HP LeftHand P4500 and P4300

1GbE to 10GbE migration instructions
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This guide provides information about migrating bonded interfaces in an existing cluster from 1GbE to 10GbE.
Instructions for migrating bonded interfaces in a SAN/iQ cluster from 1GbE to 10GbE Ethernet

Overview

The 10GbE feature option adds 10GbE over CX4 cabling to the HP LeftHand P4300 and HP LeftHand P4500 platforms. This is an add-on feature to the standard 1GbE dual Ethernet adapters built into the system boards of the P4300 and P4500. After the 10GbE dual port Ethernet adapter is installed and configured, users see 4 Ethernet interfaces listed in the Centralized Management Console (CMC) TCP/IP Network tab window. These 4 interfaces can be bonded a number of ways for redundancy and failover.

Bonding 10GbE interfaces

After installing the 10GbE Ethernet upgrade, you have a choice of supported bond configurations. Note that not all the bond configurations which are supported by the HP LeftHand Storage Solution are supported with the 10GbE upgrade. We recommend using the Active-Passive bond configuration with the 10GbE interface as the active primary interface and the 1GbE interface as the passive failover interface.

Supported bonds with 10GbE

The HP LeftHand P4300 and HP LeftHand P4500 with the 10GbE feature installed and configured now supports these new bond types.

- Active-Passive bond with 1GbE NIC and 10GbE NIC
- Adaptive Load Balancing (ALB) bond with the two 10GbE Ethernet NICs
- Active-Passive bond with two 10GbE Ethernet NICs
- Link Aggregation Dynamic Mode (802.3ad) bond with two 10GbE Ethernet NICs

Unsupported bonds with 10GbE

The HP LeftHand P4300 and HP LeftHand P4500 with the 10GbE feature installed and configured do not support these bond types.

- ALB with 1GbE Ethernet NIC and 10GbE Ethernet NIC
- 802.3ad with 1GbE Ethernet NIC and 10GbE Ethernet NIC
- Bonding 3 ports or all 4 ports (two 1GbE Ethernet & two 10GbE Ethernet)
• Bonding two bonds

### Table 1 HP LeftHand P4300 and HP LeftHand P4500 - possible 1GbE and 10GbE Ethernet bonds

<table>
<thead>
<tr>
<th>Motherboard:Port1 (1GbE)</th>
<th>Motherboard:Port2 (1GbE)</th>
<th>eth2 (10GbE)</th>
<th>eth3 (10GbE)</th>
<th>SAN/iQ interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disabled</td>
<td>Disabled</td>
<td>Enabled</td>
<td>Disabled</td>
<td>eth2</td>
</tr>
<tr>
<td>Disabled</td>
<td>Disabled</td>
<td>Enabled</td>
<td>Enabled</td>
<td>eth2</td>
</tr>
<tr>
<td>Disabled</td>
<td>Disabled</td>
<td>Enabled</td>
<td>Enabled</td>
<td>eth3</td>
</tr>
<tr>
<td>Disabled</td>
<td>Disabled</td>
<td>ALB Bond</td>
<td>ALB Bond</td>
<td>Bond</td>
</tr>
<tr>
<td>Disabled</td>
<td>Disabled</td>
<td>802.3ad bond</td>
<td>802.3ad bond</td>
<td>Bond</td>
</tr>
<tr>
<td>Disabled</td>
<td>Disabled</td>
<td>Bond (Active)</td>
<td>Bond (Passive)</td>
<td>Bond</td>
</tr>
<tr>
<td>Bond (Passive)</td>
<td>Disabled</td>
<td>Bond (Active)</td>
<td>Disabled</td>
<td>Bond</td>
</tr>
<tr>
<td>Bond (Passive)</td>
<td>Disabled</td>
<td>Disabled</td>
<td>Bond (Active)</td>
<td>Bond</td>
</tr>
<tr>
<td>Disabled</td>
<td>Bond (Active)</td>
<td>Bond (Active)</td>
<td>Disabled</td>
<td>Bond</td>
</tr>
<tr>
<td>Disabled</td>
<td>Bond (Active)</td>
<td>Disabled</td>
<td>Bond (Active)</td>
<td>Bond</td>
</tr>
<tr>
<td>Bond-1GbE</td>
<td>Bond-1GbE</td>
<td>Bond-10GbE</td>
<td>Bond-10GbE</td>
<td>Bond-10GbE</td>
</tr>
</tbody>
</table>

