Abstract

This guide describes installation and deinstallation procedures for the HP 3PAR T-Class Storage System. The installation of HP 3PAR equipment is to be performed by qualified technicians who are authorized by HP to install storage systems and their hardware components. Authorized technicians include HP service engineers, Value Added Resellers (VARs), certified self-maintaining customers, and authorized third-party field technicians.
Acknowledgments

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Warranty

WARRANTY STATEMENT: To obtain a copy of the warranty for this product, see the warranty information website:

http://www.hp.com/go/storagewarranty

Documentation

For the latest version of this document, go to the Services Access Workbench at http://sawpro.atlanta.hp.com/km/saw/pmBrowse.do?oid=5044215.
Contents

I Preinstallation.................................................................8

1 Preparing for Storage System Installation.........................9
   Advisories...........................................................................9
   Preinstallation Planning....................................................9
   Configuration Planning....................................................10
   Planning Network Access................................................10
      Supported Network Topologies..................................10
      Shared............................................................................10
      Private...........................................................................11
      Split...............................................................................12
   Service Processor Connectivity.......................................12
   Meeting System Requirements........................................13
   Management Workstations..............................................13
   Providing for Service Access............................................14
   Meeting Structural Requirements...................................14
      Weight and Pressure Loads.........................................14
      Raised Floor Requirements.........................................14
      Tile Cutout Specifications............................................16
   Meeting Electrical Requirements...................................16
   Supporting Redundant Power..........................................17

2 Storage System Physical Layout and Numbering...................23
   Identifying Storage System Components..........................23
   Service Processor Placement..........................................25
   Understanding Component Numbering.............................26
      Cabinet Numbering.......................................................26
      PDU Numbering............................................................26
      Battery Backup Unit Numbering.................................29
      Battery Backup Units..................................................31
      Controller Node Numbering.......................................32
      Drive Chassis Numbering............................................35
         Drive Magazine Allocation......................................38
      Power Supply Numbering..........................................39

II Installation.................................................................41

3 Setting Up the Storage System........................................42
   Collecting the Necessary Tools........................................42
   Unpacking the Cabinet...................................................42
      Unpacking a Type 2 Container....................................42
   Placing the Storage System............................................45
   Storage System Fascias..................................................46
      Removing Fascias........................................................46
      Removing Locking Fascias...........................................47
   Locating the Wrist Grounding Strap...............................48
   Removing the Rear Door...............................................49
   Removing Side Panels...................................................51
   Adjusting Power Cables................................................52

4 Installing the Drive Magazines........................................56
   Preparing to Install Drive Magazines...............................56
   Handling the Drive Magazines.........................................57
      Drive Chassis Placement and Numbering......................57
### Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unpacking and Inserting the Drive Magazines</td>
<td>58</td>
</tr>
<tr>
<td>Unpacking Drive Magazines</td>
<td>58</td>
</tr>
<tr>
<td>Drive Magazine Loading Pattern</td>
<td>59</td>
</tr>
<tr>
<td>Inserting the Drive Magazines</td>
<td>61</td>
</tr>
<tr>
<td>Installing Drive Cage Filler Panels</td>
<td>62</td>
</tr>
<tr>
<td>5 Checks and Setup before Powering On the Storage System</td>
<td>64</td>
</tr>
<tr>
<td>Checking Power Cord Connections</td>
<td>64</td>
</tr>
<tr>
<td>AC Cord Connections</td>
<td>64</td>
</tr>
<tr>
<td>Redundant Power</td>
<td>66</td>
</tr>
<tr>
<td>Checking Battery Backup Unit Cable Connections</td>
<td>68</td>
</tr>
<tr>
<td>Connecting the Main Power Cords</td>
<td>70</td>
</tr>
<tr>
<td>Positioning the Storage System</td>
<td>73</td>
</tr>
<tr>
<td>Replacing the Rear Door</td>
<td>73</td>
</tr>
<tr>
<td>Replacing the Side Panels and Filler Panels</td>
<td>75</td>
</tr>
<tr>
<td>Securing the Storage System</td>
<td>76</td>
</tr>
<tr>
<td>Verifying Acclimatization</td>
<td>77</td>
</tr>
<tr>
<td>Completing the Power-On Sequence</td>
<td>77</td>
</tr>
<tr>
<td>6 Understanding LED Status</td>
<td>79</td>
</tr>
<tr>
<td>Using the Component LEDs</td>
<td>79</td>
</tr>
<tr>
<td>Removing the Bezels and Unlocking the Door</td>
<td>79</td>
</tr>
<tr>
<td>Drive Cage LEDs</td>
<td>79</td>
</tr>
<tr>
<td>DC4 Drive Cage FC-AL Module LEDs</td>
<td>79</td>
</tr>
<tr>
<td>Drive Magazine LEDs</td>
<td>81</td>
</tr>
<tr>
<td>Controller Node LEDs</td>
<td>82</td>
</tr>
<tr>
<td>Fibre Channel Port LEDs</td>
<td>83</td>
</tr>
<tr>
<td>QLogic iSCSI Port LEDs</td>
<td>84</td>
</tr>
<tr>
<td>Ethernet Adapter LEDs</td>
<td>85</td>
</tr>
<tr>
<td>Power Supply LEDs</td>
<td>86</td>
</tr>
<tr>
<td>Battery Backup Unit LEDs</td>
<td>87</td>
</tr>
<tr>
<td>Power Distribution Unit Lamps</td>
<td>88</td>
</tr>
<tr>
<td>Service Processor LEDs</td>
<td>89</td>
</tr>
<tr>
<td>Wintec Service Processor</td>
<td>89</td>
</tr>
<tr>
<td>Supermicro Service Processor</td>
<td>89</td>
</tr>
<tr>
<td>Supermicro II Service Processor</td>
<td>90</td>
</tr>
<tr>
<td>Securing the Storage System</td>
<td>91</td>
</tr>
<tr>
<td>7 Initializing the Storage System Software</td>
<td>92</td>
</tr>
<tr>
<td>Preparing for System Software Setup</td>
<td>92</td>
</tr>
<tr>
<td>Collecting Necessary Information</td>
<td>92</td>
</tr>
<tr>
<td>Dial-Up Connection Settings</td>
<td>92</td>
</tr>
<tr>
<td>Setting Up the Storage System</td>
<td>92</td>
</tr>
<tr>
<td>Storage System Out-of-the-Box Script</td>
<td>92</td>
</tr>
<tr>
<td>Setting up the Service Processor</td>
<td>98</td>
</tr>
<tr>
<td>Service Processor Moment of Birth</td>
<td>98</td>
</tr>
<tr>
<td>Using the Service Processor Setup Wizard</td>
<td>100</td>
</tr>
<tr>
<td>Server Processor ID failed with the following error</td>
<td>107</td>
</tr>
<tr>
<td>Set date and time failed with the following error</td>
<td>108</td>
</tr>
<tr>
<td>Configure networking failed with the following error</td>
<td>108</td>
</tr>
<tr>
<td>Configure remote support failed with the following error</td>
<td>108</td>
</tr>
<tr>
<td>Restart Service Processor failed with the following error</td>
<td>109</td>
</tr>
<tr>
<td>Finish setup failed with the following error</td>
<td>109</td>
</tr>
<tr>
<td>High Speed Setup</td>
<td>110</td>
</tr>
<tr>
<td>Configuring the SP with SP Mode</td>
<td>110</td>
</tr>
<tr>
<td>Configuring the SP with Secure Network Mode</td>
<td>116</td>
</tr>
</tbody>
</table>
III Deinstallation.................................................................154

8 Deinstalling the Storage System.................................155
    Preparing for deinstallation..............................................155
    Storage System Inventory.......................................................155
    Deinstalling the Storage System........................................156
        Packing the Storage System in the Type 1 Shipping Container.....163
        Packing the Storage System in the Type 2 Shipping Container.....166

9 Support and Other Resources.................................170
    Contacting HP.................................................................170
    HP 3PAR documentation......................................................170
    Typographic conventions...................................................174
    HP 3PAR branding information...........................................174

10 Documentation feedback........................................175

IV Appendices......................................................................176

A Regulatory compliance notices......................................177
    Regulatory compliance identification numbers...............177
    Federal Communications Commission notice......................177
        FCC rating label.............................................................177
        Class A equipment..........................................................177
        Class B equipment..........................................................177
        Declaration of Conformity for products marked with the FCC logo, United States only........178
    Modification........................................................................178
    Cables................................................................................178
    Canadian notice (Avis Canadien)...178
        Class A equipment..........................................................178
        Class B equipment..........................................................178
    European Union notice.......................................................178
    Japanese notices.................................................................179
        Japanese VCCI-A notice....................................................179
        Japanese VCCI-B notice....................................................179
        Japanese VCCI marking....................................................179
        Japanese power cord statement..........................................179
    Korean notices.................................................................179
        Class A equipment..........................................................179
        Class B equipment..........................................................179
    Taiwanese notices............................................................180
        BSMI Class A notice........................................................180
        Taiwan battery recycle statement.........................................180
    Turkish recycling notice.....................................................180
    Vietnamese Information Technology and Communications compliance marking................180
    Recycling notices...............................................................180
        English recycling notice..................................................180
B Current and Voltage Requirements.................................................................189
C Connecting the Maintenance PC..................................................................191
   Connecting to a Controller Node.................................................................191
   Connecting to the Service Processor............................................................193
      Ethernet Connection..................................................................................194
         Logging in to SPOCC...........................................................................195
         Using a Secure Shell Protocol...............................................................196
         Using PuTTY.........................................................................................196
         Using SecureCRT...............................................................................197
   Using a Serial Connection...........................................................................198
   Serial Cable Pinouts....................................................................................200
   Crossover Adapter Assembly.....................................................................200
   Straight-Through Adapter..........................................................................200
D Performing Node Rescue..............................................................................202
   Node-to-Node CLI Rescue...........................................................................202
   Service Processor-to-Node Rescue...............................................................204
E Controller Node to Drive Chassis Cabling....................................................208
   Standard Cabling.......................................................................................208
F Fibre Channel Adapter Installation Order....................................................210
   PCI Slot Installation Order........................................................................211
   Fibre Channel Adapters............................................................................211
      Drive Cage Connections.......................................................................211
      Host Connections...................................................................................211
   Ethernet Adapters.....................................................................................211
   iSCSI Adapters...........................................................................................211
   Node Connection Matrix............................................................................211
G Storage System Sparing Schedule .......................................................... 214
Index ........................................................................................................ 221
Part I Preinstallation
Preparing for Storage System Installation

This chapter provides information about meeting system requirements, planning the configuration and preparing an operating site for the HP 3PAR Storage Systems.

**NOTE:** For additional information about preinstallation planning and system requirements, refer to the *HP 3PAR S-Class/T-Class Storage System Physical Planning Manual* and the systems planning document described in the “Preinstallation Planning” (page 9) section of this chapter.

Advisories

Before performing any of the procedures described in this guide, read “Regulatory compliance notices” (page 177) to obtain important safety information.

To avoid personal injury or damage to data and equipment, always observe the cautions and warnings in this guide. Always be careful when handling any electrical equipment.

The following advisories appear throughout this guide:

⚠️ **WARNING!** Warnings alert you to actions that may cause injury to people or irreversible damage to data or the operating system.

⚠️ **CAUTION:** Cautions alert you to actions that may cause damage to equipment, software, or data.

**NOTE:** Notes are reminders, tips, or suggestions to supplement the procedures in this guide.

Preinstallation Planning

Prior to installation, complete a systems planning document, *HP 3PAR Systems Assurance Document* along with an HP Sales Representative or HP Systems Engineer.

The systems planning document must contain the following:

- Contact information for customer personnel and for HP technical sales, support, and service personnel
- Implementation project plan
- Configuration information for the storage system to be installed, including system configuration diagrams
- Shipping and delivery details and requirements
- Management workstation, service processor, and network information
- Description of the customer environment
- Volume and RAID level planning information
- Customer training project plan
- Additional notes and comments regarding installation
- Current support matrix
- System technical specifications
- Systems Acceptance Certificate
- Customer Services installation checklist
Configuration Planning

In addition to verifying the operating site meets all physical and environmental requirements, the preinstallation process also includes configuration planning.

- Hardware configuration planning issues such as system component layout and drive magazine allocation are discussed in this chapter and in the HP 3PAR S-Class/T-Class Storage System Physical Planning Manual.
- Networking and cabling issues such as storage system and service processor network topologies, internal system cabling configurations, and cabling of connected host computers are discussed in this chapter and in the HP 3PAR S-Class/T-Class Storage System Physical Planning Manual.
- System planning issues such as volume management, SAN implementation, and currently supported platforms and hardware configurations are discussed in the HP 3PAR Systems Assurance Document or other systems planning documents.

Planning Network Access

External Ethernet, Fibre Channel, and optional modem cable connections are completed at the time of installation.

**NOTE:** All networking equipment, including all necessary switches, hubs, and cables are to be provided by the customer unless otherwise indicated.

These external connections are necessary to:

- Establish connections from the controller nodes to the host computer or computers.
- Connect the storage system to the network to enable the storage system management through the Management Console and CLI.
- Enable access to storage system equipment from a service processor.
- Enable HP Customer Services personnel to locally and remotely monitor and service the storage system.

Supported Network Topologies

Several different network topologies can be used to connect the storage system to the local area network, depending on operating site policies and requirements. Currently, the three supported topologies are *shared*, *split*, and *private*.

**Shared**

With a *shared* network topology, the storage system and service processor share the internal customer network (Figure 1 (page 11)).
A **shared** topology requires:
- A static IP address and system name for the storage system.
- Two Ethernet connections from a switch or hub to the storage system controller nodes.
- A static IP address for the service processor.
- One Ethernet connection from a switch or hub to the service processor.
- At least one management station on the network segment.

**Private**

With a **private** network topology, the storage system and the service processor sit on the same private network segment on the customer local area network. All management workstations used to administer the system must also sit on the same private network segment (**Figure 2 (page 11)**).

A **private** topology requires:
- A static IP address for the storage system.
- Two Ethernet connections from the storage system to a private network segment.
- One Ethernet connection from the service processor to the private network segment.
- A static IP address for the service processor.
- At least one management station on the private network segment.
With a split network topology, the storage system is on the internal customer network, but the storage system communicates with the service processor on a dedicated private network segment (Figure 3 (page 12)). 3PAR assigns the IP address to the private segment.

**Figure 3 Storage System on the Local Area Network with the Service Processor on a Private Segment (Split Topology)**

A split topology requires:

- Two static IP addresses and a system name for the storage system. One IP address is for the LAN and the other IP address is for the private network segment. Only one interface per network is active at any one time.
- Two Ethernet connections from a switch or hub to the storage system controller nodes.
- Two Ethernet connections from the private network segment to the storage system controller nodes.
- A static IP address for the service processor.
- One Ethernet connection from the private segment to the service processor.

**NOTE:** The private network segment should also have a management station to communicate with the service processor.

**Service Processor Connectivity**

The storage system service processor is used to provide remote error detection and reporting, and to support diagnostic and maintenance activities involving storage systems. In general, one service processor is required per storage system.

**NOTE:** For more information about service processor security, see the **HP 3PAR Service Tools Platform** document.

When a new HP 3PAR storage system is installed at a customer location, a Service Processor (SP) is also included with the system. If the system is delivered in an HP cabinet, the SP comes pre-installed in the cabinet. If the storage system is being installed in a third party rack, the SP must be installed in the same area. For more details of SP placement, see Section (page 25).

The data collected by the service processor is used by HP to maintain, troubleshoot, and upgrade the HP equipment on the customer site. To perform these activities, the service processor must communicate with HP Central or a local service provider. The connection between the service

1. For an HP 3PAR T-Class Storage System, it is only possible to create one Ethernet connection from a switch or hub to a storage system controller node and one Ethernet connection from the private network segment to a controller node. This configuration does not support redundancy and is not permitted.
processor and HP Central or a local service provider can be made using the customer network and the Internet, or through a point-to-point connection using a modem. Connections using the customer network pass through the customer firewall. Connections using a modem, bypass the customer firewall. When a designated management workstation situated on the same network as the service processor (as described in Section (page 10)) and configured to access the service processor, the customer has the option of blocking external communications at any time.

**NOTE:** When the service processor connects through a modem, the customer is responsible for supplying an analog phone line.

Table 1 (page 13) summarizes the connectivity options for both data transfer and remote operations. Data transfer involves external communications between the service processor and HP. Remote operations include problem solving and diagnostics performed from a remote location. HP recommends that both data transfer and remote operations occur through the customer network when possible.

### Table 1 Service Processor Connectivity Options

<table>
<thead>
<tr>
<th>Connection Type Data Transfer / Remote Ops</th>
<th>Software Update Method</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network / Network</td>
<td>Remote update capability</td>
<td>This is the preferred method of service processor connectivity</td>
</tr>
<tr>
<td>Network / Modem</td>
<td>Locally by CD</td>
<td>Lower bandwidth inbound inhibits large file transfers.</td>
</tr>
<tr>
<td>Network / Blocked</td>
<td>Locally by CD</td>
<td>Remote operations are not allowed.</td>
</tr>
<tr>
<td>Modem / Modem</td>
<td>Locally by CD</td>
<td>Lower bandwidth of modem connection inhibits large file transfers. Dumps must be transferred manually through FTP.</td>
</tr>
<tr>
<td>Modem / Blocked</td>
<td>Locally by CD</td>
<td>Remote operations are not allowed.</td>
</tr>
</tbody>
</table>

### Meeting System Requirements

Before installing a storage system, obtain the most current information on compatible system configurations by consulting the support matrix located in the *HP 3PAR Systems Assurance Document* or other systems planning documents.

Information for other operating environments is available by referring to the *HP 3PAR Configuration Matrix* and *Best Practices* documents.

To obtain a copy of this documentation, go to http://www.hp.com/go/3par/, navigate to your product page, click **HP Support and Documents** for your product, and then click **Manuals**.

### Management Workstations

Administering the storage system requires installing the InForm Administration Tools on one or more management workstations.

**NOTE:** See “Supported Network Topologies” (page 10) for specific information about network topologies and management workstation connectivity.

See the *HP 3PAR InForm Management Console Online Help* and the *HP 3PAR InForm OS CLI Administrator’s Manual* for system requirements before installing management software.
Providing for Service Access

HP 3PAR Storage System cabinets feature locking rear doors, removable side panels and fascias to improve access for installing, cabling, and servicing components. See Table 2 (page 14) for storage system cabinet dimensions.

Table 2 Storage System Cabinet Dimensions

<table>
<thead>
<tr>
<th>Cabinet</th>
<th>Height</th>
<th>Depth</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>2M (40U)</td>
<td>76.4 in (194 cm)</td>
<td>23.8 in (60.5 cm)</td>
<td>36 in (91.4 cm)</td>
</tr>
</tbody>
</table>

When establishing an operating site for storage system, provide for adequate access to cabinets by following the recommendations in Table 3 (page 14).

NOTE: A T800 storage system provides circuit breakers located at both the front and rear of the system. It is necessary to maintain access to both the front and rear circuit breakers.

