cluster, both the active appliance and the standby appliance are reset.

**Prerequisites**

- Minimum required privileges: Infrastructure administrator
- When resetting or reimaging a Composer to a factory-fresh state, you must also reset all the frames managed by that Composer to their factory-fresh state. However, if you intend to restore the Composer settings from a backup after it is reset or reimaged, you do not need to reset all the frames.

⚠️ **IMPORTANT:** To reset the whole system to a factory-fresh state, you must also perform a factory reset on all the frames in the domain.

If you intend to restore the system from a backup file, you do not need to perform a factory reset of all the frames. Restoring the system from the backup file restores the frames to management.

- Ensure that all tasks have been completed or stopped, and that all other users are logged off.

**Procedure**

1. If you are decommissioning the appliance and its managed environment, remove all hardware from HPE OneView management, for example:
   - Delete or un-assign all server profiles.
   - Delete all logical enclosures.
   - Delete any storage volumes allocated within HPE OneView.
   - Reset managed devices (configured through IP address pools) to default IP addressing

2. From the main menu, select **Settings**, and then click **Appliance**.

3. Select **Actions > Factory Reset**.

4. Select the appropriate option:
   - Reset to factory defaults while preserving appliance network settings—Use this option to erase the appliance data without losing network connectivity, for example, for rebuilding the appliance.
   - Full appliance factory reset to defaults—Use this option to prepare a system when returning or discarding appliance hardware, or when completely reusing a new appliance with new communication settings.

⚠️ **IMPORTANT:** This option can cause you to lose your network connection to the appliance. Therefore, you must access the appliance using its IPv6 link local address.

This action displays a progress bar while it is running. Logins are disabled automatically. When the appliance reset is completed after several minutes, you can log in and set up your appliance as you did for the first time.
Performing a frame link module factory reset

NOTE: This procedure only factory resets the frame link modules installed in the frame. It does not factory reset any other components installed in the frame.

NOTE: The frame link module can be factory reset by pressing the front panel reset button until the front panel UID flashes or by using the HPE Synergy Console Actions menu. Hewlett Packard Enterprise recommends using the HPE Synergy Console to perform a factory reset.

Procedure

1. Connect to the HPE Synergy Console.
2. Select Actions > FLM Diagnostics > Factory Reset.
   
   A progress bar displays.
Documentation and troubleshooting resources for HPE Synergy

HPE Synergy documentation

The Hewlett Packard Enterprise Information Library (www.hpe.com/info/synergy-docs) is a task-based repository. It includes installation instructions, user guides, maintenance and service guides, best practices, and links to additional resources. Use this website to obtain the latest documentation, including:

- Learning about HPE Synergy technology
- Installing and cabling HPE Synergy
- Updating the HPE Synergy components
- Using and managing HPE Synergy
- Troubleshooting HPE Synergy

HPE Synergy Configuration and Compatibility Guide

The HPE Synergy Configuration and Compatibility Guide is in the Hewlett Packard Enterprise Information Library (www.hpe.com/info/synergy-docs). It provides an overview of HPE Synergy management and fabric architecture, detailed hardware component identification and configuration, and cabling examples.

HPE Synergy Frame Link Module User Guide

The HPE Synergy Frame Link Module User Guide is in the Hewlett Packard Enterprise Information Library (www.hpe.com/info/synergy-docs). It outlines frame link module management, configuration, and security.

HPE OneView User Guide for HPE Synergy

The HPE OneView User Guide for HPE Synergy is in the Hewlett Packard Enterprise Information Library (www.hpe.com/info/synergy-docs). It describes resource features, planning tasks, configuration quick start tasks, navigational tools for the graphical user interface, and more support and reference information for HPE OneView.

HPE OneView Global Dashboard

The HPE OneView Global Dashboard provides a unified view of health, alerting, and key resources managed by HPE OneView across multiple platforms and data center sites. The HPE OneView Global Dashboard User Guide is in the Hewlett Packard Enterprise Information Library (www.hpe.com/info/synergy-docs). It provides instructions for installing, configuring, navigating, and troubleshooting the HPE OneView Global Dashboard.