### Migrating an existing cluster to a 10GbE bonded configuration

If you are upgrading to 10GbE HP LeftHand P4300s and HP LeftHand P4500s that have bonded NICs and are already in a cluster and providing storage volumes, you must follow certain steps to ensure an effective migration to the new hardware configuration. This migration guide covers the following 2 of these possible bonded configurations.

- **Active-Passive Bond**: configured with the 10GbE interface as the active primary interface and the 1GbE interface as the passive failover interface.
- **Adaptive Load Balancing Bond**: configured with 2 10GbE interfaces as an ALB bonded pair.

### Recommended bond configuration

The Active-Passive bond provides the best combination of high availability and performance. The performance boost comes from using the 10GbE as the active primary interface and using the 1GbE interface as the passive failover interface ensures a robust failover configuration.

### Installation overview

The example below shows how to migrate existing HP LeftHand P4300s and HP LeftHand P4500s configured with a 1GbE Adaptive Load Balancing (ALB) bond to a configuration with a 10GbE and 1GbE Active-Passive Ethernet bond. In this case, the 10GbE interface will be the Active Ethernet interface of the bond and the 1GbE interface will act as the failover interface for the bond. For this example the other 2 Ethernet interfaces in the storage nodes are not used by SAN/iQ and can be disabled.
The example below utilizes planned downtime of the entire management group and results in none of the volumes needing to restripe data. However, all access and I/O to the volume(s) is disconnected during this upgrade period.

A summary of the installation and migration steps follow:

1. Stop all I/O and disconnect all iSCSI sessions to volumes.
2. Shut down management group and power off all storage nodes.
3. Install 10GbE Ethernet adapter and additional memory in each storage node.
4. Power on each storage node and install 10GbE SAN/iQ software Patch 10041.
5. Configure new IP address and bonds for 10GbE on each storage node, and change SAN/iQ communication IP address.
6. Change the cluster’s VIP if required.
7. Reconnect iSCSI sessions and start I/O.

**Installation prerequisites**

Check the following two items before starting the migration from 1GbE interface to 10GbE interface:

- Have compatible VIP addresses for 10GbE and 1GbE switches that are running the 10GbE – 1GbE Active/Passive bond. SAN/iQ version 8.x requires each cluster to have a valid VIP address. A valid VIP address is one that is on the same subnet as the storage nodes. This VIP address must be valid after updating the storage nodes to the 10GbE - 1GbE Active/Passive bond failover network. If the 10GbE and 1GbE are on the same network, you may not need to change/update the cluster VIP.
- Ensure that all network settings (Flow Control, Frame Size (MTU)) for each NIC are consistent across the switch, the storage node and the client. The network settings must be configured the same on each interface before creating a bond.

Table 2 shows a summary of the network interfaces and bonds listed on the CMC TCP/IP Network panels before installing and configuring the 10GbE adapter. Table 3 shows a summary list of those interfaces and bonds after installing and configuring the 10GbE adapter. NOTE: The SAN/iQ communication interface in both configurations is Bond0.