Table 3 Recommended Access Areas for 3PAR Cabinets

<table>
<thead>
<tr>
<th>Cabinet Surface</th>
<th>Access Area During Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front</td>
<td>36 in (91.4 cm)</td>
</tr>
<tr>
<td>Rear</td>
<td>30 in (76.2 cm)</td>
</tr>
</tbody>
</table>

NOTE: HP 3PAR cabinets do not require side access during operation. HP recommends leaving at least 3 ft (91.4 cm) of space on either the left or right side of the cabinet during installation to allow for the removal of at least one side panel.

Meeting Structural Requirements

Before installing a storage system, establish an operating site to meet the physical, electrical, and atmospheric requirements of the system.

Weight and Pressure Loads

Depending on the configuration, a storage system may weigh up to 2,000 lb (907 kg). Table 4 (page 14) provides the maximum weights and pressure loads per leveling foot for a cabinet. Use these values to approximate the structural support required by a system configuration.

Table 4 Maximum Weights and Pressure Loads

<table>
<thead>
<tr>
<th>Cabinet Size</th>
<th>Maximum Weight</th>
<th>Maximum Weight Per Leveling Foot</th>
<th>Maximum Load Per Leveling Foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>2M (40U)</td>
<td>2,000 lb (907.2 kg)</td>
<td>500 lb (226.8 kg)</td>
<td>161 lb/sq in (7.3 kg/sq cm)</td>
</tr>
</tbody>
</table>

Raised Floor Requirements

There are additional structural considerations when installing a storage system in an environment with raised flooring.

NOTE: This section assumes a standard raised floor construction consisting of the following: 24 in. (61.1 cm) square or 24 in. (61.1 cm) X 36 in. (91.5 cm) panels, steel or aluminum stringers, and pedestal supports attaching to an underlying concrete slab or steel deck.

Prior to installation, verify the raised floor at the operating site meets the specifications described in Table 5 (page 15).
### Table 5 Raised Floor Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flatness tolerance Per 10 ft (3 m) span Overall</td>
<td>Less than 0.06 in. (1.5 mm) Less than 0.10 in. (2.5 mm)</td>
</tr>
<tr>
<td>Deflection Dynamic Permanent</td>
<td>Less than 0.15 in. (3.8 mm) Less than 0.02 in. (0.5 mm)</td>
</tr>
<tr>
<td>Pedestal assembly load Axial Side</td>
<td>At least 5,000 lb (2,268 kg) At least 30 ft-lb (40.7 N-m)</td>
</tr>
</tbody>
</table>

Placing each cabinet across two floor tiles is strongly recommended. It is also strongly recommended to place the front of each cabinet in front of a vented floor tile. Figure 4 (page 15) shows two storage systems side-by-side and each resting across two floor tiles.

**Figure 4 Cabinets Placed Across Two Floor Panels Each (Recommended)**

When necessary, a storage system can also rest across four floor tiles, with two adjacent storage systems resting partially on the same tiles so the systems use a total of six tiles, as shown in Figure 5 (page 15). Again, it is strongly recommended to have vented tiles in the front.

**Figure 5 Storage Systems Resting Partially on the Same Floor Panels**

Before placing a cabinet on floor tiles shared with other cabinets or equipment, first verify the floor panels can tolerate the weight and pressure loads. Maximum weight and pressure loads for storage systems are provided in Table 4 (page 14).

When placing cabinets with their weight shared by the same panels as shown in Figure 5 (page 15), verify each panel can tolerate the maximum weight, where cabinet x and cabinet y are cabinets or equipment resting partially on the same floor panel, calculated as follows:
Figure 6 (page 16) contains the recommended tile cutout specifications for storage system cabinets.

⚠️ **WARNING!** To prevent potential collapse, loaded floor panels that have cutouts to facilitate cable routing may require additional reinforcement.

**Figure 6 Tile Cutout Specifications for a Storage System Cabinet Resting on Two Floor Tiles**

**Meeting Electrical Requirements**

Before placing a storage system, verify the operating site has the necessary electrical circuitry. Refer to Table 25 (page 189) for current requirements of storage system components depending on voltage.
HP 3PAR cabinets contain four power distribution units (PDU). Each PDU requires service from a dedicated single-phase 200-240 VAC 30-A grounded electrical circuit. HP recommends a redundant AC configuration using independent sources to provide a dedicated, grounded electrical circuit to each PDU.

**NOTE:** If a storage system cabinet does not have components installed in the top four bays (bays 0–3, or the highest 16U of the cabinet), the two upper PDUs (PDU 0 and PDU 1) are not used to power the system and does not need to be connected. Redundant power is still supplied to the lower bays in the cabinet through PDU 2 and PDU 3.

The storage system PDUs are equipped with NEMA® L6-30 or IEC 60309 receptacle connectors, depending on the region. The appropriate receptacles are necessary at the operating site to accommodate these connectors.

### Supporting Redundant Power

The use of redundant PDUs and power supplies creates power redundancy for storage systems inside 3PAR cabinets.

As shown in Figure 7 (page 17) and Figure 8 (page 18), power domains within the storage system are distributed between the upper and lower halves of the cabinet.

**Figure 7 Front View of the Power Domains Within the Controller Nodes and Drive Chassis**
**WARNING!** To avoid possible injury, damage to storage system equipment, and potential loss of data, do not use the surplus power outlets in the storage system PDUs. Never use outlets in the PDUs to power components that do not belong to the storage system or to power storage system components residing in other cabinets.

To support redundant power:
- The power supplies in each power domain must connect to separate PDUs.
- Each PDU in the system must connect to an independent AC circuit.

*Figure 9 (page 19) and Table 6 (page 19) contain information about power cord connections for standard redundant power configurations.*
Table 6 T400 Redundant Power Configuration (T400 Node Cabinet or Drive Expansion Cabinet)

<table>
<thead>
<tr>
<th>PDU Number</th>
<th>Power Bank</th>
<th>AC Cord</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>0-L, 1-L</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>2-R, 3-R</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>2-L, 3-L</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>0-R, 1-R</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>4-R, 5-R</td>
</tr>
</tbody>
</table>
Table 6 T400 Redundant Power Configuration (T400 Node Cabinet or Drive Expansion Cabinet) (continued)

<table>
<thead>
<tr>
<th>PDU Number</th>
<th>Power Bank</th>
<th>AC Cord</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>6-L, 7-L</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>6-R, 7-R</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>4-L, 5-L</td>
</tr>
</tbody>
</table>

Figure 10 (page 21) and Table 7 (page 21) contain information about power cord connections for T800 storage systems with PDUs placed back-to-back to take up only 2U of cabinet space rather than the standard 4U of space.

**NOTE:** “Redundant Power Configuration Diagram (T800 Node Cabinet)” (page 21) applies only to the T800 configuration with front and rear PDUs. For information on the T800 configuration with only rear PDUs, see the *HP 3PAR Storage System Troubleshooting and Maintenance Guide*. 
Figure 10 Redundant Power Configuration Diagram (T800 Node Cabinet)

Table 7 T800 Redundant Power Configuration (T800 Node Cabinet)

<table>
<thead>
<tr>
<th>PDU Number</th>
<th>Power Bank</th>
<th>AC Cord</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>0-L, 1-L</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>2-R, 3-R</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>2-L, 3-L</td>
</tr>
</tbody>
</table>
### Table 7 T800 Redundant Power Configuration (T800 Node Cabinet) (continued)

<table>
<thead>
<tr>
<th>PDU Number</th>
<th>Power Bank</th>
<th>AC Cord</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>0-R, 1-R</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>5-R, 6-R</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>7-L, 8-L</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>7-R, 8-R</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>5-L, 6-L</td>
</tr>
</tbody>
</table>
2 Storage System Physical Layout and Numbering

This chapter identifies the major components of the HP 3PAR T-Class Storage System and explains the numbering of the system components.

**NOTE:** Illustrations in this chapter show sample systems and may not match a particular storage system configuration.

Identifying Storage System Components

Figure 11 (page 24) and Figure 12 (page 25) identify the major components of an T400 Storage System in a 2M (40U) 3PAR cabinet.
Figure 11 The Front of a T400 Storage System

- Front Fascia
- Drive Magazines
- Drive Chassis
- Bezel
- Drive Cage
  - FC-AL
  - Modules
- Controller Nodes
- Storage Server Backplane with Controller Nodes
- Battery Tray
- Service Processor
- Main Power Cords
- Leveling Foot
**Service Processor Placement**

A service processor designed to support all actions required for the maintenance of the storage system also resides at the bottom of the cabinet to provide real time, automated monitoring. The service processor allows HP to diagnose and resolve potential problems remotely.

The service processor is usually installed directly above the PDUs and below the battery tray (Figure 13 (page 26)). The service processor is powered internally by the storage system and does not require an external power connection.
NOTE: For T800 Storage Systems, the service processor is located above the system backplane, below the lowest drive chassis but above the upper battery tray. Figure 15 (page 28) illustrates service processor placement for a T800.

When a cabinet does not include a service processor, a filler panel covers the area of the cabinet that the service processor normally occupies.

Understanding Component Numbering

Because of the large number of potential system configurations, HP standardized component placement and internal cabling to simplify installation and maintenance. System components are placed in the cabinet according to the principles outlined in this section and numbered according to their order and location in the cabinet.

NOTE: For information about standardized cabling, see “Controller Node to Drive Chassis Cabling” (page 208).

Cabinet Numbering

The 2M (40U) cabinet is an EIA-standard rack divided into 10 chassis bays (4U) for housing storage system components.

Numbers for chassis bays are assigned:

- Beginning with 0
- From top to bottom

Figure 14 (page 27) illustrates numbering of chassis bays in a cabinet.
A storage system can be housed in a single cabinet or multiple cabinets. When multiple cabinets are required, the first cabinet (the controller node cabinet) holds the system backplane populated with controller nodes. Any additional cabinets, or drive chassis cabinets, hold the additional drive chassis that do not fit into the controller node cabinet.

Table 8 (page 27) describes the pattern for cabinet numbering in multi-cabinet storage systems and for operating sites with multiple systems:

**Table 8 Cabinet Numbering**

<table>
<thead>
<tr>
<th>Cabinet</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller node cabinet</td>
<td>C00</td>
</tr>
<tr>
<td>Drive chassis cabinets connecting to the first node cabinet</td>
<td>C01, C02, C03 ... C09</td>
</tr>
</tbody>
</table>

Figure 15 (page 28) shows the location of system components for T400 and T800 controller node cabinets. Figure 16 (page 29) shows the location of system components for drive chassis cabinets.

2. When a 1U service processor is present, a 1U filler panel resides immediately above or below the unit.
3. When a 1U service processor is present, a 1U filler panel resides immediately above or below the unit.
### PDU Numbering

For each cabinet, the four Power Distribution Units (PDU) occupy the lowest chassis bay in the cabinet.

Numbers for PDUs are assigned:

- Beginning with 0
- From top to bottom

*Figure 17 (page 30) illustrates the four PDUs at the bottom of a cabinet.*
NOTE: For T800 systems, the PDUs are positioned back-to-back to only occupy two units of space at the bottom of the cabinet instead of the standard four units of space. PDUs are accessible from both the front and the rear of the system. “Controller Node Cabinet Component Layout by Storage System Model" (page 28) illustrates PDU placement for a T800 system.

Each PDU has two power banks with a separate circuit breaker and use only with storage system components (Figure 18 (page 30)).

WARNING! To avoid possible injury, damage to storage system equipment, and potential loss of data, do not use the surplus power outlets in the storage system PDUs. Never use outlets in the PDUs to power components not belong to the storage system or power storage system components residing in other cabinets.

NOTE: For more information on PDUs and storage system configurations, see “Preparing for Storage System Installation” (page 9).

Battery Backup Unit Numbering

The storage system controller node cabinet includes one or two battery trays to house the battery backup units (BBU). A BBU supplies enough power to write the cache memory to the drive inside the nodes in the event of a power failure. One battery per controller node is required for all storage system configurations.

A battery tray is located directly below the storage system backplane. Storage systems with six or eight controller nodes requires a second battery tray. The second battery tray rests immediately above the storage system backplane.

Each battery unit contains two independently-switched batteries, labeled battery A and battery B (Figure 19 (page 31)).
BBU placement and numbering schemes vary according to the type of components used in the system.

A battery tray may hold a maximum of four BBUs. The number of BBUs and battery trays in a system depends on the number of controller nodes installed (Table 9 (page 31)).

**Table 9 Number of BBUs and Battery Tray Placement by Storage System Backplane and Number of Controller Nodes**

<table>
<thead>
<tr>
<th>Backplane</th>
<th>Nodes</th>
<th>BBU</th>
<th>Battery Trays</th>
<th>Tray Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>T400</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>Below backplane</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>Below backplane</td>
</tr>
<tr>
<td>T800</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>Below backplane</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>Below backplane</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>6</td>
<td>2</td>
<td>Below backplane (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Above backplane (1)</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>8</td>
<td>2</td>
<td>Below backplane (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Above backplane (1)</td>
</tr>
</tbody>
</table>

**Battery Backup Units**

BBUs include batteries resting vertically, with battery A above battery B. (Figure 20 (page 32)).
When facing the rear of the storage system, the BBUs are numbered from right to left, 0 through 3. When two battery trays are present, the upper tray is numbered 0 and the lower tray is numbered 1 (Figure 21 (page 32)).

Controller Node Numbering

A T-Class Storage System may contain two, four, six, or eight controller nodes per system. Controller nodes are loaded into the storage system backplane enclosure from bottom to top. A T800 storage system with only two controller nodes installed, the controller nodes occupy the lowest 4U of the backplane and numbered node 6 and node 7. The empty bays in the backplane enclosure with filler panels protect the node chassis.

Controller node positions in the storage system backplane, as shown in Figure 22 (page 33).
As shown in Figure 23 (page 34), a controller node contains six PCI slots. These slots accept PCI adapters such as quad-port Fibre Channel adapters, iSCSI adapters, and Ethernet adapters. The controller node also has a management Ethernet port (E0), a dedicated Remote Copy over IP (E1), and a maintenance port (C0).
Each Fibre Channel adapter in a PCI slot has four ports. Each iSCSI adapter in a PCI slot has two ports. PCI adapters assume the numbers of the occupying PCI slots.

- In dual-port adapters, ports are labeled port 1 and port 2 from top to bottom.
- In quad-port Fibre Channel adapters, the ports are numbered port 1, port 2, port 3 and port 4 from top to bottom.

Inside the controller node are control cache DIMMs and data cache DIMMs.

- Control cache DIMMs are located in control cache slots 0 and 1 ("Control Cache and Data Cache DIMMs in the Controller Node" (page 35)).
- Data cache DIMMs are located on data cache riser cards ("Control Cache and Data Cache DIMMs in the Controller Node" (page 35)).
Numbers for controller nodes and their components are assigned in the order indicated in Table 10 (page 35).

**Table 10 Numbering System for Controller Nodes and Their Components**

<table>
<thead>
<tr>
<th>The Following Components...</th>
<th>Are Numbered...</th>
<th>Running from...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller nodes</td>
<td>0,1,2,3,4,5,6,7</td>
<td>left to right(^1) and top to bottom</td>
</tr>
<tr>
<td>PCI adapters</td>
<td>0,1,2,3,4,5</td>
<td>left to right(^1)</td>
</tr>
<tr>
<td>PCI ports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dual-port adapters</td>
<td>1,2</td>
<td>top to bottom</td>
</tr>
<tr>
<td>quad-port adapters</td>
<td>1,2,3,4</td>
<td>top to bottom</td>
</tr>
<tr>
<td>Control Cache DIMMs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>control cache</td>
<td>0,1</td>
<td>left to right(^1)</td>
</tr>
<tr>
<td>data cache</td>
<td>0,1,2,3,4,5,6,7</td>
<td></td>
</tr>
<tr>
<td>Data Cache DIMMs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank 0</td>
<td>0,1</td>
<td>top to bottom</td>
</tr>
<tr>
<td>Bank 1</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>Bank 2</td>
<td>0,1</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) When facing the storage system.

**Drive Chassis Numbering**

Depending on the specific configuration, a storage system may support up to 64 drive chassis. A cabinet provides 10 drive bays and may support up to 10 drive chassis. Each drive chassis slot accommodates a single drive magazine which holds four disks for a total of 40 hard drives per drive chassis.
Numbers for drive chassis are assigned:
- Beginning with 0.
- From bottom to top, beginning with the drive chassis directly above the storage system backplane.

Drive chassis are always placed above the storage system backplane enclosure and numbered according to their position in relation to the backplane, as shown in Figure 25 (page 36).

**Figure 25 Numbering of Drive Chassis**

![Diagram](image)

**NOTE:** For systems occupying multiple cabinets, drive chassis numbers continue at the bottom of the next cabinet and progress through the top of the cabinet.

Figure 26 (page 37) and Figure 27 (page 37) illustrate individual drive chassis components and how they are numbered. Fibre Channel ports in the FC-AL adapters at the sides of the drive chassis enable connection to the controller nodes.
Numbers for drive chassis components are assigned:

- From bottom to top.
- From rear to front (in reference of disks).
- In the order indicated by “Numbering System for Drive Chassis Components” (page 37).

**Table 11 Numbering System for Drive Chassis Components**

<table>
<thead>
<tr>
<th>The Following Components...</th>
<th>Are Numbered...</th>
<th>Running from...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive cages</td>
<td>0,1,...</td>
<td>bottom to top</td>
</tr>
<tr>
<td>FC-AL modules</td>
<td>0,1</td>
<td>left to right</td>
</tr>
</tbody>
</table>
### Table 11 Numbering System for Drive Chassis Components (continued)

<table>
<thead>
<tr>
<th>The Following Components...</th>
<th>Are Numbered...</th>
<th>Running from...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibre Channel ports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FC-AL 0</td>
<td>A0, B0</td>
<td>top to bottom</td>
</tr>
<tr>
<td>FC-AL 1</td>
<td>A1, B1</td>
<td></td>
</tr>
<tr>
<td>Drive magazine</td>
<td>0,1,2,3,4,5,6,7,8,9</td>
<td>left to right</td>
</tr>
<tr>
<td>Hard drives on the drive magazine</td>
<td>0,1,2,3</td>
<td>rear to front</td>
</tr>
</tbody>
</table>

### Drive Magazine Allocation

For highest availability and data protection, drive magazines are placed on different loops and internal power domains by loading them in the order illustrated by Figure 28 (page 39).

**NOTE:** See the systems planning document, HP 3PAR System Assurance and Pre-Site Planning Guide drive magazine allocation instructions specific to your system.
NOTE: See “Installing the Drive Magazines” (page 56), for further instructions on drive magazine allocation.

Power Supply Numbering

The cabinets are divided into upper and lower power domains containing drive cages or controller nodes and dedicated power supplies. The drive cages and controller nodes depend on these power supplies connecting to PDUs for power.