HPE Synergy Image Streamer User Guide

The HPE Synergy Image Streamer User Guide is in the Hewlett Packard Enterprise Information Library (www.hpe.com/info/synergy-docs). It describes the OS deployment process using Image Streamer, features of Image Streamer, and purpose and life cycle of Image Streamer artifacts. It also includes authentication, authorization, and troubleshooting information for Image Streamer.
HPE Synergy Image Streamer GitHub

The HPE Synergy Image Streamer GitHub repository (github.com/HewlettPackard) contains sample artifacts and documentation on how to use the sample artifacts. It also contains technical white papers explaining deployment steps that can be performed using Image Streamer.

HPE Synergy Software Overview Guide

The HPE Synergy Software Overview Guide is in the Hewlett Packard Enterprise Information Library (www.hpe.com/info/synergy-docs). It provides detailed references and overviews of the various software and configuration utilities to support HPE Synergy. The guide is task-based and covers the documentation and resources for all supported software and configuration utilities available for:

- HPE Synergy setup and configuration
- OS deployment
- Firmware updates
- Troubleshooting
- Remote support

Best Practices for HPE Synergy Firmware and Driver Updates

The Best Practices for HPE Synergy Firmware and Driver Updates is in the Hewlett Packard Enterprise Information Library (www.hpe.com/info/synergy-docs). It provides information on how to update the firmware and recommended best practices to update firmware and drivers through HPE Synergy Composer, which is powered by HPE OneView.

HPE OneView Support Matrix for HPE Synergy

The HPE OneView Support Matrix for HPE Synergy is in the Hewlett Packard Enterprise Information Library (www.hpe.com/info/synergy-docs). It maintains the latest software and firmware requirements, supported hardware, and configuration maximums for HPE OneView.

HPE Synergy Image Streamer Support Matrix

The HPE Synergy Image Streamer Support Matrix is in the Hewlett Packard Enterprise Information Library (www.hpe.com/info/synergy-docs). It maintains the latest software and firmware requirements, supported hardware, and configuration maximums for HPE Synergy Image Streamer.

HPE Synergy Glossary

The HPE Synergy Glossary, in the Hewlett Packard Enterprise Information Library (www.hpe.com/info/synergy-docs), defines common terminology associated with HPE Synergy.

HPE Synergy troubleshooting resources

HPE Synergy troubleshooting resources are available within HPE OneView and in the Hewlett Packard Enterprise Information Library (www.hpe.com/info/synergy-docs).

Troubleshooting within HPE OneView

HPE OneView graphical user interface includes alert notifications and options for troubleshooting within HPE OneView. The UI provides multiple views of HPE Synergy components, including colored icons to indicate resource status and potential problem resolution in messages.
You can also use the Enclosure view and Map view to quickly see the status of all discovered HPE Synergy hardware.

**HPE Synergy Troubleshooting Guide**

The *HPE Synergy Troubleshooting Guide* is in the Hewlett Packard Enterprise Information Library ([www.hpe.com/info/synergy-docs](http://www.hpe.com/info/synergy-docs)). It provides information for resolving common problems and courses of action for fault isolation and identification, issue resolution, and maintenance for both HPE Synergy hardware and software components.

**Error Message Guide for HPE ProLiant Gen10 servers and HPE Synergy**

The *Error Message Guide for HPE ProLiant Gen10 servers and HPE Synergy* is in the Hewlett Packard Enterprise Information Library ([www.hpe.com/info/synergy-docs](http://www.hpe.com/info/synergy-docs)). It provides information for resolving common problems associated with specific error messages received for both HPE Synergy hardware and software components.

**HPE OneView Help and HPE OneView API Reference**

The *HPE OneView Help* and the *HPE OneView API Reference* are readily accessible, embedded online help available within the HPE OneView user interface. These help files include “Learn more” links to common issues, as well as procedures and examples to troubleshoot issues within HPE Synergy.