**Table 2 Storage node network configuration pre-migration**

<table>
<thead>
<tr>
<th>NIC</th>
<th>Speed</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motherboard:Port1</td>
<td>1GbE</td>
<td>Slave (bond0)</td>
</tr>
<tr>
<td>Motherboard:Port2</td>
<td>1GbE</td>
<td>Slave (bond0)</td>
</tr>
<tr>
<td>Bond type</td>
<td>1GbE</td>
<td>Logical Failover Device (Adaptive Load Balancing - ALB)</td>
</tr>
</tbody>
</table>

**Table 3 Storage node network configuration post-migration**

<table>
<thead>
<tr>
<th>NIC</th>
<th>Speed</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motherboard:Port1</td>
<td>1GbE</td>
<td>Passive (bond0)</td>
</tr>
<tr>
<td>Motherboard:Port2</td>
<td>1GbE</td>
<td>Disabled</td>
</tr>
<tr>
<td>eth2</td>
<td>10GbE</td>
<td>Active (bond0)</td>
</tr>
<tr>
<td>eth3</td>
<td>10GbE</td>
<td>Disabled</td>
</tr>
<tr>
<td>NIC</td>
<td>Speed</td>
<td>Mode</td>
</tr>
<tr>
<td>-----</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>Bond type</td>
<td>—</td>
<td>Active-Passive</td>
</tr>
</tbody>
</table>

Prepare IP address worksheets

Write down the following information and keep this information handy throughout the migration process for each storage node.

In Table 4, enter information about the storage node before it is updated. In Table 5, enter the information about the storage node you will use during the update.

**Table 4 Pre-upgrade storage node information**

<table>
<thead>
<tr>
<th>Motherboard:Port1 IP address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motherboard:Port2 IP address</td>
</tr>
<tr>
<td>Bond address</td>
</tr>
<tr>
<td>Cluster VIP</td>
</tr>
</tbody>
</table>

**Table 5 During upgrade, use this storage node information**

<table>
<thead>
<tr>
<th>Motherboard:Port1 IP address to use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motherboard:Port2 IP address to use</td>
</tr>
<tr>
<td>Bond0 IP address to use</td>
</tr>
<tr>
<td>Which 10GbE interface to use (eth2 or eth3) for bond</td>
</tr>
<tr>
<td>Which 1GbE interface to use for bond (Motherboard:Port1 or Motherboard:Port2)</td>
</tr>
<tr>
<td>Cluster VIP (if different from step 4)</td>
</tr>
</tbody>
</table>

Put the management group into maintenance mode

1. Halt all I/O to the volume(s).
2. Via the iSCSI initiator, log off all the volumes attached to this cluster.
3. Right-click the management group in the navigation window and select Shutdown Management Group to place the group into Maintenance mode. The following message opens:
4. Click Shut Down Group. You are next prompted to confirm the management group shutdown.

5. Click Shut Down Group to continue the shutdown process.
6. Verify that all the storage nodes in the management group are powered OFF.

**Install the hardware and the software upgrade patch**

Follow the instructions in the *Hardware Upgrade Guide* to install the 10GbE network card and additional memory.

1. Power ON the storage nodes.
2. Rediscover the storage nodes in the CMC.
3. Wait for the Store to become READY on all storage nodes.
4. Make sure the management group is operating in the Normal mode. (Once all storage nodes are up with all SAN/iQ services running properly, the CMC shows the management group in Normal mode).
5. Install Patch 10041 on all the upgraded storage nodes as described in "Upgrading the SAN/iQ Software" in the *Hardware Upgrade Guide*. The patch installs the required drivers and firmware to use the HP IB 4X DDR Conn-X PCI-e G2 Dual Port HCA.

   a. Right-click on an upgraded storage node and select Install Software. The Install Software window opens. The completed window is shown below, after finding the patch file and selecting the storage nodes to upgrade.
b. Click Install. A confirmation message opens, shown below.

![Confirmation Message]

C. Click Install to start the upgrade patch installation.

Patch 10041 will be installed on the selected storage nodes and the storage nodes will be rebooted.

**NOTE:**

If volumes were online, then the CMC waits for those volumes to resync before the patch installation can complete successfully. This resync could take a while depending on the amount of data that was written while the storage node was rebooting.

**NOTE:**

The cluster may continue flashing the warning symbol while the volumes are resyncing. Clicking on the cluster resolves the blinking.