When viewing the cabinet from the rear, the power supplies in drive chassis in each power domain are numbered from 0 to 3, from left to right (Figure 29 (page 40)). Each node contains two power supplies that are numbered 0 and 1, from left to right.
Figure 29 Numbering of Power Supplies Within the Power Domains
3 Setting Up the Storage System

This chapter provides instructions for unpacking and placing HP 3PAR cabinets. It also includes instructions for removing the rear door, removing side panels, and adjusting the power cabling configuration.

⚠️ **CAUTION:** Before unpacking and placing a cabinet, establish an operating site to meet the physical, electrical, and atmospheric requirements for a storage system. “Preparing for Storage System Installation” (page 9), contains instructions for establishing a safe and functional operating site.

Collecting the Necessary Tools

In addition to the Electrostatic Discharge (ESD) wrist grounding strap provided with the cabinet, you will need the following tools to install and service a storage system:

- #1 Phillips screwdriver
- #2 Phillips screwdriver
- 1/8 in. (3 mm) slotted screwdriver
- 3/16 in. (5 mm) slotted screwdriver
- 5/16 in. (8 mm) deep well socket
- Adjustable wrench

Unpacking the Cabinet

Read this section for instructions on unpacking HP 3PAR T-Class Storage Systems in cabinets. Cabinets and drive magazines arrive in separate shipping containers. Ask the agent of the carrier to be present while you inspect the containers and use the shipping list to verify the shipment is complete. Before unpacking any components, inspect all shipping containers for damage. If any part of the shipment shows evidence of damage, a TIP-N-TELL indicator displays the mishandling or tipping of the container. If the shipment is incomplete, contact HP 3PAR Technical Support for assistance and services.

The HP 3PAR T-Class Storage System is shipped in one of two types of containers, type 1 with a drop down door in the rear, and type 2 with a wide base.

Unpacking a Type 2 Container

⚠️ **CAUTION:** To avoid tipping the cabinet, use two people to unpack the cabinet. One person guides the cabinet down the ramp while a second person pushes from behind.

To unpack the cabinet:

---

4. For systems shipped internationally and for systems with fewer than 15 drive magazines, the magazines are shipped in boxes. Each box contains three magazines.
1. Locate the front of the shipping container ("The Front of the Cabinet Shipping Container “ (page 43)) and un latch the four rotary latches securing the front panel.

   **Figure 30 The Front of the Cabinet Shipping Container**

2. To un latch the rotary latches, raise the levers and turn them counterclockwise one half turn, as shown in “Un latching a Rotary Latch” (page 164).
3. Lower the front panel of the shipping container to form a ramp.

4. Remove the packing foam from the front of the storage system (“Removing Packing Foam” (page 44)).

5. Grasp the two straps on either side of the cabinet and carefully pull the cabinet out of the container (“Location of Straps” (page 45)).
6. Carefully guide the cabinet down the ramp.
7. Remove the plastic ESD-preventative packing materials from the cabinet and place into the shipping container for reuse.

**NOTE:** Retain packing materials, including wooden crates and pallets, for reuse.

### Placing the Storage System

After following the guidelines to establish a safe operating site as described in Chapter 1 (page 9), place the storage system in the operating location.

**CAUTION:** To avoid tipping the cabinet, use two people to unpack the cabinet. One person guides the cabinet down the ramp while a second person pushes from behind.

For information on recommended and required access areas, see Section (page 14).

If the operating site has raised floor tiles with cutouts to facilitate cable routing, position the storage systems over the cutouts in the tiles. See Section (page 14) and Section (page 16) for more information on the structural considerations involved in using raised flooring.

**CAUTION:** To avoid potential damage to system equipment, do not adjust the position of the cabinet when the power is on.

After positioning the cabinet, use the four leveling feet to stabilize the cabinet and prevent movement during operation.

To stabilize the cabinet with the leveling feet:
1. Use an adjustable wrench and turn clockwise to lower each foot until the weight of the cabinet rests on the leveling feet instead of the casters (“Lowering a Leveling Foot” (page 46)).

   ![Figure 34 Lowering a Leveling Foot]

2. Lock the feet in place by turning the locking nut on each foot counterclockwise until tight with an adjustable wrench (“Tightening the Locking Nut” (page 46)).

   ![Figure 35 Tightening the Locking Nut]

3. Verify the cabinet is stationary.

### Storage System Fascias

HP 3PAR cabinets feature removable fascias. The fascias are removable for cable routing and limiting access to the drive chassis and drive magazines.

### Removing Fascias

To remove a side panel:
1. Use a #2 Phillips screwdriver to loosen the three screws securing the fascia.
2. Pull the fascia to remove from cabinet.

**Figure 36 Removing a Front Fascia**

Removing Locking Fascias

HP 3PAR cabinets features optional locking left and right fascias. HP recommends locking both fascias during operation.

The locking fascias prevent the bezels from being removed and restrict access to the drive chassis and drive magazines.
1. Use the provided key to unlock the left and right fascia ("Location of Fascia Locks" (page 48)).

![Figure 37 Location of Fascia Locks](image)

2. Use a #2 screwdriver to remove the three screws securing each fascia and carefully remove each fascia from the cabinet.

**Locating the Wrist Grounding Strap**

To prevent damage from electrostatic discharge, it is necessary to wear an Electrostatic Discharge (ESD) wrist grounding strap during installation and maintenance of the storage system. Every cabinet includes a wrist grounding strap secured with a hook and loop fastener in the front of the cabinet, below the lowest battery tray.

**NOTE:** If the cabinet has locking fascias, remove the fascias before accessing the bezels. See “Storage System Fascias” (page 46).

To locate the grounding strap, remove the second bezel from the bottom of the cabinet. To remove a bezel, use the handle slots located on the sides of the bezel and pull with both hands (Figure 38 (page 49)).
Removing the Rear Door

HP 3PAR cabinets feature a locking rear door. HP recommends locking the rear door during operation. At the time of delivery, the rear door is unlocked. The key is taped to the inside of the rear door.

The rear door is also removable to improve access to the rear of the system during installation and maintenance.

To remove the rear door:
1. Open the door by unlatching the three latches located at the top, center, and bottom of the door.
   To open the latches, lift the lever and turn counterclockwise one quarter turn.
2. Locate the two lift-off hinges near the top and bottom of the door ("Lift-Off Hinges on the Door" (page 50)).
3. Release the bottom hinge by squeezing together the two release pins on the hinge and sliding the pins to the right ("Releasing the Hinge on the Rear Door of the Cabinet" (page 51)).
4. After releasing the bottom hinge, release the top hinge and pull the door away from the cabinet to remove it ("Removing the Rear Door" (page 51)).

**Removing Side Panels**

In addition to removing the rear door, remove one or more side panels prior to continuing with the installation.
NOTE: It is necessary to remove the side panels of a T800 cabinet when routing the main power cords up through the top of the cabinet.

- To remove a side panel, use a #2 Phillips screwdriver to loosen the screws securing the side panel. Using the handle, pull toward you while lifting up slightly “Removing a Side Panel from the Cabinet” (page 52)

Figure 42 Removing a Side Panel from the Cabinet

Adjusting Power Cables

After placing the cabinet, assess the power requirements of the system and determine if the operating site can support redundant power as described in Section (page 17).

For optimal data accessibility, HP strongly recommends:

- A redundant power configuration using independent sources to provide a separate dedicated 200-240 VAC electrical circuit for each PDU in the system.
- A fully redundant power configuration within the system, as described in “Supporting Redundant Power” (page 17).

NOTE: If a cabinet does not have components installed in the top four bays (bays 0–3, or the highest 16U of the cabinet), the two upper PDUs (PDU 0 and PDU 1) are not used to power the system and do not need to be connected. Redundant power is still supplied to the lower bays in the cabinet through PDU 2 and PDU 3.
There may be instances when an operating site lacks the capacity to provide each PDU in the system with a dedicated electrical circuit. HP recommends choosing an alternate operating site which meets all of the requirements detailed in Chapter 1 (page 9).

The standard cabling configuration for storage systems in HP 3PAR cabinets supports redundant AC within the system through AC cords situated between the power domains of the system. Figure 43 (page 54) and Figure 44 (page 55) illustrate the standard cabling configuration for a storage system in a single cabinet. For more information about this configuration and T800 system configurations, see Section (page 17).

**NOTE:** “Redundant Power Cabling Diagram (T400 Node Cabinet or Drive Expansion Cabinet)” (page 54) shows a sample system and may not match your particular system configuration.
Figure 43 Redundant Power Cabling Diagram (T400 Node Cabinet or Drive Expansion Cabinet)
Figure 44 Redundant Power Cabling Diagram (T800 Node Cabinet)
4 Installing the Drive Magazines

This chapter describes how to install drive magazines after placing a system at the operating site.

⚠️ **CAUTION:** To avoid damaging the system equipment, do not relocate or move the storage system over uneven surfaces with the drive magazines installed.

**NOTE:** If the cabinet has locking fascias, first remove the fascias to access the bezel. See “Storage System Fascias” (page 46).

**NOTE:** Before installing the drive magazines, see the *HP 3PAR Systems Assurance Document* for additional information about the placement of drive magazines for your specific system configuration.

Preventing to Install Drive Magazines

Before installing drive magazines you must remove all bezels from the cabinet.

- To remove a bezel, use the handle slots located on the sides of the bezel and pull with both hands “Removing a Bezel” (page 56)

**Figure 45 Removing a Bezel**

⚠️ **WARNING!** To prevent danger of electric shock and potential damage to equipment, verify all power supplies and PDUs are set to the OFF position before connecting a main power cord.

Clear any electrostatic charge in the area of the installation.

To discharge any electrostatic buildup on your person, put on a wrist grounding strap, connect the clip to an unpainted, metal component of the cabinet frame. Require that other personnel participating in the installation do the same.

When possible, ground the cabinet by connecting at least one main power cord to the power source at the operating site as described in Section (page 70).
Handling the Drive Magazines

When handling the drive magazines, observe the following precautions:

- Always use a wrist grounding strap. A wrist grounding strap is provided with the cabinet. Attach the grounding clip directly to an unpainted surface of the cabinet.
- Always use both hands when carrying a drive magazine.
- Avoid contact between drive magazines and clothing that can carry an electrostatic charge.
- Observe any warning labels placed on the individual hard drives or on the drive magazines.

Drive Chassis Placement and Numbering

HP 3PAR T-Class Storage Systems support DC4 drive chassis. Depending on the specific configuration, the system may support up to 32 drive chassis. The DC4 drive chassis is a 40 hard drive, 4Gb/s drive chassis.

Drive chassis are always placed above the system backplane enclosure and numbered according to their position in relation to the backplane, as shown in Figure 46 (page 57).

Figure 46 Numbering of Drive Chassis

![Drive Chassis Diagram]

NOTE: For systems occupying multiple cabinets, drive chassis numbers continue at the bottom of the next cabinet and progress through the top of the cabinet.

Figure 47 (page 58) and Figure 48 (page 58) illustrates individual drive chassis components and numbering pattern.
Unpacking and Inserting the Drive Magazines

The following sections describe how to unpack and install drive magazines into the storage systems.

Unpacking Drive Magazines

The drive magazines arrive in a shipping container. Containers hold a maximum of 30 magazines. Magazines are packaged in protective material to prevent damage from electrostatic discharge.

To unpack the drive magazines:
1. Attach the wrist grounding strap clip to any unpainted surface of the cabinet.
2. Open the drive magazine container by cutting the tie locks and then unlatching the four rotary latches located on the front and sides of the container.
3. To unlatch a rotary latch, raise the lever and turn it counterclockwise, as shown in “Unlatching a Rotary Latch” (page 59).

Figure 49 Unlatching a Rotary Latch

4. Identify the drive magazine sizes. See the HP 3PAR Systems Assurance Document for additional information about drive magazine sizes and placement for your specific storage system configuration.

5. Remove a magazine from the container. Slide the magazine out of the container protective sleeve.

Drive Magazine Loading Pattern

Figure 50 (page 60) and Table 12 (page 60) describe the recommended loading pattern for drive magazines in HP 3PAR T-Class Storage Systems.
NOTE: Depending on the number of drive chassis and drive magazines in your system, the drive magazine loading pattern may differ than the pattern depicted in “Pattern for Loading Initial Drive Magazines into the Drive Chassis” (page 60).

Table 12 Procedure for Loading Drive Magazines

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Beginning with the drive chassis nearest to the bottom of the cabinet, insert a magazine into slot 0 of the drive cage.</td>
</tr>
<tr>
<td>2</td>
<td>In the same drive chassis insert a magazine into slot 9 of the drive cage.</td>
</tr>
<tr>
<td>3</td>
<td>Depending on your configuration, populate the drive chassis from the outside slots to the inside slots. Then continue to the next drive chassis. The drive magazines should be distributed throughout the drive cages as evenly as possible.</td>
</tr>
</tbody>
</table>
Inserting the Drive Magazines

To insert the drive magazines:

1. Locate the drive chassis nearest to the bottom of the cabinet and insert the magazine into slot 0 within that drive chassis. Use the notch at the top of the drive bay as a guide while inserting the magazine (“Inserting a Drive Magazine Into a Drive Chassis” (page 61))

**NOTE:** For systems that occupy multiple cabinets, drive chassis numbers continue at the bottom of the next cabinet and progress through the top of the cabinet.

**NOTE:** See “Drive Chassis Numbering” (page 35) for an explanation of the numbering system applied to drive chassis and their components.

**NOTE:** If the drive magazine allocation for this system differs from the standard allocation pattern, it may be necessary to remove filler panels before installing drive magazines in some bays. See “Installing Drive Cage Filler Panels” (page 62) for more information.

![Figure 51 Inserting a Drive Magazine Into a Drive Chassis](image)

2. With the drive magazine handle in the open (down) position, insert the drive magazine into the drive bay and push until it stops. Lift the drive handle quickly into the closed (up) position
to fully seat the drive magazine in the chassis. When fully seated, the drive handle of the magazine rests against the front of the drive chassis housing.

⚠️ **CAUTION:** Drive magazines should glide in easily. If a drive magazine does not insert smoothly, do not force it. Check if the magazine is properly aligned with the guide notch at the top of the drive bay and apply moderate pressure toward the left side of the magazine while inserting.

**NOTE:** If you have difficulty inserting drive magazines into drive chassis that also have drive magazine filler panels installed, loosen the screws that fasten the adjacent filler panels to enable you to insert the drive magazines more easily.

3. After the drive magazine is fully inserted, use a #2 Phillips screwdriver to tighten the captive screw below the magazine handle, as shown in “Securing a Drive Magazine” (page 62). Do not overtighten.

![Figure 52 Securing a Drive Magazine](image)

4. For highest availability and data protection, place drive magazines on different loops and internal power domains by loading them in the order established in “Procedure for Loading Drive Magazines” (page 60) as illustrated by “Pattern for Loading Initial Drive Magazines into the Drive Chassis” (page 60).

**NOTE:** See the HP 3PAR Systems Assurance Document for additional information about drive magazine allocation for your system configuration.

After installing all the drive magazines, some drive chassis may contain empty slots. Install a drive magazine filler panel into each empty drive slot.

### Installing Drive Cage Filler Panels

Any drive cage partially populated with magazines requires drive magazine filler panels to promote the necessary airflow pattern within the cage. The drive magazine filler panel is a small piece of sheet metal and similar in same size as the face of a drive magazine, as shown in Figure 53 (page 63). Cover all unpopulated slots with a drive magazine filler panel.

⚠️ **CAUTION:** To prevent overheating of the drive chassis, do not operate a system unless all bays in the drive chassis are filled with drive magazines or sealed with drive magazine filler panels.
If the drive magazine allocation for this system differs from the standard allocation pattern, it may be necessary to remove some drive magazine filler panels before installing the drive magazines. Insert a screwdriver into the filler panel slot and leverage the drive magazine filler panel out.

To install drive magazine filler panels, place a drive magazine filler panel over the front opening of each empty drive bay in the system. Align the filler panel magazine slot and push the panel until it is securely seated (“Securing a Drive Magazine Filler Panel” (page 63)).

**Figure 53 Securing a Drive Magazine Filler Panel**
5 Checks and Setup before Powering On the Storage System

This chapter describes how to connect the power cords and complete the power on sequence for an HP 3PAR T-Class Storage System.

Checking Power Cord Connections

The storage systems arrive with all internal power cords configured and connected. Before powering on the storage system, verify the following:

- All AC cords are correctly configured and have not become loose during shipping.
- The service processor is properly connected to the PDU as shown in “Redundant Power Configuration (T400)” (page 67) or “Redundant Power Configuration (T800)” (page 68).

AC Cord Connections

The storage system AC cords are Y-cables. Connect the cords to two power supplies at the rear of the controller nodes and drive chassis to the PDUs at the bottom of the cabinet (Figure 54 (page 64)).

Each PDU has two separate power banks with four receptacles (Figure 55 (page 65)).
Each power bank supplies a maximum current of 12A at 220 VAC. PDUs have a cable tie system securing the AC cords to prevent accidental disconnection. Power supplies have cord locks securing the AC cords to prevent accidental disconnection (Figure 56 (page 65) and Figure 57 (page 66)).
Before powering on the storage system, check the cord locks on the power supplies to confirm the AC cords have become loose during shipping. Also check the AC cords and cable ties on the PDUs to verify cord connections are secured.

**Redundant Power**

Before powering on the storage system, verify the system has a valid redundant power configuration. In addition, verify each PDU connects to an independent AC input source. “Redundant Power Configuration (T400)” (page 67) illustrates a standard, redundant power configuration and illustrates an alternate configuration unique to some T800 storage systems.

**NOTE:** If a cabinet does not have components installed in the top four bays (bays 0–3) or the highest 16U of the cabinet, the two upper PDUs (PDU 0 and PDU1) are not used to power the system and does not need be connected. Redundant power is still supplied to the lower bays in the cabinet through PDU 2 and PDU 3.
NOTE: “Redundant Power Configuration (T800)” (page 68) applies only to the T800 configuration with front and rear PDUs.
Checking Battery Backup Unit Cable Connections

Battery cables connect the storage system Battery Backup Units (BBU) to the controller nodes. The BBUs are housed in one or more battery trays sitting above and below the controller nodes. A battery tray can hold a maximum of four BBUs (Figure 60 (page 69)).
**NOTE:** BBUs are inserted in the front of the storage system.

Each BBU contains two independently functioning batteries. BBUs have batteries resting vertically, with battery A above battery B. (Figure 20 (page 32)).

**Figure 61 Battery Backup Units Have Batteries Resting Vertically**

Storage systems in HP 3PAR cabinets arrive with all BBUs installed and cabled. Figure 62 (page 70) shows the battery cabling configuration based on the number of controller nodes in the system.
Before powering on the storage system, verify the battery cables have not loosened during shipping. In addition, verify the BBUs are cabled correctly:

- Each controller node connects to two BBUs through battery cables running from the two power supplies at the rear of the node.
- Each battery cable runs from a battery output connection on a controller node power supply to an input A or input B connection on the BBU.

⚠️ **WARNING!** Do not use the output A or output B connections on the BBU.

### Connecting the Main Power Cords

If you did not connect one or more main power cords to ground the cabinet as described in “Preparing to Install Drive Magazines” (page 56), connect all main power cords now.