The help files are also available in the Hewlett Packard Enterprise Information Library ([www.hpe.com/info/synergy-docs](http://www.hpe.com/info/synergy-docs)).

**HPE Synergy QuickSpecs**

HPE Synergy has system specifications as well as individual product and component specifications. For complete specification information, see the HPE Synergy and individual HPE Synergy product QuickSpecs on the Hewlett Packard Enterprise website ([www.hpe.com/info_qs](http://www.hpe.com/info_qs)).
HPE Synergy document overview (documentation map)

www.hpe.com/info/synergy-docs
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Specifications

HPE Synergy QuickSpecs

HPE Synergy has system specifications as well as individual product and component specifications. For complete specification information, see the HPE Synergy and individual HPE Synergy product QuickSpecs on the Hewlett Packard Enterprise website (www.hpe.com/info/qs).
Electrostatic discharge

Be aware of the precautions you must follow when setting up the system or handling components. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the system or component.

To prevent electrostatic damage:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:
  - Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megalohm ±10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
  - Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
  - Use conductive field service tools.
  - Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an authorized reseller install the part.

For more information on static electricity or assistance with product installation, contact an authorized reseller.
Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:
  http://www.hpe.com/assistance
- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:
  http://www.hpe.com/support/hpesc

Information to collect

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.
- To download product updates:
  Hewlett Packard Enterprise Support Center
  www.hpe.com/support/hpesc
  Hewlett Packard Enterprise Support Center: Software downloads
  www.hpe.com/support/downloads
  Software Depot
  www.hpe.com/support/softwaredepot
- To subscribe to eNewsletters and alerts:
  www.hpe.com/support/e-updates
- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center More Information on Access to Support Materials page:
  www.hpe.com/support/AccessToSupportMaterials
IMPORTANT: Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HPE Passport set up with relevant entitlements.

Customer self repair

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or go to the CSR website:

http://www.hpe.com/support/selfrepair

Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product's service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

If your product includes additional remote support details, use search to locate that information.

Remote support and Proactive Care information
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HPE Proactive Care service: Supported products list
www.hpe.com/services/proactivecaresupportedproducts
HPE Proactive Care advanced service: Supported products list
www.hpe.com/services/proactivecareadvancedsupportedproducts

Proactive Care customer information
Proactive Care central
www.hpe.com/services/proactivecarecentral
Proactive Care service activation
www.hpe.com/services/proactivecarecentralgetstarted

Warranty information

To view the warranty for your product or to view the Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products reference document, go to the Enterprise Safety and Compliance website:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional warranty information
HPE ProLiant and x86 Servers and Options
www.hpe.com/support/ProLiantServers-Warranties
HPE Enterprise Servers
www.hpe.com/support/EnterpriseServers-Warranties
Regulatory information

To view the regulatory information for your product, view the Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products, available at the Hewlett Packard Enterprise Support Center:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional regulatory information

Hewlett Packard Enterprise is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (Regulation EC No 1907/2006 of the European Parliament and the Council). A chemical information report for this product can be found at:

www.hpe.com/info/reach

For Hewlett Packard Enterprise product environmental and safety information and compliance data, including RoHS and REACH, see:

www.hpe.com/info/ecodata

For Hewlett Packard Enterprise environmental information, including company programs, product recycling, and energy efficiency, see:

www.hpe.com/info/environment

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Acronyms and abbreviations

CSA
Canadian Standards Association
CSR
Customer Self Repair
DHCP
Dynamic Host Configuration Protocol
ESD
electrostatic discharge
IEC
International Electrotechnical Commission
iLO
Integrated Lights-Out
iLO 4
Integrated Lights-Out 4
iPDU
Intelligent Power Distribution Unit
PCIe
Peripheral Component Interconnect Express
PDU
power distribution unit
RETMA
Radio Electronics Television Manufacturers Association (rack spacing)
RoHS
Restriction of Hazardous Substances
SAS
serial attached SCSI
TMRA
recommended ambient operating temperature
UID
unit identification
UPS
uninterruptible power system
USB
universal serial bus