6. After the storage nodes finish rebooting, log in to each storage node in the management group and navigate to the TCP/IP Network tab window. You should see two Mellanox Technologies ConnectX EN 10GigE devices on the TCP/IP tab.
Configure the 10GbE ports for SAN/iQ communication using the CMC

For each storage node in the cluster, configure the ports as follows:

1. Right-click the existing bond and delete it. (This is the old ALB bond of the two 1GbE interfaces.)
2. Search for the storage node using the Find dialog.
3. Log in to the management group (if necessary).
4. Make sure the storage node Storage Server status is Normal before proceeding.
5. On the TCP/IP tab window, right-click the eth2 interface and select Edit.
6. In the Edit TCP/IP Configuration window, select one of the following options to assign an IP address:
   • Obtain an IP address automatically using the DHCP/BOOTP protocol
   • IP Address, and manually assign an available IP address
If you are prompted with the following message, click OK to continue. The condition described is not actually true.

7. When the following confirmation prompt opens, click OK to confirm the TCP/IP settings change on this storage node. The storage node reboots.

8. After the storage node reboots, search for it using the Find dialog.
9. Log in to the management group (if necessary).
10. Log in to the storage node.
11. Verify that the eth2 interface was assigned an IP address successfully.
Configure the Active-Passive bond using eth2 and Motherboard:Port1
(RECOMMENDED)

The following instructions describe how to configure the storage node network bonding for the high availability Active-Passive configuration. This configuration takes advantage of the speed of the 10GbE interface on the adapter while providing failover protection through the 1GbE interface on the motherboard.

<table>
<thead>
<tr>
<th>Motherboard:Port1 (1GbE)</th>
<th>Motherboard:Port2 (1GbE)</th>
<th>eth2 (10GbE)</th>
<th>eth3 (10GbE)</th>
<th>SAN/iQ Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive (Ready)</td>
<td>Disabled</td>
<td>Active</td>
<td>Disabled</td>
<td>Bond0</td>
</tr>
</tbody>
</table>

Creating the Active-Passive bond

1. Before proceeding, make sure both the Motherboard:Port1 interface and the eth2 interface have consistent network settings. You can view individual TCP settings on the TCP Status tab window.
2. Select the eth2 interface in the CMC. This NIC will be the Active NIC in the bond.
3. Hold down Ctrl and select the Motherboard:Port1 interface. This NIC will be the Passive NIC in the bond.
4. Click TCP/IP Tasks and select New Bond. The Create Bond Configuration window opens.
5. Under Type, select Active-Passive and click OK. A confirmation prompt opens.
6. Click OK to confirm the TCP/IP settings change.
7. Search for the storage node using the Find function.
8. Log in to the management group (if necessary). 
9. Log in to the storage node.

Verifying the bond

1. Verify on the TCP/IP tab window that the bond was created successfully.
2. Switch to the TCP Status tab.
3. Verify that the status of the 10GbE NIC eth2 interface is Active and the Preferred column is Yes.
   a. If the status of the 10GbE NIC eth2 interface is not shown as Active and the Preferred column is empty, then select the eth2 interface and right-click and select Set Preferred.
   b. Verify that the status of the eth2 interface is now shown as Active.
   c. Verify that the Preferred column of the eth2 interface now shows Yes.
   d. Verify that the status of the Motherboard:Port1 interface is now shown as Passive (Ready).
4. Switch to the Communication tab and verify the SAN/iQ Interface is set to communicate via the Active-Passive bond you just created.

Changing the VIP if required
1. Select the Cluster node and select the iSCSI tab.
2. Select the existing VIP address, click iSCSI Tasks and select Edit VIP & Subnet mask.
3. Change the VIP to a valid VIP for the new bond/network environment.
4. Add the bond IP address to the Find by Node IP or Hostname list and rediscover this storage node.