⚠️ **WARNING!** To prevent danger of electric shock and potential damage to equipment, verify all power supplies and PDUs are set to the off position before connecting a main power cord.

To connect the main power cords:
1. Access the rear of the system and verify all power supplies are set to the OFF position.

2. Verify the safety breakers on all four of the PDUs are set to the OFF position, as shown in “Setting the Safety Breakers to the OFF Position” (page 71).

![Figure 63 Setting the Safety Breakers to the OFF Position](image)

3. For a T400 or drive expansion cabinet, at the front of the cabinet, use #2 Phillips screwdriver to remove the screws securing the 4U filler panel covering the lowest chassis bay in the cabinet, then remove the panel. For T800 node cabinets, remove both side panels to access the main AC cords.

4. Locate the main power cord for each of the four PDUs. Remove the protective packaging from the power receptacle connectors.

**NOTE:** For T800 storage system, remove the cabinet side panels to gain access to the four PDU power cords.

**NOTE:** If a cabinet does not have components installed in the top four bays (bays 0–3, or the highest 16U of the cabinet), it is not necessary to connect the two upper PDUs (PDU 0 and PDU 1). Use the two upper PDUs for future upgrades.

5. Route the main power cords through the lower access opening at the bottom of the cabinet or the upper access opening at the top of the cabinet. The side panels can be removed for easier cabling access (“Routing the Main Power Cords” (page 72)).
NOTE: To route power cords through the upper access opening of the cabinet, it is first necessary to remove one or both side panels as described in “Removing Side Panels” (page 51).

6. Plug each of the main power cords into a dedicated single-phase 200-240 VAC 30-A grounded electrical circuit.

To plug in a main power cord with a NEMA® L6-30 power receptacle connector, insert the power receptacle connector into the electrical outlet and rotate the connector clockwise one quarter turn (“Preventing Accidental Disconnection of the Main Power Cord (NEMA L6-30)” (page 73)).
**WARNING!** The main power cords include safety features to prevent plugging them into electrical circuits not compatible with the storage system. To prevent serious injury to people and damage to equipment, do not override this feature by using outlet adapters, altering power cords, or modifying power receptacle connectors.

**WARNING!** To avoid possible injury, damage to storage system equipment, and potential loss of data, do not use the surplus power outlets in the system PDUs. Never use outlets in the PDUs to power components that do not belong to the storage system or to power storage system components residing in other cabinets.

To plug in a main power cord with an IEC 60309 receptacle connector, insert the receptacle connector until it locks into place.

7. Replace the side panels (for a T800) or the 4U filler panel covering the lowest chassis bay at the front of the storage system.

**CAUTION:** To prevent overheating, do not operate a system unless all chassis bays are filled with components or sealed with filler panels.

### Positioning the Storage System

Before powering on the storage system, replace the rear door of the cabinet and any side panels removed during installation. Move the storage system to a permanent operating location.

**CAUTION:** To avoid potential damage to system equipment, do not adjust the positioning of a storage system while it is powered on.

### Replacing the Rear Door

To replace the rear door:
1. Align the rear door with the two hinges near the top and bottom of the cabinet frame, as shown in “Aligning the Rear Door with the Hinges” (page 74).

Figure 66 Aligning the Rear Door with the Hinges
2. Engage the hinges by squeezing the two release pins on the hinges and pushing the hinges to the left, as shown in “Engaging the Hinges on the Rear Door” (page 75).

![Figure 67 Engaging the Hinges on the Rear Door](image)

Replacing the Side Panels and Filler Panels

Replace any side panels or filler panels removed during cabling and positioning of the storage system.

⚠️ **CAUTION:** To prevent overheating of the system, do not operate a system unless all chassis bays are filled with components or sealed with filler panels. Do not operate the storage system with the side panels removed.

- To replace a side panel, use the handle located in the center of the panel to position it, then secure the panel by tightening all screws with a #2 Phillips screwdriver.
- To replace a filler panel, tighten the four screws securing the panel by using a #2 Phillips screwdriver.

When you have replaced all side and filler panels, make any final adjustments to the positioning of the system.

⚠️ **CAUTION:** To avoid tipping, one person should guide the cabinet from the front while a second person pushes from behind.

To adjust the positioning of the system (if necessary), first raise the leveling feet:
1. Use an adjustable wrench to turn the upper locking nuts clockwise completely ("Releasing the Locking Nut" (page 76)).

**Figure 68 Releasing the Locking Nut**

2. Using an adjustable wrench, turn each foot counterclockwise until completely raised ("Raising the Leveling Foot" (page 76)).

**Figure 69 Raising the Leveling Foot**

**NOTE:** If the operating site has raised floor tiles with cutouts to facilitate cable routing, position the cabinets over the cutouts in the tiles. See “Raised Floor Requirements” (page 14) for more information on the structural considerations involved in using raised flooring.

**Securing the Storage System**

After positioning the storage system, use the four leveling feet to stabilize the cabinet and to prevent movement during operation. For instructions on stabilizing the cabinet using the leveling feet, see Section (page 45).
Verifying Acclimatization

Before being powered on, the storage system may require up to 24 hours to acclimatize to the new operating environment when outside-to-inside conditions vary greatly. If there is a possibility the storage system or its components may have experienced environmental changes during transit, verify the amount of acclimatization time for the storage system before proceeding with the power-on sequence.

⚠️ **CAUTION:** To prevent potential damage to system hardware, do not power on the storage system until it has properly acclimatized.

⚠️ **CAUTION:** If condensation is present after the 24 hour acclimatization period, wait until all condensation evaporates before completing the power-on sequence.

Completing the Power-On Sequence

After checking or completing all cable connections and verifying the storage system is stationary, perform the power-on sequence:

1. Connect the maintenance PC to the highest numbered controller node and initiate a terminal emulation session as described in “Connecting the Maintenance PC” (page 191) for monitoring and recording boot activity.
2. Access the rear of the system and verify all PDUs are set to the OFF position.
3. Set each of the power supplies to the ON position.
4. Set the safety breakers on the PDUs to the ON position (“Setting the Safety Breakers to the ON Position” (page 77)).
5. Set both battery switches in each of the BBUs to the ON position.

**NOTE:** For T800 systems, two PDUs are accessible from the rear and the remaining PDUs are accessible at the front of the storage system.
6. After approximately 10 minutes, check the status of all LEDs for proper operation. Refer to “Understanding LED Status” (page 79) for specifics.

**NOTE:** At this time, the node system LEDs appear solid green because the system has not been initialized.
6 Understanding LED Status

Using the Component LEDs

HP 3PAR T-Class Storage System components have LEDs to indicate the hardware is properly functioning and to help identify errors. These LEDs help diagnose basic hardware problems. You can quickly identify hardware problems by examining the LEDs on all the components. Use the tables and diagrams in the following sections to verify the hardware is properly functioning.

Removing the Bezels and Unlocking the Door

⚠️ WARNING! Hazardous energy is located behind the rear access door of the storage system cabinet. Use caution when working with the door open.

**NOTE:** If your 3PAR cabinet has locking fascias, first remove the fascias to access the system bezel. See “Storage System Fascias” (page 46).

- To view the node, drive chassis or service processor LEDs, remove the bezels.
- To view the power supply, battery or PDU LEDs, open the rear door by unlatching the three latches of the door (T800 systems contain PDUs in the front and rear of the cabinet).

**NOTE:** Many LEDs are visible without removing the bezels. To view the power supply, battery or PDU LEDs, open the rear door of the cabinet.

Drive Cage LEDs

The T-Class system uses a DC4 drive chassis that holds one DC4 drive cage housing two drive cage FC-AL modules and a maximum of 10 drive magazines. See Figure 71 (page 79).

**Figure 71 DC4 Drive Cage**

DC4 Drive Cage FC-AL Module LEDs

The DC4 drive cage FC-AL modules have the following LEDs (Figure 72 (page 80)).
Consult Table 13 (page 80) to verify proper functioning of the DC4 drive cage FC-AL modules.

Table 13 Drive Cage DC4 FC-AL Module LED Displays

<table>
<thead>
<tr>
<th>LED</th>
<th>Appearance</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>RX</td>
<td>Steady green light</td>
<td>Indicates the presence of a small form-factor pluggable optical transceiver (SFP) and a valid signal from the node.</td>
</tr>
<tr>
<td></td>
<td>No light</td>
<td>Indicates there is not a connection to the node or an SFP is not installed.</td>
</tr>
<tr>
<td>TX</td>
<td>Steady green light</td>
<td>Indicates the presence of an SFP and the LED is on and transmitting.</td>
</tr>
<tr>
<td></td>
<td>No light</td>
<td>Indicates an SFP is not present or the SFP transmitter failed.</td>
</tr>
<tr>
<td>FC-AL status</td>
<td>Steady green light</td>
<td>Indicates the drive cage is functioning properly, but is not communicating with any nodes.</td>
</tr>
<tr>
<td></td>
<td>Flashing green light (1 blink per second)</td>
<td>Indicates the cage is connected and communicating with the system manager of a node in the cluster.</td>
</tr>
</tbody>
</table>
Table 13 Drive Cage DC4 FC-AL Module LED Displays (continued)

<table>
<thead>
<tr>
<th>LED</th>
<th>Appearance</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Steady amber light</td>
<td>Normal, initial indication for two seconds upon power up. Otherwise, indicates FC-AL module error or other cage error. If both FC-AL modules have a steady light, the temperature of a disk drive has exceeded 55°C, or a power supply has failed.</td>
</tr>
<tr>
<td></td>
<td>Flashing amber light (1 blink per second)</td>
<td>The drive cage has some type of error, for example a failed or missing power supply, but is communicating with a node.</td>
</tr>
<tr>
<td></td>
<td>Rapid toggle between amber and green light</td>
<td>Indicates a cage firmware upgrade initiated by the upgradeCage CLI command is in progress. A firmware upgrade normally takes less than two minutes to complete.</td>
</tr>
<tr>
<td>Hot-plug</td>
<td>Steady amber light</td>
<td>Indicates FC-AL module is prepared for replacement (hot-plug).</td>
</tr>
<tr>
<td></td>
<td>No light</td>
<td>Indicates FC-AL module is not prepared for hot-plug.</td>
</tr>
<tr>
<td>Split Mode</td>
<td>Steady green light</td>
<td>Indicates the drive cage is split into two logical portions.</td>
</tr>
<tr>
<td></td>
<td>No light</td>
<td>Indicates the drive cage is not split.</td>
</tr>
<tr>
<td>4 GB/s</td>
<td>Steady green light</td>
<td>Indicates the transfer rate is operating at 4 Gb/s.</td>
</tr>
<tr>
<td></td>
<td>No light</td>
<td>Indicates the transfer rate is operating at 2 Gb/s.</td>
</tr>
</tbody>
</table>

Drive Magazine LEDs

Drive magazines contain the following LEDs (Figure 73 (page 81)):

Figure 73 DC4 Drive Magazine LEDs

Consult Table 14 (page 82) to verify proper functioning of hard drives and drive magazines.
Table 14 Drive Magazine LED Displays

<table>
<thead>
<tr>
<th>LED</th>
<th>Appearance</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC4 Drive Magazine Status</td>
<td>Steady green light</td>
<td>Indicates the drive magazine is functioning properly.</td>
</tr>
<tr>
<td></td>
<td>Steady amber light</td>
<td>Indicates a drive magazine error, or one or more drives are bypassed on at least one path.</td>
</tr>
<tr>
<td>Disk status</td>
<td>Quick flashing, or 20 percent-on and 80 percent-off green light</td>
<td>Indicates disk is not spun up but is functioning.</td>
</tr>
<tr>
<td></td>
<td>Steady green light</td>
<td>Indicates the disk is spun up and waiting for a command.</td>
</tr>
<tr>
<td></td>
<td>Flashing green light</td>
<td>Indicates the disk is executing commands.</td>
</tr>
<tr>
<td></td>
<td>No light</td>
<td>Indicates a disk is not present.</td>
</tr>
<tr>
<td></td>
<td>Steady amber light</td>
<td>Indicates a disk error, or the disk is bypassed on both paths (loops).</td>
</tr>
<tr>
<td>DC4 Hot-plug</td>
<td>Steady amber light (depending on hardware version).</td>
<td>When illuminated, the drive magazine is prepared for replacement (hot-plug).</td>
</tr>
<tr>
<td></td>
<td>No light</td>
<td>Indicates magazine is not prepared for hot-plug.</td>
</tr>
<tr>
<td></td>
<td>Flashing amber light</td>
<td>Indicates drive magazine error. Contact HP 3PAR Technical Support for assistance and services.</td>
</tr>
</tbody>
</table>

**NOTE:** After powering on, allow approximately two minutes for the hard drives on the DC4 drive magazine to spin up before checking the drive magazine LEDs.

**Controller Node LEDs**

Depending upon the configuration, storage systems containing between two and eight controller nodes, all controller nodes are located in the storage system chassis.

Controller nodes contain the following LEDs (Figure 74 (page 82)):

**Figure 74 Controller Node LEDs**
Consult Table 15 (page 83) to verify proper functioning of controller nodes.

**Table 15 Controller Node LED Displays**

<table>
<thead>
<tr>
<th>LED</th>
<th>Appearance</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk Hot-plug</td>
<td>Steady amber light</td>
<td>Indicates the internal disk is ready for hot-plug.</td>
</tr>
<tr>
<td></td>
<td>No light.</td>
<td>Indicates the internal disk is not ready for hot-plug.</td>
</tr>
<tr>
<td>Node Hot-plug</td>
<td>Steady amber light</td>
<td>In combination with the Status LED blinking green three times per second, indicates the controller node is prepared for removal. In combination with the Status LED being solid, indicates a fatal node failure.</td>
</tr>
<tr>
<td></td>
<td>No light</td>
<td>Indicates node is not prepared for removal.</td>
</tr>
<tr>
<td>Node Status</td>
<td>Flashing green light (1 blink per second)</td>
<td>Indicates node is fully functional and part of the cluster.</td>
</tr>
<tr>
<td></td>
<td>Flashing amber light (1 blink per second)</td>
<td>Indicates the node has a failed or missing power supply, fan, backup battery, or TOD battery, but the node is still operational.</td>
</tr>
<tr>
<td></td>
<td>Steady green light</td>
<td>Indicates node is in the process of joining the cluster.</td>
</tr>
<tr>
<td></td>
<td>Rapidly flashing green (3 blinks per second), in conjunction with the hot-plug LED being solid amber.</td>
<td>Indicates the node is safe to remove.</td>
</tr>
<tr>
<td></td>
<td>Steady amber light</td>
<td>Indicates an error within the node.</td>
</tr>
<tr>
<td></td>
<td>Solid amber and hot-plug LED amber</td>
<td>Indicates a fatal node failure.</td>
</tr>
<tr>
<td>Ethernet activity</td>
<td>Steady or flashing green light</td>
<td>Indicates Ethernet activity.</td>
</tr>
<tr>
<td></td>
<td>No light</td>
<td>Indicates no Ethernet activity.</td>
</tr>
<tr>
<td>Ethernet 10/100/1000 Mbps</td>
<td>Steady amber light</td>
<td>1000 Mb/sec mode.</td>
</tr>
<tr>
<td></td>
<td>Steady green light</td>
<td>100 Mb/sec mode.</td>
</tr>
<tr>
<td></td>
<td>No light</td>
<td>10 Mb/sec mode (or disconnected).</td>
</tr>
</tbody>
</table>

**Fibre Channel Port LEDs**

The Fibre Channel adapter contained in the controller node also contains Fibre Channel port LEDs (Figure 75 (page 84)).
Consult Table 16 (page 84) to verify proper function of the Fibre Channel adapter LED.

### Table 16 Fibre Channel Port Status LED Indications (4-Port Adapter)

<table>
<thead>
<tr>
<th>LED Appearance</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>No light</td>
<td>Wake-up Failure (broken device).</td>
</tr>
<tr>
<td>Steady green light</td>
<td>Normal – Link up at 2 or 4 Gbps.</td>
</tr>
<tr>
<td>Flashing green light</td>
<td>Link down or disconnected.</td>
</tr>
</tbody>
</table>

**QLogic iSCSI Port LEDs**

The QLogic iSCSI adapter contains two ports and each port has one LED.
Consult Table 17 (page 85) to verify the proper functioning of QLogic iSCSI adapter LEDs.

**Table 17 iSCSI Adapter Port LED Indications**

<table>
<thead>
<tr>
<th>LED Appearance</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steady green</td>
<td>Indicates a link is established.</td>
</tr>
<tr>
<td>Flashing green</td>
<td>Indicates receiving or transmitting activity.</td>
</tr>
<tr>
<td>Off</td>
<td>Indicates no connection or active link.</td>
</tr>
</tbody>
</table>

**Ethernet Adapter LEDs**

The controller node Ethernet adapter has two LEDs (Figure 77 (page 86)).
Consult Table 18 (page 86) to verify the proper functioning of Ethernet adapter LEDs.

**Table 18 Ethernet Adapter Indications**

<table>
<thead>
<tr>
<th>LED</th>
<th>Appearance</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT/LNK</td>
<td>Steady green light</td>
<td>Valid link partner.</td>
</tr>
<tr>
<td></td>
<td>Flashing green light</td>
<td>Data activity.</td>
</tr>
<tr>
<td></td>
<td>No light</td>
<td>ACT/LNK is off.</td>
</tr>
<tr>
<td>Speed</td>
<td>Steady yellow light</td>
<td>1000 Mb/sec mode.</td>
</tr>
<tr>
<td></td>
<td>Steady green light</td>
<td>100 Mb/sec mode.</td>
</tr>
<tr>
<td></td>
<td>No light</td>
<td>10 Mb/sec mode.</td>
</tr>
</tbody>
</table>

**Power Supply LEDs**

Power supply units are located at the rear of all drive cages and controller nodes. Power supplies have the following LEDs ("Power Supply LEDs" (page 87)): 
**NOTE:** The appearance of the drive chassis and controller node power supplies can vary slightly according to manufacturer and location.

Consult Table 19 (page 87) to verify proper operation of the power supplies.

**Table 19 Power Supply LED Displays**

<table>
<thead>
<tr>
<th>LED</th>
<th>Appearance</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply status</td>
<td>Steady green light</td>
<td>Indicates the power is on.</td>
</tr>
<tr>
<td></td>
<td>Steady amber light</td>
<td>Indicates a power supply error.</td>
</tr>
<tr>
<td></td>
<td>No light</td>
<td>Indicates a broken connection to the AC power source.</td>
</tr>
<tr>
<td>AC</td>
<td>Steady green light</td>
<td>Indicates an AC is from an external source.</td>
</tr>
<tr>
<td></td>
<td>No light</td>
<td>Indicates an AC is not entering from an external source (for example, when power is off or when using battery power).</td>
</tr>
</tbody>
</table>

**Battery Backup Unit LEDs**

Depending on the configuration, storage systems with HP 3PAR cabinets include one or more battery trays that hold up to four Battery Backup Units (BBUs) apiece. BBUs supply enough power to write the cache memory to the drive inside the node in the event of a power failure.
BBUs contain two batteries, labeled battery A and battery B. The BBUs also include the following LEDs (Figure 79 (page 88)):

**Figure 79 Battery Backup Unit LEDs (Magnetek)**

<table>
<thead>
<tr>
<th>LED</th>
<th>Appearance</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery A status LED</td>
<td>Steady green light</td>
<td>Indicates battery A is charged.</td>
</tr>
<tr>
<td></td>
<td>Flashing green light</td>
<td>Indicates the battery is undergoing a test.</td>
</tr>
<tr>
<td></td>
<td>Steady amber light</td>
<td>Indicates a battery error.</td>
</tr>
<tr>
<td></td>
<td>No light</td>
<td>BBUs or power supply is turned off.</td>
</tr>
<tr>
<td>Battery B status LED</td>
<td>Steady green light</td>
<td>Indicates battery B is charged.</td>
</tr>
<tr>
<td></td>
<td>Blinking green light</td>
<td>Indicates the battery is undergoing a test.</td>
</tr>
<tr>
<td></td>
<td>Steady amber light</td>
<td>Indicates a battery error.</td>
</tr>
<tr>
<td></td>
<td>No light</td>
<td>BBUs or power supply is turned off.</td>
</tr>
</tbody>
</table>

Consult Table 20 (page 88) to verify proper functioning of the BBUs.

**Table 20 Battery Backup Unit LED Displays**

Power Distribution Unit Lamps

Storage systems include four Power Distribution Units (PDUs). PDUs contain two power bank lamps (Figure 80 (page 88)):

**Figure 80 Power Distribution Unit Lamps**

A blue illuminated lamp indicates power is being supplied to a power bank. When the blue lamp is not illuminated, the power bank is not receiving AC input.
Service Processor LEDs

Wintec Service Processor

The Wintec service processor LEDs are defined in the following section. The LED’s are located at the top of the Wintec service processor (Figure 81 (page 89)).

Figure 81 Wintec Service Processor LEDs

Consult Table 21 (page 89) to verify proper functioning of the Wintec service processor displays.

Table 21 Wintec Service Processor LED Displays

<table>
<thead>
<tr>
<th>LED</th>
<th>Appearance</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard Disk</td>
<td>No light</td>
<td>Indicates no hard drive activity.</td>
</tr>
<tr>
<td></td>
<td>Flashing blue light</td>
<td>Indicates hard drive activity.</td>
</tr>
<tr>
<td>NIC Port 2</td>
<td>No light</td>
<td>Indicates no network activity.</td>
</tr>
<tr>
<td></td>
<td>Flashing amber light</td>
<td>Indicates network activity.</td>
</tr>
<tr>
<td>NIC Port 1</td>
<td>No light</td>
<td>Indicates no network activity.</td>
</tr>
<tr>
<td></td>
<td>Flashing amber light</td>
<td>Indicates network activity.</td>
</tr>
<tr>
<td>Power</td>
<td>No light</td>
<td>The system is off.</td>
</tr>
<tr>
<td></td>
<td>Steady blue light</td>
<td>Indicates the system is powered on.</td>
</tr>
</tbody>
</table>

Supermicro Service Processor

The Supermicro service processor LEDs are defined in the following section. The LEDs are located at the top of the service processor (Figure 82 (page 90)).
Consult Table 22 (page 90) to verify proper functioning of the Supermicro service processor displays.

**Table 22 Supermicro Service Processor LED Displays**

<table>
<thead>
<tr>
<th>LED</th>
<th>Appearance</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overheat</td>
<td>No light</td>
<td>Indicates the system is normal</td>
</tr>
<tr>
<td></td>
<td>Steady red light</td>
<td>Indicates the system is overheated</td>
</tr>
<tr>
<td>NIC Port 2</td>
<td>No light</td>
<td>Indicates no network activity</td>
</tr>
<tr>
<td></td>
<td>Flashing green light</td>
<td>Indicates network activity</td>
</tr>
<tr>
<td></td>
<td>Steady green light</td>
<td>Indicates network is linked</td>
</tr>
<tr>
<td>NIC Port 1</td>
<td>No light</td>
<td>Indicates no network activity</td>
</tr>
<tr>
<td></td>
<td>Flashing green light</td>
<td>Indicates network activity</td>
</tr>
<tr>
<td></td>
<td>Steady green light</td>
<td>Indicates network is linked</td>
</tr>
<tr>
<td>Hard Disk</td>
<td>No light</td>
<td>Indicates no hard drive activity</td>
</tr>
<tr>
<td></td>
<td>Flashing amber light</td>
<td>Indicates hard drive activity</td>
</tr>
<tr>
<td>Power</td>
<td>No light</td>
<td>The system is off</td>
</tr>
<tr>
<td></td>
<td>Steady green light</td>
<td>Indicates the system is powered on</td>
</tr>
</tbody>
</table>

**Supermicro II Service Processor**

The Supermicro II service processor LEDs are defined in the following section. The LEDs are located at the top of the service processor (Figure 83 (page 90)).
Consult Table 23 (page 91) to verify proper functioning of the Supermicro II service processor displays.

**Table 23 Supermicro II Service Processor Front-Panel Displays**

<table>
<thead>
<tr>
<th>LED</th>
<th>Appearance</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>No light</td>
<td>Indicates the service processor is off.</td>
</tr>
<tr>
<td></td>
<td>Steady green light</td>
<td>Indicates the service processor is on.</td>
</tr>
<tr>
<td>Hard Disk Drive</td>
<td>No light</td>
<td>Indicates no hard drive activity.</td>
</tr>
<tr>
<td></td>
<td>Flashing amber light</td>
<td>Indicates hard drive activity.</td>
</tr>
<tr>
<td>NIC Port 2</td>
<td>No light</td>
<td>Indicates the port is not connected.</td>
</tr>
<tr>
<td></td>
<td>Steady green light</td>
<td>Indicates that the port is connected.</td>
</tr>
<tr>
<td></td>
<td>Flashing green light</td>
<td>Indicates network activity.</td>
</tr>
<tr>
<td>NIC Port 1</td>
<td>No light</td>
<td>Indicates the port is not connected.</td>
</tr>
<tr>
<td></td>
<td>Steady green light</td>
<td>Indicates the port is connected.</td>
</tr>
<tr>
<td></td>
<td>Flashing green light</td>
<td>Indicates network activity.</td>
</tr>
<tr>
<td>Overheat</td>
<td>No light</td>
<td>Indicates the service processor temperature is normal.</td>
</tr>
<tr>
<td></td>
<td>Flashing red light</td>
<td>Indicates the service processor has a failed fan.</td>
</tr>
<tr>
<td></td>
<td>Steady red light</td>
<td>Indicates the service processor temperature is overheating.</td>
</tr>
</tbody>
</table>

**Securing the Storage System**

After verifying the storage system is properly functioning, secure the system by closing the rear door and locking cabinet.

**WARNING!** Hazardous energy is located behind the rear access door of the cabinet. Use caution when working with the door open.
7 Initializing the Storage System Software

This chapter describes how to complete the installation of a storage system by setting up and configuring the storage system software and service processor software. You must execute these scripted setup procedures from the maintenance PC after powering on the system.

**NOTE:** In this and other chapters, the command-line examples use bold type to indicate user input and *<angle brackets>* to denote variables. Examples may not match the exact output of your system.

### Preparing for System Software Setup

This section contains crucial information about preparing to run the scripted setup procedures described in this chapter.

Before executing the scripted setup procedures in this chapter:

- Complete all physical installation procedures
- Inspect all cable connections before powering on the storage system
- Inspect all LEDs
- Correct any problems indicated by the component LEDs

### Collecting Necessary Information

Obtain the following information before proceeding with the setup and configuration procedures described in this chapter. See the HP 3PAR Installation Workbook in collecting this information.

- Storage system name, IP address, and subnet mask
- Service processor IP address and subnet mask
- Customer gateway IP address
- Customer NTP server IP address (optional)
- Sparing plan (default, minimum, maximum, or customized)

### Dial-Up Connection Settings

If the customer is using a dial-up connection, it is also necessary to obtain the telephone number, including area code and dial-out prefix, of the line to be connected to the service processor.

### Setting Up the Storage System

The Out-of-the-Box (OOTB) script guides you through setting up and configuring the storage system software.

### Storage System Out-of-the-Box Script

1. Connect the PC to controller node-0 through a serial cable and log in with user ID `console`. See “Connecting the Maintenance PC” (page 191), for instructions.

   ```
   3PAR(R) InForm(tm) OS 3.1.1 1200163-0 ttyS0
   1200163-0 login:console
   Password: 
   ```
2. From the console menu, select option 1 for Out of The Box Procedure.

3PAR Console Menu 1400293-1 3.1.1.xxx

1. Out Of The Box Procedure
2. Run ootb-stress-analyzer
3. Re-enter network configuration
4. Update the CBIOS
5. Enable or disable CLI error injections
6. Perform an IDE rescue
7. Set up the system to wipe and rerun ootb
8. Cancel a wipe
9. Perform a deinstallation
10. Update the system for recently added hardware (admithw)
11. Check system health (checkhealth)
12. Exit

⚠️ WARNING! ⚠️ Proceeding with the system setup script causes complete and irrecoverable loss of data. Do not perform this procedure on a system that has already undergone the system setup described in this chapter.

**NOTE:** At some point during this process, you may receive a message to indicate the caching limit for power fail is set to 0 pages. This is normal during initialization and does not require any action.

**NOTE:** If you quit this setup script at any point, you must repeat the entire process.

When the system is ready for the system setup script, the following message appears:

It appears your Cluster is in a proper manual startup state to proceed.

Welcome to the Out-Of-The-Box Experience 3.1.1.xxx

***************************************************************************
***************************************************************************
*                                                                           *
*   CAUTION!! CONTINUING WILL CAUSE COMPLETE AND IRRECOVERABLE DATA LOSS    *
*                                                                           *
***************************************************************************
***************************************************************************

You need to have the InServ network config information available. This can be obtained from the Systems Assurance Document.

DO YOU WISH TO CONTINUE? yes/no ==> yes

Cluster has the following nodes:

Node 0
Node 1

Enter < C > to continue or < Q > to quit  ==> c

- Verify the number of controller nodes in the system, then type c and press ENTER.
- If the system is not ready for the system setup script, an error message appears. After following any onscreen instructions and correcting any problems return to Step 2 and attempt to run the setup script again.
3. Set up the time zone for the operating site as follows:
   a. Select a location from the list, type the corresponding number <N>, and press ENTER.
   b. Select a country, type the corresponding number <N>, and press ENTER.
   c. Select a time zone region, type the corresponding number <N>, and press ENTER.
   d. Verify the time zone settings are correct, type 1, and press ENTER.

   **NOTE:** The system automatically makes the time zone change permanent. Disregard the instructions on the screen for appending the command to make the time zone change permanent.

4. Press ENTER to accept the default time and date, or type the date and time in the format <MMDDhhmmYYYY>, where M, D, h, m, and Y are the current month, day, hour, minute, and year, respectively, and then press ENTER.

   Current date according to the system: <date_and_time>

   Enter dates in MMDDhhmmYYYY format. For example, 031822572008 would be March 18, 2012 10:57 PM.
   Enter the correct date and time, or just press enter to accept the date shown above. => <enter>
   (...) Is this the desired date? (y/n) y

   To confirm the date setting, type y and press ENTER.

5. Name the storage system using up to 31 alphanumeric characters. Type yes and press ENTER to confirm the name.

   **NOTE:** The system name can only include letters, numbers and the special characters “-_”, (dot, hyphen, underscore) and can be no more than 31 characters long. The first character must be a letter or number.

   Enter the InServ system name ==> <system name>

   Cluster will be initialized with the name <system name>

   IS THIS THE CORRECT NAME? yes/change ==> yes

   Cluster is being initialized with the name <system name>
   ...Please Wait...

6. Verify the InForm OS version is correct. Type C and press ENTER to continue.

   Please verify your InForm OS versions are correct.

   Release version 3.1.1.226
   Patches: None

   Component Name          Version
   CLI Server              3.1.1.xxx
   CLI Client              3.1.1.xxx
   System Manager          3.1.1.xxx
   Kernel                  3.1.1.xxx
   TPD Kernel Code         3.1.1.xxx

   Enter < C > to continue or < Q > to quit ==> c
7. Verify the number of drive magazines and physical disks in the storage system.

Examining the port states...
All ports are in acceptable states.

Examining state of new disks...

Found < 4 > HUA722020ALA330 disks
Found < 8 > HVIPC0300GBFC15K disks
Found < 8 > HVIPC0600GBFC15K disks
Found < 8 > SEGLE0300GBFC15K disks
Found < 8 > SEGLE0600GBFC15K disks

Cluster has < 36 > total disks in < 9 > magazines.
< 36 > are new.

Now would be the time to fix any disk problems.
Enter < C > to continue or < Q > to quit  ==> c

- To continue, type c and press ENTER.
- If the number of disks is not correct, or if there are any failed, invlabel, or notready disks, type q and press ENTER to quit the setup script. To remedy any disk problems, refer to the HP 3PAR T-Class Storage System Maintenance Manual.

8. As the system checks cage connections and firmware, verify the status is OK for all drive cages, as indicated in the far right column in the following example.

Ensuring all ports are properly connected before continuing... Please Wait...

Cages appear to be connected correctly, continuing.

Examining drive cage firmware... Please wait a moment...

Issuing admitpd... Please wait a moment...
admitpd completed with the following results...

Found < 4 > HUA722020ALA330 disks
Found < 8 > HVIPC0300GBFC15K disks
Found < 8 > HVIPC0600GBFC15K disks
Found < 8 > SEGLE0300GBFC15K disks
Found < 8 > SEGLE0600GBFC15K disks

Cluster has < 36 > total disks in < 9 > magazines.
< 36 > are valid.

All disks have current firmware.

If there are any missing, or nonstandard connections, an error message appears on the screen. Verify all non-standard connections are correct or complete any missing connections, then type r and press ENTER to recheck the connections. If it is necessary to quit the setup procedure to resolve an issue, type q and press ENTER. When all connections are correct, type c and press ENTER to continue.
9. The system checks disk states and firmware versions. If there are no problems, the script continues automatically. Continue onto step 10.

Issuing admitpd... Please wait a moment...
admitpd completed with the following results...

Found < 4 > HUA722020ALA330 disks
Found < 8 > HVIPC0300GBFC15K disks
Found < 8 > HVIPC0600GBFC15K disks
Found < 8 > SEGLE0300GBFC15K disks
Found < 8 > SEGLE0600GBFC15K disks

Cluster has < 36 > total disks in < 9 > magazines.
< 36 > are valid.
All disks have current firmware.

If some disks have old firmware, upgrade them now by typing u and pressing ENTER. This allows upgrade of disk firmware without exiting the system setup script. When finished, continue to step 10.

10. When the system prompts to begin the system stress test script, type y and press ENTER.

At this point, it is recommended that the OOTB stress test be started. This will run heavy I/O on the PDs for 1 hour following 1 hour of chunklet initialization. The results of the stress test can be checked in approximately 2 hours and 15 minutes. Chunklet initialization will continue even after the stress test completes. Select the "Run ootb-stress-analyzer" option from the console menu to check the results.

Do you want to start the test (y/n)? ==> y
Starting system stress test...
The system stress test continues to run in the background as you complete the system setup.

11. Verify the version of the operating system matches for all components. When finished, type c and press ENTER.

12. Create spare chunklets.

Calculating space usage of sparing algorithms...
Select one of the following spare chunklet selection algorithms:
Minimal: About 9% of the system chunklets will be used.
Default: About 36% of the system chunklets will be used.
Maximal: About 14% of the system chunklets will be used.
Custom allows specifying the exact number of chunklets, but is not recommended as spares must be manually added when new disks are added.

Enter "Ma" for maximal, "D" for default, "Mi" for minimal, or "C" for custom:

⚠️ CAUTION: See “Storage System Sparing Schedule” (page 214) for further information about sparing minimums and recommendations.

13. Verify the correct license(s) is displayed and press ENTER.

Please enter the new license key below. When finished, press enter on an empty line. If the key is entered by hand, note that characters other than letters and numbers are ignored, and the key is not case sensitive.
The following features will be enabled:
Domains                                 (No expiration date)
Thin Provisioning (1024G)               (No expiration date)
Virtual Copy                            (No expiration date)

Are these the expected changes? (yes/no) y License key successfully set.

If the license information is not correct, type c and press ENTER to continue with the system setup. After completing the system setup, contact HP 3PAR Technical Support for assistance to obtain the proper license keys.

14. If the customer wants the CIM-based management API enabled, type y, otherwise type n.

Support for CIM-based management API is disabled by default. It can be enabled at this point.

Does the customer want this feature to be enabled (y/n)? ==>n

15. Complete the network configuration:
   a. When prompted, type the number of IP addresses used by the system (usually 1) and press ENTER.
   b. Type the IP address and press ENTER.
   c. Type the netmask and press ENTER.
   d. Type the gateway IP address and press ENTER.
   e. Specify the speed and duplex settings and press ENTER.

      Please specify speed (1, 100, or 1000) and duplex (half or full), or auto to use autonegotiation: auto

   f. Type the NTP server IP address and press ENTER.

      NOTE: If an NTP server IP address is not provided, use the SP IP address.

   g. If you indicated more than one IP address in step 15, the setup script prompts you to choose which nodes to use for each address. Note, <X Y Z> are node numbers (for example: 023 for nodes 0, 2, and 3).

      Enter config for IP #0
      IP Address: <IpAddress>
      Netmask: <netmask>
      Nodes Using IP address: <X Y Z>

   h. If the customer specifies disabling all non-encrypted ports, type yes, otherwise type no.

      Disabling non-encrypted ports will disable SP event handling, Recovery Manager for VMWare, SRA, and CLI connections with default parameters. It should only be done if there is a strict requirement for all connections to be encrypted. Disable non-encrypted ports? no
i. Verify the IP address information is correct. Type y and press ENTER.

<table>
<thead>
<tr>
<th>Please verify the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Address: xxxx</td>
</tr>
<tr>
<td>Netmask: xxxx</td>
</tr>
<tr>
<td>Nodes: 0 2 3</td>
</tr>
<tr>
<td>Default route through gateway xxxx, via xxxx</td>
</tr>
<tr>
<td>Speed and duplex will be autonegotiated.</td>
</tr>
<tr>
<td>No NTP server.</td>
</tr>
<tr>
<td>Does this appear to be correct? [y/n] y</td>
</tr>
<tr>
<td>Updated netc configuration in the PR.</td>
</tr>
<tr>
<td>SIGHUP has been sent to the netc controller. The network configuration should reach the new state momentarily.</td>
</tr>
</tbody>
</table>

16. At the conclusion, the following screen displays:

<table>
<thead>
<tr>
<th>Out-Of-The-Box has completed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please continue with the SP moment of birth.</td>
</tr>
<tr>
<td>Exiting Out-Of-The-Box Experience...</td>
</tr>
</tbody>
</table>

If any unexpected alerts occur during OOTB, the alerts display. Resolve any alert issues before proceeding.

**Setting up the Service Processor**

The service processor (SP) enables the service provider to locally and remotely monitor and service the storage system.