NOTE:
Delete the existing IP address that was being used to discover this storage node.
The SAN/iQ Storage Server on this storage node will restart to allow the networking changes to take effect. Wait for the Storage Server to become Normal before proceeding.

5. Navigate to the node's TCP/IP Network category.
6. Select the Communication tab to verify that the Manager IP Addresses are correctly updated with the eth2 interface IP address of this node. If not, click Communication Tasks and select Update Manager IP Addresses.

At this point, the SAN is ready to communicate via the 10GbE interface.

Preparing your host server to be 10GbE capable
While reconnecting to the iSCSI volumes, configure the iSCSI initiator on the host server to communicate via the 10GbE interface for all iSCSI communication.

You have successfully upgraded your existing SAN to 10GbE Ethernet.

Configure the 10GbE and 10GbE ALB bond (using eth2 and eth3)

⚠️ CAUTION:
Bonding both the ports on the 10GbE network adapter and then using this bond for all SAN/iQ communication could pose a risk to your volume and snapshot availability in the event of any network connectivity and/or functionality issues with the 10GbE adapter. If you set up this bond configuration, make sure you configure your volumes and snapshots for 2-way or higher replication to ensure that your volumes and snapshots remain available at all times.

This example describes how to configure two 10GbE interfaces into a Balance ALB bond. Note that this configuration does not provide the failover protection of the Active-Passive bond described previously.

<table>
<thead>
<tr>
<th>Motherboard:Port1 (1GbE)</th>
<th>Motherboard:Port2 (1GbE)</th>
<th>eth2 (10GbE)</th>
<th>eth3 (10GbE)</th>
<th>SAN/iQ interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disabled</td>
<td>Disabled</td>
<td>ALB bond</td>
<td>ALB bond</td>
<td>Bond0</td>
</tr>
</tbody>
</table>

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Creating the ALB bond

1. Navigate to the TCP/IP Network tab window.
2. Right-click the eth3 interface and select Edit.
3. In the Edit TCP/IP Configuration dialog, assign a valid IP to eth3.
4. If you are prompted with an error like this, click OK to continue. The condition described is not actually true.

5. Click OK to confirm the TCP/IP settings change.

6. Search for the storage node using the Find function.
7. Log in to the management group (if necessary).
8. Log in to the storage node.
9. Verify that the eth3 interface was assigned the IP address successfully.
10. Hold down Ctrl and select the eth2 and eth3 interfaces.
11. Right-click and select New Bond. The Create Bond Configuration window opens.

12. Under Type, select Adaptive Load Balancing (ALB) and click OK. A confirmation prompt opens.
13. Click OK to confirm the TCP/IP settings change.

14. Search for the storage node using the Find function.
15. Log in to the management group (if necessary).
16. Log in to the storage node.
Verifying the bond

1. Verify on the TCP/IP tab window that the bond was created successfully.
2. Switch to the Communication tab and verify that the SAN/iQ Interface is set to communicate via the Balance-ALB bond interface that you just created.

Changing the VIP if required

1. Select the Cluster node and select the ISCSI tab.
2. Select the existing VIP address, click ISCSI Tasks and select Edit VIP & Subnet mask.
3. Change the VIP to a valid VIP for the new bond/network environment.
4. Add the bond IP address to the Find by Node IP or Hostname list and rediscover this storage node.

NOTE:
Delete the existing IP address that was being used to discover this storage node.

5. The SAN/iQ Storage Server on this storage node will restart to allow the networking changes to take effect. Wait for the Storage Server to become Normal before proceeding.
6. Navigate to the node’s TCP/IP Network category.
7. Select the Communication tab to verify that the Manager IP Addresses are correctly updated. If not, click Communication Tasks and select Update Manager IP Addresses.

At this point, the SAN is ready to communicate via the 10GbE interface.

Preparing your host server to be 10GbE capable

While reconnecting to the iSCSI volumes, configure the iSCSI initiator on the host server to communicate via the 10GbE interface for all iSCSI communication.

You have successfully upgraded your existing SAN to 10GbE.