**Service Processor Moment of Birth**

The Service Processor Moment of Birth script (SPMOB) sets up and configures the service processor.

**NOTE:** Before performing the SPMOB, always reference the *HP 3PAR Installation Workbook* for details of customer network setting requirements.

**NOTE:** The SP 2.5.2 release does not support Policy Manager and Keystroke Recording. These features should not be configured during SPMOB. If you require these features, you must rebuild to SP 2.5.1 MU1.
The service processor features two network configuration options to enable communication access during the SPMOB script.

- **SP Mode**—enables the Customer Controlled Access (CCA) setting to control inbound/outbound communication access via SSH session. Refer to “Configuring the SP with SP Mode” (page 110) to enable the feature.

- **Secure Network Mode**—enables HP 3PAR Secure Service Agent (SSA) setting to control inbound/outbound communication access via HTTPS. Refer to “Configuring the SP with Secure Network Mode” (page 116) to enable the feature.

**CAUTION:** Except in SP 2.5.2, the customer must first install HP 3PAR Secure Service Policy Manager before enabling Secure Network Mode with HP 3PAR Secure Service Policy Manager during the SPMOB process. At the conclusion of the SPMOB, the SP initializes contact with the host of the HP 3PAR Secure Service Policy Manager to validate communication access configuration.

**NOTE:** Secure Network Mode can only be configured for high speed (Ethernet) connectivity.

**NOTE:** Always register an updated SPID with Secure Service Collector database before migrating to Secure Network Mode from SP Mode. If the updated SPID is not registered in the database, migrating to Secure Network Mode fails.

Before performing the service processor setup using the SPMOB, determine which of the following configurations best describes the service processor connectivity model to be used at the operating site:

- **High Speed.** The service processor uses an Ethernet connection to the customer network for all external communications. Remote control of the service processor may or may not be permitted. When permitted, remote control of the service processor also occurs through the customer network.

- **Mixed.** The service processor uses an Ethernet connection to the customer network for all external communications. Remote control of the service processor is permitted but must occur through a serial modem connection using a customer-supplied dialup number.

- **Modem.** The service processor uses a serial modem connection through a customer-supplied dialup number for all external communications. Remote control of the service processor may or may not be permitted. When permitted, remote control also occurs through the serial modem connection.

- **Secure site.** The service processor is configured to use the customer network to monitor the storage system. However, there is no access to or from the SP from outside of the customer network.

**NOTE:** When selecting the Secure Site option during the SPMOB, the option configuration is irreversible. To configure for SP Mode, the SP needs to be rebuilt before rerunning the SPMOB.

Use the setup instructions in the following sections to complete the service processor setup based on one of these connectivity models.

**NOTE:** On the service processor output screens, brackets [ ] denote default responses. If you press ENTER without typing a response, the service processor uses the default response indicated in brackets, when present.

**NOTE:** If, at any time, you press CTRL+C to escape the service processor setup script, restart the process by typing /sp/prod/code/csst/bin/.sbin/spmob and pressing ENTER.
Using the Service Processor Setup Wizard

This procedure shows you how to use the SP Setup Wizard to install and configure a service processor.

1. The Welcome page is displayed.

2. Click Next to continue. The Configure Server Processor Networking page appears.
Enter the following information:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Processor ID</td>
<td>A unique and static identifier for this SP.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE:</strong> Enter the Service Processor ID only when you set up this SP for the first time.</td>
</tr>
<tr>
<td>Service Processor hostname</td>
<td>The host name that you want to apply to this SP.</td>
</tr>
<tr>
<td>IP Address</td>
<td>The IPv4 address you want to assign to this SP.</td>
</tr>
<tr>
<td>Subnet Mask</td>
<td><strong>Optional.</strong> If you do not want to accept the default subnet mask, enter a custom setting.</td>
</tr>
<tr>
<td>Gateway</td>
<td><strong>Optional.</strong> If you do not want to accept the default subnet mask, enter a custom setting.</td>
</tr>
</tbody>
</table>

3. To confirm the SP ID, click **Next**. The **Configure Remote Support** page displays.
Enter information in the following fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
</table>
| Remote Support Level                 | • **Active**: HP 3PAR support uses your remote support settings to maintain your Service Processor and HP 3PAR storage system. Log files are automatically sent to monitor the health of your system.  
                                           **NOTE**: HP recommends that you use this option.  
                                           • **Passive**: Log files are automatically sent to HP 3PAR support to monitor the health of your system. Remote maintenance is disabled.  
                                           • **No support**: HP 3PAR support will not perform remote maintenance tasks, and will not send log files. It is possible to manually send log files, if needed. |
| Enable proxy server for remote support|                                                                             |
| Advanced                              |                                                                             |

4. Click **Next**. The **Time and Region** page displays.
5. Click **Next**. The **Summary** page displays.
Settings will automatically be applied on this apply settings screen. After the Configure networking setting is applied, the Connect to the new IP address dialog displays with instructions to continue after the wizard page refreshes to the new IP address. After the wizard refreshes to the new IP address, a final Apply Settings displays.

6. Click Next. The Apply Settings page displays.
7. The system will apply the configured settings and display a confirmation dialog box. Click **OK** to accept the settings you just set up.

8. Click **Next**. The **Apply Settings** page displays with the active settings.
9. If the operation is successful, click Finish. The Finish page displays.
10. Do one of the following:
   - Click **Finish** to close the wizard.
   - Click the **Launch** button next to **Storage System Setup Wizard** to start the Storage System Setup Wizard.
   - Click the **Launch** button next to **Service Processor Onsite Customer Care** for support through Service Processor Onsite Customer Care (SPOCC).
   - If there are errors in the setup, do one of the following:

**Server Processor ID failed with the following error:**
Failed to set SP ID.

Troubleshooting recommendations:
1. Click **Stop** to return to the wizard.
2. Click the **Prev** button to return to Step 2 of the wizard.
3. Verify the Server Processor ID

**Set date and time failed with the following error:**
Failed to set time zone.

![Set date and time failure warning]

**Troubleshooting recommendations:**
1. Click **Stop** to return to the wizard.
2. Click the **Prev** button to return to Step 4 of the wizard.
3. Verify the Server Processor ID

**Configure networking failed with the following error:**
Failed to configure DNS.

![Configure networking failure warning]

**Troubleshooting recommendations:**
1. Click **Stop** to return to the wizard.
2. Click the **Prev** button to return to Step 2 of the wizard.
3. Verify the Server Processor ID.

**Configure remote support failed with the following error:**
Failed to make contents of SP logs anonymous
Troubleshooting recommendations:
1. Click **Stop** to return to the wizard.
2. Click the **Prev** button to return to Step 3.
3. Verify the remote support settings.

**Restart Service Processor failed with the following error:**
Failed to restart the SP

Troubleshooting recommendations:
1. Wait for one minute.
2. Click the **Retry** button.

**Finish setup failed with the following error:**
Failed to finalize SP setup

Troubleshooting recommendations:
1. Wait for one minute
2. Click the **Retry** button.

**High Speed Setup**

Use the following procedure to set up the SP at a site where an Ethernet connection to the customer network is used to monitor the storage system and for all external communications with the service processor. Remote control of the service processor may or may not be permitted. If permitted you must also use the customer network.

**Configuring the SP with SP Mode**

**NOTE:** Before performing the SPMOB, always reference the Systems Assurance form for details of customer network setting requirements.

1. Connect the maintenance PC to the service processor through a serial connection, as described in “Connecting to the Service Processor” (page 193), then power on the service processor and log in as the **root** user.
2. Type *yes* to begin the service processor setup script (SPMOB) and press **ENTER**.

```plaintext
Welcome to the 3PAR Service Processor Moment of Birth
Enter Control-C at any time to abort this process
Are you ready to configure the SP at this time? (yes or no) [yes]: [enter]
```

3. Type *no* to indicate the site is not secured and press **ENTER**.

**CAUTION:** If you answer *yes*, the service processor will not be able to communicate with HP Central. A complete rebuild of the SP is required if the SP needs to establish communication with HP Central.

```plaintext
Site Security Level
Enter Control-C at any time to abort this process
A Secure Site is a site where the customer will NEVER allow a 3PAR SP to access the public internet. Thus the SP public interface will be used only to access and monitor the 3PAR InServ attached to this SP.
Is this a Secure Site? (yes or no) [no] [enter]
```

4. Type *1* to assign SP Mode for file transfer/remote operations and press **ENTER**.

```plaintext
Type of transport control
Enter Control-C at any time to abort this process
You have two options for file transfer/remote operations:
1 ==> SP Mode where inbound/outbound access is via ssh session and control is via the Customer Controlled Access (CCA) setting.
2 ==> Secure Network Mode where inbound/outbound access is via https and is controlled by the 3PAR Secure Service Agent (SSAgent).
X  None of the above. Cancel and Exit
```
Please enter your selection [X]:

1

5. **Type 1 to continue with the SPMOB and press ENTER.**

<table>
<thead>
<tr>
<th>Type of install</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Control-C at any time to abort this process</td>
</tr>
<tr>
<td>How do you want to configure this SP?</td>
</tr>
<tr>
<td>1  ==&gt;  Continue with spmob ( new site install )</td>
</tr>
<tr>
<td>2  ==&gt;  Restore from a backup file ( SP rebuild/replacement )</td>
</tr>
<tr>
<td>X  None of the above. Cancel and Exit</td>
</tr>
</tbody>
</table>

6. **Type No to retain the current value or enter the current value of the Service Processor ID (SPID) if applicable and press ENTER.**

Do you need to change the Service Processor Id (SPID) from its current value of SPXXXXX? (y or n)

n

7. **Press ENTER to accept the default service processor name (in brackets) or type an alternate name. The default service processor name is the SPID. Accepting the default is recommended.**

<table>
<thead>
<tr>
<th>SP Network Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Control-C at any time to abort this process</td>
</tr>
<tr>
<td>Valid characters are [a-z] [A-Z] [0-9] dash(-) underscore(_)</td>
</tr>
<tr>
<td>Please enter the host name [SPXXXXX] : [enter]</td>
</tr>
</tbody>
</table>

8. **Type the static IP address assigned to the SP and press ENTER.**

<table>
<thead>
<tr>
<th>SP Network Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Control-C at any time to abort this process</td>
</tr>
<tr>
<td>Please enter the IP address for the public network interface:</td>
</tr>
<tr>
<td>&lt;static.IP.address&gt;</td>
</tr>
</tbody>
</table>

9. **Press ENTER to accept the default subnet mask, or type an alternate subnet mask for the SP and press ENTER.**

Please enter the netmask for this interface [255.255.255.0]: <subnet.mask.address>
10. Press **ENTER** to accept the default gateway address shown in brackets, or type an alternate default gateway address and press **ENTER**. The setup script suggests a default gateway address based on the supplied IP address.

```
Please enter the IP address of a default gateway, or NONE [<static.IP.address.1>]:
<default.gateway.address>
```

11. Press **ENTER** to accept the default network speed or enter the network speed and press **ENTER**.

```
Please enter the network speed (10HD,10FD,100HD,100FD,1000HD,1000FD,AUTO) [AUTO]
```

12. Type **yes** to allow inbound and/or outbound files transfers and press **ENTER**.

```
Will this ethernet interface be used for inbound and/or outbound files transfers (yes or no) [no]?
yes
```

13. For technical support and services through a remote location, press **ENTER**, or type **yes** and press **ENTER**.

To prohibit remote control of the service processor, type **no** and press **ENTER**, then skip to step 15.

```
SP Network Parameters
Enter Control-C at any time to abort this process
Will this SP be allowed to be remotely controlled (yes or no)? [yes] (Replying 'yes' will allow Remote Operations sessions from a Connection Portal)
yes
```

14. To use the customer network to access the service processor from a remote location, type **e** and press **ENTER**

```
Which media will be used for Remote Operations ( ethernet or modem )?
Enter 'e' or 'm' [modem]
e
```

15. To use the 3PAR Connection Portal, type **yes** or press **ENTER**, and skip to step 17.

To assign an alternate connection server, type **no** press **ENTER** and continue with step 16.

```
SP Network Parameters
Enter Control-C at any time to abort this process
Will this SP use the 3PAR Connection Portal? ( yes or no ) [yes]
yes
```

---

**112 Initializing the Storage System Software**
16. If you answered no in step 15, type the hostname for an alternate connection server and press ENTER.

```
SP Network Parameters
Enter Control-C at any time to abort this process
Please enter the fully qualified hostname for the Connection Server
(use only alpha numeric or . - _)
- or -
QUIT to abort
<server_name.company.com>
```

17. If the connection portal (CP) does not require connection to proxy services, type no and press ENTER. If you answered no, skip to step 20.
If the CP requires connection to proxy services, type yes and press ENTER.

```
SP Network Parameters
Enter Control-C at any time to abort this process
Does the connection to the CP require proxy services? (yes or no) [no]
yes
```

18. Type the IP address for the connection server and press ENTER.

```
SP Network Parameters
Enter Control-C at any time to abort this process
Please enter the IP address for <server_name>: <server.IP.address>
```

19. Press ENTER to accept the default router address, or type an alternate router address and press ENTER.

```
Please enter the IP address of the router to reach stddev.3pardata.com, or NONE: [default.router.address]
[enter]
```

20. Type the external NTP server address (if applicable) or none and press ENTER.

```
Network Time Server
Enter Control-C at any time to abort this process
Please enter the I/P address of an external NTP server, or a blank delimited list if more than one is desired, or 'noe' if there will not be any time server [?]:
Enter the IP address of an external NTP server <NTP.server.address>
```
21. Type yes to configure the SP firewall in *permissive* mode and press ENTER.

```
SP Network Parameters
Enter Control-C at any time to abort this process

The SP firewall protects the SP and the customer network from unauthorized use. It can be configured in ‘permissive’ mode to allow any host to connect to the SP via SSH and HTTP. Do you wish to configure the SP firewall in ‘permissive’ mode? [yes/no] yes
```

**NOTE:** Configuring the SP firewall in *permissive* mode enables access to the SP from any host on the local area network.

22. Type yes after verifying the network information and press ENTER. Some items only appear when applicable so the screen content may differ according to the chosen setup options.

```
SP Network Parameters - Confirmation
Enter Control-C at any time to abort this process

The Host Name is: SPXXXXX
- Public IP address: <static.IP.address>
- Netmask: <subnet.mask.address>
- Gateway: <default.gateway.address>
- Network Speed: AUTO

PERMISSIVE FIREWALL MODE SELECTED
NTP Server address: <NTP.server.address> or none
Data Transfer media: ETHERNET
Remote Operations media: ETHERNET
Connection Portal: <3PAR default portal> or <server_name>

Is this data correct? (yes or no)? [yes]
```

23. Set the time zone for the operating site:
   a. Select a country from the list, type the corresponding number <X>, then press ENTER.
   b. Select a continent or ocean, type the corresponding number <X>, then press ENTER.
   c. Select a country from the regional list, type the corresponding number <X>, then press ENTER.
   d. Select a time zone region, type the corresponding number <X>, then press ENTER.

24. Verify the time zone setting is correct, type 1 and press ENTER. Choosing option 2 restarts the time zone configuration.

   **NOTE:** The system automatically makes the time zone change permanent. Disregard the instructions on the screen for appending the command to make the time zone change permanent.

25. Press ENTER to accept the default date in brackets, or type the current date in MM/DD/YYYY format and press ENTER.
26. Type the current time in HH:MM format or press ENTER to accept the default time indicated by the installation script.

Basic Date and Time

Enter Control-C at any time to abort this process

Please enter the time in HH:MM format [<Time>]:
[enter]

27. Type yes to verify the date and time indicated from step 25 and 26 and press ENTER.

 Basic Date and Time

Enter Control-C at any time to abort this process

The date and time you entered is <current date> and <time>

Is this Correct? (yes or no)

yes

28. Type yes to select the default installed site keys or type no to enter alternate site keys and press ENTER.

Confirmation

Enter Control-C at any time to abort this process

Using the DEFAULT, installed Site key files:

If this is the INITIAL INSTALLATION of this 3PAR SP and InServ at this site, the DEFAULT keys should be used.

If this is a REPLACEMENT SP, or there is already an InServ running at this site with which this SP must communicate, do one of the following:

1) If you have external media containing the currently deployed key pair (on CD or floppy), then answer NO and provide the Keys to use.

2) If you do not have a copy of the current keys, answer YES and force a key-exchange by MANUALLY adding the cluster during the SP Moment of Birth, or by using "spmaint" option 6.4.2 AFTER the moment of birth to invoke (or force) a key exchange.

You may have to manually add any existing InServ clusters in order to perform the key exchange.

Do you wish to use the DEFAULT, installed Site key files? (y or n)

Y
CAUTION: If you receive any Password: prompts during this process, this indicates the nodes in the system have not been properly configured. Verify the IP addresses on the SP and controller nodes. Use the red crossover cable to connect the highest node port ETH 0 to SP ETH 0 to establish a private network. If the problem still exists, do not proceed any further. Contact HP 3PAR Technical Support for assistance.

29. Press ENTER to conclude MOB configuration.

InServ configuration is no longer done during the Moment Of Birth.

Use spmaint to install the InForm OS software on the SP and add the InServ configuration to the SP after a successful MOB.

Press ENTER to continue.

NOTE: After completing the SPMOB process, additional InForm OS files may need to be installed in order to communicate and add an storage system. To install InForm OS files, refer to “Installing HP 3PAR OS Files” (page 145).

NOTE: To add a cluster after installing InForm OS files, refer to “Adding a Storage System to the Service Processor” (page 146).

30. Monitor the system while the service processor uses the site key. When the system configuration process is complete, the following message appears:

*** starting final MOB phase
  Fix passwords
  Enabling key change on reboot ...
  Disabling sendmail...
  verifying postfix status...
  Setup to run all ST/SP tasks at boot time
  Add SPID to ppp id
  Cleanup MOB
  Updating PAM settings
  Rebooting....

The service processor automatically restarts.

Welcome to the 3PAR Service Processor Moment of Birth

Rebooting....

Continue on to “Installing HP 3PAR OS Files” (page 145).

Configuring the SP with Secure Network Mode

NOTE: Before performing the SPMOB, always reference the Systems Assurance form for details of customer network setting requirements.

NOTE: Always register an updated SPID with Secure Service Collector database before migrating to Secure Network Mode from SP Mode. If the updated SPID is not registered in the database, migrating to Secure Network Mode fails.
NOTE: The customer must have the minimum network configuration to allow a Secure Network Mode enabled SP to communicate with the collector server.

1. Connect the maintenance PC to the service processor through a serial connection, as described in “Connecting to the Service Processor” (page 193), then power on the service processor and log in as the root user.

2. Type yes to begin the service processor setup script (SPMOB) and press ENTER.

```
Welcome to the 3PAR Service Processor Moment of Birth

Enter Control-C at any time to abort this process

Are you ready to configure the SP at this time? (yes or no) [yes]: [enter]
```

3. Type no to indicate the site is not secured and press ENTER

⚠️ CAUTION: If you answer yes, the SP will not be able to communicate with HP Central. A complete rebuild of the SP is required if the SP needs to establish communication link with HP Central.

```
Site Security Level

Enter Control-C at any time to abort this process

A Secure Site is a site where the customer will NEVER allow a 3PAR SP to access the public internet. Thus the SP public interface will be used only to access and monitor the 3PAR InServ attached to this SP.

Is this a Secure Site? (yes or no) [no] [enter]
```

NOTE: For additional technical support with Secure Network Mode configuration, contact an HP Technical Support Representative.

4. Type 2 to assign Secure Network Mode for file transfer/remote operations and press ENTER.

```
Type of transport control

Enter Control-C at any time to abort this process

You have two options for file transfer/remote operations:
1 ==> SP Mode where inbound/outbound access is via ssh session and control is via the Customer Controlled Access (CCA) setting.
2 ==> Secure Network Mode where inbound/outbound access is via https and is controlled by the 3PAR Secure Service Agent (SSAgent).
X  None of the above. Cancel and Exit

Please enter your selection [X]:
```

5. Type 1 to continue with the SPMOB and press ENTER.
Enter Control-C at any time to abort this process

How do you want to configure this SP?

1  ==>  Continue with spmob ( new site install )
2  ==>  Restore from a backup file ( SP rebuild/replacement )
X  None of the above. Cancel and Exit

1

6. Type No to retain the current value or enter the current value of the Service Processor ID (SPID) if applicable and press ENTER.

Do you need to change the Service Processor Id (SPID) from its current value of SPXXXXX?
(y or n)
n

7. Press ENTER to accept the default service processor name (in brackets) or type an alternate name and press ENTER. The default service processor name is the SPID. Accepting the default is recommended.

SP Network Parameters

Enter Control-C at any time to abort this process
Valid characters are [a-z] [A-Z] [0-9] dash(-) underscore(_) 
Please enter the host name [SPXXXXX] :
[enter]

8. Type the static IP address assigned to the service processor and press ENTER.

SP Network Parameters

Enter Control-C at any time to abort this process
Please enter the IP address for the public network interface: <static.IP.address>

9. Press ENTER to accept the default subnet mask, or type an alternate subnet mask for the service processor and press ENTER.

Please enter the netmask for this interface [255.255.255.0]: <subnet.mask.address>

10. Press ENTER to accept the default gateway address shown in brackets, or type an alternate default gateway address and press ENTER. The setup script suggests a default gateway address based on the supplied IP address.

Please enter the IP address of a default gateway, or NONE [<static.IP.address.1>]: <default.gateway.address>
11. Press **ENTER** to accept the default network speed or enter the network speed and press **ENTER**.

Please enter the network speed (10HD, 10FD, 100HD, 100FD, 1000HD, 1000FD, AUTO) [AUTO]

12. Type the static IPv4 address assigned to the domain server or none and press **ENTER**.

SP Network Parameters

Enter Control-C at any time to abort this process

Please enter the IPv4 address (or blank separated list of addresses) of the Domain Name Server(s)

or 'none' if there will not be any DNS support: [?]:

<static.ipv4.address> or none

13. Type yes to assign use of the HP 3PAR Secure Service Policy Manager with the HP 3PAR Secure Service Collector and press **ENTER**. If you answered yes, skip to step 16.

To refrain from assigning use of the HP 3PAR Secure Service Policy Manager with the HP 3PAR Secure Service Collector, type no, press **ENTER**, and continue with step 14.

**NOTE:** In SP 2.5.2, do not configure Policy Manager.

Will a 3PAR Secure Service Policy Manager be used with this 3PAR Secure Service Collector Server? (yes or no) [yes]: no

14. Type yes to allow remote access to the service processor and press **ENTER**.

Remote access to this Service Processor would normally be controlled by the 3PAR Secure Service Policy Manager. Since there will not be one, the ability to remotely access this SP will be controlled by a configuration setting of the local SSAgent.

Will remote access to this Service Processor be allowed (yes or no)? [yes]: yes

15. Type yes to confirm that the data is correct, and press **ENTER**. If you indicated yes, skip to step 26.

3PAR Secure Service Policy Manager

- Name/address: none
- Remote access: Allowed

Is this data correct? (yes or no)? [yes] yes
16. Type the static hostname or IP address assigned to the HP 3PAR Secure Service Policy Manager and press **ENTER**.

```
Please enter the hostname or I/P address of the 3PAR Secure Service Policy Manager [?] :
<static.IP.address>
```

17. Type the port number of the HP 3PAR Secure Service Policy Manager or press **ENTER** to accept the default port number.

```
Please enter the port number on which to contact <static.IP.address> [default] : [XXXX]
```

18. Type **no** to not allow a proxy server to connect to the hostname or IP address of HP 3PAR Secure Service Policy Manager and press **ENTER**. If you indicated **no**, skip to step 25.

Type **yes** to allow a proxy server to connect to the hostname or IP address of HP 3PAR Secure Service Policy Manager, press **ENTER** and continue with step 19.

```
Will a proxy server be required to connect to <static.IP.address> ? (yes or no) [no] : no
```

19. Assign the type of proxy server and press **ENTER**. The use of http is only an example and configurations may vary. If applicable, refer to the System Assurance document.

```
What type of proxy server will be used? (http or socks) [http] : http
```

20. Type the hostname or IP address of the http proxy server and press **ENTER**.

```
Please enter the hostname or I/P address of the http proxy server [?] : <static.IP.address>
```

21. Type the port number of the http proxy server or press **ENTER** to accept the default port number.

```
What port number should be used on the http proxy server? [default] : [XXXX]
```

22. Type **no** to not allow proxy authentication and press **ENTER**. If you indicated **no**, skip to step 26.

Type **yes** and press **ENTER** to allow proxy authentication.

```
Will proxy authentication (id/password) be used? (yes or no) [no] : yes
```
23. Type the proxy User ID and press **ENTER**.

```
Please enter the proxy user id:
alphanumeric value
```

24. Type the proxy password for User ID [alphanumeric value] and press **ENTER**. Retype the password to confirm and press **ENTER**.

```
Please enter the password for id 'username id': alphanumeric value
Please re-enter (confirm) the password: alphanumeric value
```

25. Type **yes** to confirm that the data is correct and press **ENTER**.

```
3PAR Secure Service Policy Manager
- Name/address: <static.IP.address>
- Port: [default] or [XXXX]
- Proxy: http
- Proxy name/address: XX.XXX.XXX.XXX
- Proxy port: [default] or [XXXX]
- Proxy id: alphanumeric value

Is this data correct? (yes or no)? [yes]
yes
```

26. Type **1** to assign the type of HP 3PAR Secure Service Collector Server to connect with the SSAgent and press **ENTER**.

```
To which 3PAR Secure Service Collector Server should this SSAgent connect?

1   ==>  Production
OTHER ==> 3PAR Internal testing (not for customer sites!)

Please enter your selection [1]:
1
```

27. Type **no** to not require a proxy server to connect to the HP 3PAR Secure Service Collector Server and press **ENTER**. If you indicated **no**, skip to step 34.

Type **yes** to require a proxy server to connect to the HP 3PAR Secure Service Collector Server, press **ENTER** and continue with step 28.

```
Will a proxy server be required to connect to the 3PAR Secure Service Collector Server? (yes or no) [no]:
yes
```

28. Assign the type of proxy server and press **ENTER**. The use of http is only an example and configurations may vary. If applicable, refer to the System Assurance document.

```
What type of proxy server will be used? (http or socks) [http]:
http
```
29. Type the hostname or IP address of the http proxy server and press **ENTER**.

```
Please enter the hostname or I/P address of the http proxy server [?]::
<static.IP.address>
```

30. Press **ENTER** to accept the default port number or type the port number of the http proxy server and press **ENTER**.

```
What port number should be used on the http proxy server? [default]: [XXXX]
```

31. Type **no** to not require proxy authentication and press **ENTER**. If you indicated **no**, skip to step 34.

Type **yes** to require proxy authentication, press **ENTER**, and continue with step 32.

```
Will proxy authentication (id/password) be used? (yes or no) [no]:
yes
```

32. Type the proxy User ID and press **ENTER**.

```
Please enter the proxy user id:
alphanumeric value
```

33. Type the proxy password for User ID [alphanumeric value] and press **ENTER**. Retype the password to confirm and press **ENTER**.

```
Please enter the password for id 'alphanumeric value': alphanumeric value
Please re-enter (confirm) the password: alphanumeric value
```

34. Type **yes** to confirm that the data is correct and press **ENTER**.

```
3PAR Secure Service Policy Manager
- Name/address: <static.IP.address>
- Port: [default] or [XXXX]
- Proxy: http
- Proxy name/address: XX.XXX.XXX.XXX
- Proxy port: [default] or [XXXX]
- Proxy id: [alphanumeric value]

Is this data correct? (yes or no)? [yes]
yes
```

35. Type the external NTP server address (if applicable) or **none** and press **ENTER**.

```
Network Time Server
Enter Control-C at any time to abort this process

Please enter the I/P address of an external NTP server, or a blank delimited list if more than one is desired, or 'none' if there will not be any time server [?]::
```
Enter the IP address of an external NTP server
<NTP.server.address>

36. Type yes to configure the SP firewall in permissive mode and press ENTER.

SP Network Parameters

Enter Control-C at any time to abort this process

The SP firewall protects the SP and the customer network from unauthorized use. It can be configured in ‘permissive’ mode to allow any host to connect to the SP via SSH and HTTP.

Do you wish to configure the SP firewall in ‘permissive’ mode? [yes/no] [yes]

NOTE: Configuring the SP firewall in permissive mode enables access to the SP from any host on the local area network. When Secure Network Mode is enabled, only the customer may alter the permissive firewall setting.

37. Type yes to verify the supplied network information and press ENTER. Some items only appear when applicable so the screen content can differ according to the chosen setup options.

SP Network Parameters - Confirmation

Enter Control-C at any time to abort this process

The Host Name is: <spname>
- Domain name: Company Name or IP Address
- Public IP address: <static.IP.address>
- Netmask: <subnet.mask.address>
- Gateway: <default.gateway.address>
- Network Speed: AUTO

DNS Server(s): <static.IPv4.address>

3PAR Secure Service Agent transport control selected.

PERMISSIVE FIREWALL MODE SELECTED

NTP Server address: none

3PAR Secure Service Collector Server
- Name/address: Production
- Proxy: none

3PAR Secure Service Policy Manager
- Name/address: <static.IP.address>
- Port: 8080
- Proxy: none

Is this data correct? (yes or no)? [yes] [yes]

38. Set the time zone for the operating site:
   a. Select a continent or ocean, type the corresponding number <X>, then press ENTER.
   b. Select a country from the regional list, type the corresponding number <X>, then press ENTER
   c. Select a time zone region, type the corresponding number < X >, then press ENTER.
39. Verify the time zone setting is correct, then type \textbf{1} and press \textbf{ENTER}. Choosing option \textbf{2} restarts the time zone configuration.

\textbf{NOTE:} The system automatically makes the time zone change permanent. Disregard the instructions on the screen for appending the command to make the time zone change permanent.

40. Press \textbf{ENTER} to accept the default date in brackets, or type the current date in \textbf{MM/DD/YYYY} format and press \textbf{ENTER}.

```
Basic Date and Time

Enter Control-C at any time to abort this process

Please enter the current date in MM/DD/YYYY format [<current date>] :
```

41. Type the current time in \textbf{HH:MM} format or press \textbf{ENTER} to accept the default time indicated by the installation script.

```
Basic Date and Time

Enter Control-C at any time to abort this process

Please enter the time in HH:MM format [<Time>] :
[enter]
```

42. Type \textbf{yes} to verify the date and time indicated from step 40 and 41 and press \textbf{ENTER}.

```
Basic Date and Time

Enter Control-C at any time to abort this process

The date and time you entered is <current date> and <time>
Is this Correct? (yes or no)
yes
```

43. Type \textbf{yes} to select the default installed site keys or type \textbf{no} to enter alternate site keys.

```
Confirmation

Enter Control-C at any time to abort this process

Using the DEFAULT, installed Site key files:

If this is the INITIAL INSTALLATION of this 3PAR SP and InServ at this site, the DEFAULT keys should be used.
If this is a REPLACEMENT SP, or there is already an InServ running at this site with which this SP must communicate, do one of the following:

1) If you have external media containing the currently deployed key pair (on CD or floppy), then answer NO and provide the Keys to use.

2) If you do not have a copy of the current keys, answer YES and force a key-exchange by MANUALLY adding the cluster during the SP Moment of Birth.
```
or by using "spmaint" option 6.4.2 AFTER the moment of birth to invoke (or force) a key exchange. You may have to manually add any existing InServ clusters in order to perform the key exchange.

Do you wish to use the DEFAULT, installed Site key files? (y or n)

Y

44. Press ENTER to conclude MOB configuration.

InServ configuration is no longer done during the Moment Of Birth.

Use spmaint to install the InForm OS software on the SP and add the InServ configuration to the SP after a successful MOB.

Press ENTER to continue.

NOTE: After completing the SPMOB process, additional InForm OS files may need to be installed in order to communicate and add a storage system. To install InForm OS files, refer to “Installing HP 3PAR OS Files” (page 145).

⚠️ CAUTION: If you receive any Password: prompts during this process, this indicates the nodes in the system have not been properly configured. Verify the IP addresses on the SP and controller nodes. Use the red crossover cable to connect the highest node port ETH 0 to SP ETH 0 to establish a private network. If the problem still exists, do not proceed any further. Contact HP 3PAR Technical Support for assistance.

NOTE: To add a cluster after installing HP 3PAR InForm OS files, refer to “Adding a Storage System to the Service Processor” (page 146).

45. Monitor the system while the service processor uses the site key. When the system configuration process is complete, the following message appears:

```plaintext
*** starting final MOB phase
    Fix passwords
    Enabling key change on reboot ...
    Disabling sendmail...
    verifying postfix status...
    Setup to run all ST/SP tasks at boot time
    Add SPID to ppp id
    Cleanup MOB

    Updating PAM settings

    Rebooting....
```

The service processor automatically restarts.

Welcome to the 3PAR Service Processor Moment of Birth

Rebooting....

Continue on to “Installing HP 3PAR OS Files” (page 145).
Mixed Connectivity Setup

Use the following procedure to set up the service processor at a site where monitoring the storage system and external communication occurs through the customer network. Remote control of the service processor occurs through a serial modem connection using a customer-supplied dialup number.

1. Connect the maintenance PC to the service processor through a serial connection, as described in “Connecting to the Service Processor” (page 193), then power on the service processor and log in as the root user.

2. Type yes to begin the service processor setup script (SPMOB) and press **ENTER**.

   > Welcome to the 3PAR Service Processor Moment of Birth
   > Enter Control-C at any time to abort this process
   > Are you ready to configure the SP at this time? (yes or no) [yes]: [enter]

3. Type no to indicate the site is not secured and press **ENTER**.

   △ **CAUTION:** If you answer yes, the service processor will not be able to communicate with HP Central. A complete rebuild of the SP is required if the SP needs to establish communication link with HP Central.

   > Site Security Level
   > Enter Control-C at any time to abort this process
   > A Secure Site is a site where the customer will NEVER allow a 3PAR SP to access the public internet. Thus the SP public interface will be used only to access and monitor the 3PAR InServ attached to this SP.
   > Is this a Secure Site? ( yes or no ) [no]: [enter]

4. Type 1 to assign SP Mode option for file transfer/remote operations and press **ENTER**.

   > Type of transport control
   > Enter Control-C at any time to abort this process
   > You have two options for file transfer/remote operations:
   > 1 ==> SP Mode where inbound/outbound access is via ssh session and control is via the Customer Controlled Access (CCA) setting.
   > 2 ==> Secure Network where inbound/outbound access is via https and is controlled by the 3PAR Secure Service Agent (SSAgent).
   > X None of the above. Cancel and Exit
   > Please enter your selection [X]: 1

   **NOTE:** Secure Network Mode can not be enabled through mixed connectivity setup.
5. Type 1 to continue with the SPMOB and press ENTER.

<table>
<thead>
<tr>
<th>Type of install</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Control-C at any time to abort this process</td>
</tr>
<tr>
<td>How do you want to configure this SP?</td>
</tr>
<tr>
<td>1  ==&gt;  Continue with spmob ( new site install )</td>
</tr>
<tr>
<td>2  ==&gt;  Restore from a backup file ( SP rebuild/replacement )</td>
</tr>
<tr>
<td>X  None of the above. Cancel and Exit</td>
</tr>
</tbody>
</table>

6. Type No to retain the current value or enter the current value of the Service Processor ID (SPID) if applicable and press ENTER.

| Do you need to change the Service Processor Id (SPID) from its current value of SPXXXXX? |
| (y or n) |
| n |

7. Accept the default service processor name (in brackets) by pressing ENTER, or type an alternate name and press ENTER. The default service processor name is the SPID. Accepting the default is recommended.

<table>
<thead>
<tr>
<th>SP Network Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Control-C at any time to abort this process</td>
</tr>
<tr>
<td>Please enter the host name [SPXXXXX]:</td>
</tr>
<tr>
<td>[enter]</td>
</tr>
</tbody>
</table>

8. Type the static IP address assigned to the SP and press ENTER.

<table>
<thead>
<tr>
<th>SP Network Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Control-C at any time to abort this process</td>
</tr>
<tr>
<td>Please enter the IP address for the public network interface:</td>
</tr>
<tr>
<td>&lt;static.IP.address&gt;</td>
</tr>
</tbody>
</table>

9. Press ENTER to accept the default subnet mask, or type an alternate subnet mask for the service processor and press ENTER.

| Please enter the netmask for this interface [255.255.255.0]: |
| <subnet.mask.address> |
10. Press **ENTER** to accept the default gateway address, or type an alternate default gateway address and press **ENTER**. The setup script suggests a default gateway address based on the supplied IP address.

   Please enter the IP address of a default gateway, or NONE [<static.IP.address.1>]:
   <default.gateway.address>

11. Type **yes** to allow inbound and/or outbound files transfers and press **ENTER**.

   Will this ethernet interface be used for inbound and/or outbound files transfers (yes or no) [no]?
   yes

12. Type **yes** to allow the SP to be remotely controlled and press **ENTER**.

   SP Network Parameters
   Enter Control-C at any time to abort this process
   Will this SP be allowed to be remotely controlled (yes or no)? [yes]
   (Replying 'yes' will allow Remote Operations sessions from a Connection Server)
   [enter]

13. Type **m** to use the modem for Remote Operations and press **ENTER**.

   SP Network Parameters
   Enter Control-C at any time to abort this process
   Which media will be used for Remote Operations ( ethernet or modem )?
   Enter 'e' or 'm' [modem]:
   [enter]

14. Type the phone number, including area code, for the service processor and press **ENTER**.

   SP Network Parameters
   Enter Control-C at any time to abort this process
   Please enter the SP’s local phone number, including area code, using only the following characters: 0-9 ( ) - , Ex: (510)555-1212 011 813 55 12123:
   <splocalnumber>

   **NOTE:** Enter any *outside* prefix separately, see step 15.

15. Type the prefix required when dialing out from the operating site if applicable and press **ENTER**.

   SP Network Parameters
   Enter Control-C at any time to abort this process
   Please enter the required prefixes when dialing out.
   - Just hit enter for no prefix
   - Number to get an outside line (ex. 8 or 9)
- Sequence to disable call waiting (ex. #70)
- When more then one sequence is required you may have to insert one,

<prefix>

16. To use the HP 3PAR Connection Server, press ENTER, or type yes and press ENTER and then skip to step 20.
To specify an alternate connection server, type no, press ENTER, and continue to step 17.

Will this SP use the 3PAR Connection Server? (yes or no) [yes]
[enter]

17. If you answered no in step 16, type the host name for an alternate connection server and press ENTER.

SP Network Parameters
Enter Control-C at any time to abort this process
Please enter the fully qualified hostname for the Connection Server (use only alpha numeric or . - _) or - QUIT to abort
<server_name>

18. Type the connection server PPPD server IP address and press ENTER.

SP Network Parameters
Enter Control-C at any time to abort this process
Enter the Connection Server's dialup (PPPD) server IP address.
Select it to be in one of following private networks IP ranges.
Note: This address MUST be the same as specified on the Connection Server, using the ModemConfig command.
10.0.0.0 --> 10.255.255.255
172.16.0.0 --> 172.31.255.255
192.168.0.0 --> 192.168.255.255
<PPPD.server.IP.address>

19. Type the connection server phone number(s), including area code, and press ENTER.

Please enter Connection Server phone number(s), including area code, using only the following characters: 0-9 ( ) - ,
Ex: 1-510-555-1212 011 813 555 12123
If there are more than one(1) phone numbers then separate them with a colon(:)
<phone_number>
20. Type the external NTP server address (if available) and press **ENTER**. If unavailable, type **none** and press **ENTER**.

<table>
<thead>
<tr>
<th>Network Time Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Control-C at any time to abort this process</td>
</tr>
<tr>
<td>Please enter the I/P address of an external NTP server, or a blank delimited list if more than one is desired, or 'none' if there will not be any time server [?]:</td>
</tr>
<tr>
<td>Enter the IP address of an external NTP server</td>
</tr>
</tbody>
</table>

| NTP.server.address |

21. Type **yes** to verify the supplied network information and press **ENTER**. Screen content varies according to the chosen setup options.

<table>
<thead>
<tr>
<th>SP Network Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Control-C at any time to abort this process</td>
</tr>
<tr>
<td>The Host Name is: &lt;spname&gt;</td>
</tr>
<tr>
<td>The IP address entered is: &lt;static.IP.address&gt;</td>
</tr>
<tr>
<td>The Netmask entered is: &lt;subnet.mask.address&gt;</td>
</tr>
<tr>
<td>The default gateway is: &lt;default.gateway.address&gt;</td>
</tr>
<tr>
<td>NTP Server address: &lt;NTP.server.address&gt;</td>
</tr>
<tr>
<td>Data Transfer media: ETHERNET</td>
</tr>
<tr>
<td>Remote Operations media: MODEM</td>
</tr>
<tr>
<td>Connection Server &lt;3PAR default server&gt; OR &lt;server_name&gt;</td>
</tr>
<tr>
<td>IP: &lt;PPPD.server.IP&gt;</td>
</tr>
<tr>
<td>Router: &lt;phone_number&gt;</td>
</tr>
<tr>
<td>The SP local number is: &lt;splocalnumber&gt;</td>
</tr>
<tr>
<td>The dialup prefix is: &lt;prefix&gt;</td>
</tr>
<tr>
<td>Is this data correct? (yes or no)? [yes] [enter]</td>
</tr>
</tbody>
</table>

**NOTE:** The connection server IP and router number only appear when you are not using the HP 3PAR Connection Server.

22. Set up the time zone for the operating site:
   a. Select a country from the list, type the corresponding number <X>, and press **ENTER**.
   b. Select a continent or ocean from the list, type the corresponding number <X>, and press **ENTER**.
   c. Select a country from the region list, type the corresponding number <X>, and press **ENTER**.
   d. Select a time zone region from the list, type the corresponding number <X>, and press **ENTER**.

23. Verify the time zone setting is correct, type 1 and press **ENTER**. Choosing option 2 restarts the time zone configuration.

24. Press **ENTER** to accept the default date in brackets, or type the current date in **MM/DD/YYYY** format and press **ENTER**.

<table>
<thead>
<tr>
<th>Basic Date and Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Control-C at any time to abort this process</td>
</tr>
</tbody>
</table>
25. Type the current time in HH:MM format or press ENTER to accept the default time indicated by the installation script.

Basic Date and Time

Enter Control-C at any time to abort this process

Please enter the time in HH:MM format [<Time>]:

[enter]

26. Type yes to verify the indicated date from step 24 and press ENTER.

Basic Date and Time

Enter Control-C at any time to abort this process

The date You entered is <current date>

Is this Correct? (yes or no)

yes

27. Select the default SSH site keys.

Using the DEFAULT, installed Site key files:

If this is the INITIAL INSTALLATION of this 3PAR SP and InServ at this site, the DEFAULT keys should be used.

If this is a REPLACEMENT SP, or there is already an InServ running at this site with which this SP must communicate, do one of the following:

1) If you have external media containing the currently deployed key pair (on CD or floppy), then answer NO and provide the Keys to use.

2) If you do not have a copy of the current keys, answer YES and force a key-exchange by MANUALLY adding the cluster during the SP Moment of Birth, or by using "spmaint" option 6.4.2 AFTER the moment of birth to invoke (or force) a key exchange. You may have to manually add any existing InServ clusters in order to perform the key exchange.

Do you wish to use the DEFAULT, installed Site key files? (y or n)

y

\[\text{CAUTION: }\] If you receive any Password: prompts during this process, this indicates the nodes in the system have not been properly configured. Verify the IP addresses on the SP and controller nodes. Use the red crossover cable to connect the highest node port ETH 0 to SP ETH 0 to establish a private network. If the problem still exists, do not proceed any further. Contact HP 3PAR Technical Support for assistance.
28. Press **ENTER** to conclude MOB configuration.

   InServ configuration is no longer done during the Moment Of Birth.

   Use spmaint to install the InForm OS software on the SP
   and add the InServ configuration to the SP after a successful MOB.

   Press ENTER to continue.

   **NOTE:** After completing the SPMOB process, additional InForm OS files must first be installed
   in order to communicate and add a storage system. To install InForm OS files, refer to “Installing
   HP 3PAR OS Files” (page 145).

   **NOTE:** To add a cluster after installing HP 3PAR InForm OS files, refer to “Adding a Storage
   System to the Service Processor” (page 146).

29. Monitor the system while the service processor uses the site key. When the system configuration
   process is complete, the following message appears:

   ```
   (....)
   Config complete for <storage.system.IP.address>...
   Welcome to the 3PAR Service Processor Moment of Birth
   The service processor automatically restarts.
   Welcome to the 3PAR Service Processor Moment of Birth
   Rebooting....
   Continue on to “Installing HP 3PAR OS Files” (page 145).
   
   **Modem Setup**

   Use the following procedure to set up the service processor at a site where a serial modem
   connection is used for external communications. Remote control of the service processor may or
   may not be permitted, but when permitted, also occurs through a serial modem connection using
   a customer-supplied dialup number.

   1. Connect the maintenance PC to the service processor through a serial connection, as described
      in “Connecting to the Service Processor” (page 193), then power on the service processor and
      log in as the root user.

   2. Type yes to begin the service processor setup script (SPMOB) and press **ENTER**.

      ```
      Enter Control-C at any time to abort this process
      Are you ready to configure the SP at this time? (yes or no) [yes]:
      [enter]
      ```
3. Type no to indicate the site is not secured and press ENTER.

⚠️ **CAUTION:** If you answer yes, the service processor will not be able to communicate with HP Central. A complete rebuild of the SP is required if the SP needs to establish communication link with HP Central.

<table>
<thead>
<tr>
<th>Site Security Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Control-C at any time to abort this process</td>
</tr>
<tr>
<td>A Secure Site is a site where the customer will NEVER allow a 3PAR SP to access the public internet. Thus the SP public interface will be used only to access and monitor the 3PAR InServ attached to this SP.</td>
</tr>
<tr>
<td>Is this a Secure Site? (yes or no) [no]</td>
</tr>
</tbody>
</table>

4. Type 1 to assign SP Mode option for file transfer/remote operations and press ENTER.

<table>
<thead>
<tr>
<th>Type of transport control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Control-C at any time to abort this process</td>
</tr>
<tr>
<td>You have two options for file transfer/remote operations:</td>
</tr>
<tr>
<td>1 ==》 SP Mode where inbound/outbound access is via ssh session and control is via the Customer Controlled Access (CCA) setting.</td>
</tr>
<tr>
<td>2 ==》 Secure Network Mode where inbound/outbound access is via https and is controlled by the 3PAR Secure Service Agent (SSAgent).</td>
</tr>
<tr>
<td>X None of the above. Cancel and Exit</td>
</tr>
<tr>
<td>Please enter your selection [X]:</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

**NOTE:** Secure Network Mode can not be enabled through modem setup.

5. Type 1 to continue with the SPMOB and press ENTER.

<table>
<thead>
<tr>
<th>Type of install</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Control-C at any time to abort this process</td>
</tr>
<tr>
<td>How do you want to configure this SP?</td>
</tr>
<tr>
<td>1 ==》 Continue with spmob (new site install)</td>
</tr>
<tr>
<td>2 ==》 Restore from a backup file (SP rebuild/replacement)</td>
</tr>
<tr>
<td>X None of the above. Cancel and Exit</td>
</tr>
</tbody>
</table>

6. Type no to retain the current value or enter the current value of the Service Processor ID (SPID) if applicable and press ENTER.

<table>
<thead>
<tr>
<th>Do you need to change the Service Processor Id (SPID)</th>
</tr>
</thead>
<tbody>
<tr>
<td>from its current value of SPXXXXX? (y or n)</td>
</tr>
<tr>
<td>n</td>
</tr>
</tbody>
</table>
7. Accept the default service processor name (in brackets) by pressing ENTER, or type an alternate name and press ENTER. The default service processor name is the SPID. Accepting the default is recommended.

8. Type the static IP address assigned to the service processor and press ENTER.

**NOTE:** Even though all external communication occurs through a modem for this service processor connection type, it is still necessary to configure the public network interface for service processor-to-storage system communications.

9. Press ENTER to accept the default subnet mask, or type an alternate subnet mask for the service processor and press ENTER.

10. Press ENTER to accept the default gateway address shown in brackets, or type a default gateway address and press ENTER. The setup script suggests a default gateway address based on the IP address you have supplied. If a gateway address is unavailable, type none and press ENTER.

**NOTE:** If you do not specify a gateway address, the service processor must be on the same subnet as the storage system.

11. Type no to not allow inbound and/or outbound file transfers and press ENTER.

---

**SP Network Parameters**

Enter Control-C at any time to abort this process

Please enter the host name [SPXXXXX]: [enter]

Please enter the IP address for the public network interface: <static.IP.address>

Please enter the netmask for this interface [255.255.255.0]: <subnet.mask.address>

Please enter the IP address of a default gateway, or NONE [<static.IP.address.1>]: <default.gateway.address>

**NOTE:** If you do not specify a gateway address, the service processor must be on the same subnet as the storage system.
12. Type `yes` to use the modem for file transfer and press `ENTER`.  

Will inbound and/or outbound files transfers be allowed via the modem (yes or no)? [yes] [enter]

13. For technical support and services through remote location, press `ENTER` or type `yes` and press `ENTER`, then continue to step 14.  

To prohibit remote control of the service processor, type `no` and press `ENTER`, then skip to step 15.

SP Network Parameters  

Enter Control-C at any time to abort this process

Will this SP be allowed to be remotely controlled (yes or no)? [yes]  
(Replying 'yes' will allow Remote Operations sessions from a Connection Server)  
[enter]

14. Type `m` to use modem for Remote Operations and press `ENTER`.  

SP Network Parameters  

Enter Control-C at any time to abort this process

Which media will be used for Remote Operations (ethernet or modem)?  
Enter 'e' or 'm' [modem]: [enter]

15. Type the phone number, including area code, for the service processor and press `ENTER`.  

SP Network Parameters  

Enter Control-C at any time to abort this process

Please enter the SP’s local phone number, including area code, using only the following characters: 0-9 ( ) - , Ex: (510)555-1212 011 813 55 12123: <splocalnumber>

NOTE: Enter any **outside** prefix separately in step 16.

16. Type the prefix required when dialing out from the operating site if applicable and press `ENTER`.  

SP Network Parameters  

Enter Control-C at any time to abort this process

Please enter the required prefixes when dialing out.  
- Just hit enter for no prefix  
- Number to get an outside line (ex. 8 or 9)  
- Sequence to disable call waiting (ex. #70)  
- When more then one sequence is required you may
have to insert one,

17. Press **ENTER** to use the HP 3PAR Connection Server, or type **yes** and press **ENTER** and then skip to step 21.
   To specify an alternate connection server, type **no**, press **ENTER**, and continue to step 18.

   Will this SP use the 3PAR Connection Server? (yes or no) [yes] [enter]

18. If you answered **no** in step 17, type the host name for an alternate connection server and press **ENTER**.

   SP Network Parameters
   Enter Control-C at any time to abort this process

   Please enter the fully qualified hostname for the Connection Server
   (use only alpha numeric or . - _) - or - QUIT to abort
   <server_name>

19. Type the connection server PPPD server IP address and press **ENTER**.

   SP Network Parameters
   Enter Control-C at any time to abort this process

   Enter the Connection Server's dialup (PPPD) server IP address.
   Select it to be in one of following private networks IP ranges.

   Note: This adress MUST be the same as specified on the Connection Server,
   using the ModemConfig command.

   10.0.0.0 --> 10.255.255.255
   172.16.0.0 --> 172.31.255.255
   192.168.0.0 --> 192.168.255.255
   <PPPD.server.IP>

20. Type the connection server phone number or numbers, including area code, and press **ENTER**.

   Please enter Connection Server phone number(s), including area code,
   using only the following characters: 0-9 ( ) - ,
   Ex: 1-510-555-1212 011 813 555 12123
   If there are more than one(1) phone numbers then separate them with a colon(:)
   <phone_number>

136 Initializing the Storage System Software
21. Type the external NTP server address (if available) and press ENTER. If unavailable, type none and press ENTER.

Network Time Server

Enter Control-C at any time to abort this process

Please enter the I/P address of an external NTP server, or a blank delimited list if more than one is desired, or 'none' if there will not be any time server [?]:

Enter the IP address of an external NTP server <NTP.server.address>

22. Type yes to verify the supplied network information and press ENTER.

SP Network Parameters

Enter Control-C at any time to abort this process

The Host Name is: <spname>
The IP address entered is: <static.IP.address>
The Netmask entered is: <subnet.mask.address>
The default gateway is: <default.gateway.address>
NTP Server address: <NTP.server.address>
Data Transfer media: MODEM
Remote Operations media: MODEM
Connection Server <3PAR default server> OR <server_name>
    IP: <PPPD.server.IP>
    Phone number: <phone_number>

The SP local number is: <splocalnumber>
The dialup prefix is: <prefix>

Is this data correct? (yes or no)? [yes] yes

NOTE: The connection server IP and phone number only appear when you are not using the HP Connection Server at HP Central.

23. Set up the time zone for the operating site:
   a. Select a country from the list, type the corresponding number <X> , and press ENTER.
   b. Select a continent or ocean from the list, type the corresponding number <X> , and press ENTER.
   c. Select a country from the region list, type the corresponding number <X> , and press ENTER

24. Verify the time zone setting is correct, type 1 and press ENTER. Choosing option 2 restarts the time zone configuration.

NOTE: The system automatically makes the time zone change permanent. Disregard the instructions on the screen for appending the command to make the time zone change permanent.
25. Press **ENTER** to accept the default date in brackets, or type the current date in MM/DD/YYYY format and press **ENTER**.

```
Basic Date and Time

Enter Control-C at any time to abort this process

Please enter the current date in MM/DD/YYYY format [<current date>] :
```

26. Type the current time in HH:MM format or press **ENTER** to accept the default time indicated by the installation script.

```
Basic Date and Time

Enter Control-C at any time to abort this process

Please enter the time in HH:MM format [<Time>] :
[enter]
```

27. Type **yes** to verify the indicated date in step 25 and press **ENTER**.

```
Basic Date and Time

Enter Control-C at any time to abort this process

The date You entered is <current date>

Is this Correct? (yes or no)
yes
```

28. Select the default SSH site keys.

```
Using the DEFAULT, installed Site key files:

If this is the INITIAL INSTALLATION of this 3PAR SP and InServ at this site, the DEFAULT keys should be used.

If this is a REPLACEMENT SP, or there is already an InServ running at this site with which this SP must communicate, do one of the following:

1) If you have external media containing the currently deployed key pair (on CD or floppy), then answer NO and provide the Keys to use.

2) If you do not have a copy of the current keys, answer YES and force a key-exchange by MANUALLY adding the cluster during the SP Moment of Birth, or by using "spmaint" option 6.4.2 AFTER the moment of birth to invoke (or force) a key exchange. You may have to manually add any existing InServ clusters in order to perform the key exchange.

Do you wish to use the DEFAULT, installed Site key files? (y or n)
y
```
**CAUTION:** If you receive any password prompts during this process, this indicates the nodes in the system have not been properly configured. Verify the IP addresses on the SP and controller nodes. Use the red crossover cable to connect the highest node port ETH 0 to SP ETH 0 to establish a private network. If the problem still exists, do not proceed any further. Contact HP 3PAR Technical Support for assistance.

29. Press **ENTER** to conclude MOB configuration.

InServ configuration is no longer done during the Moment Of Birth.

Use spmaint to install the InForm OS software on the SP and add the InServ configuration to the SP after a successful MOB.

Press **ENTER** to continue.

**NOTE:** After completing the SPMOB process, additional InForm OS files must first be installed in order to communicate and add a storage system. To install InForm OS files, refer to “Installing HP 3PAR OS Files” (page 145).

**NOTE:** To add a cluster after installing HP 3PAR InForm OS files, refer to “Adding a Storage System to the Service Processor” (page 146).

30. Monitor the system while the service processor uses the site key. When the system configuration process is complete, the following message appears:

{....}

Config complete for <storage.system.IP.address>...

Welcome to the 3PAR Service Processor Moment of Birth

The service processor automatically restarts.

Welcome to the 3PAR Service Processor Moment of Birth

Rebooting....

Continue on to “Installing HP 3PAR OS Files” (page 145).

**Secure Site Setup**

Use the following procedure to set up the service processor at a secure site, where the service processor is configured to monitor the storage system but never uses the network for external communications.

1. Connect the maintenance PC to the service processor through a serial connection as described in “Connecting to the Service Processor” (page 193), then power on the service processor and log in as the root user.
2. Type **yes** to begin the service processor setup script (SPMOB) and press **ENTER**.

Welcome to the 3PAR Service Processor Moment of Birth

Enter Control-C at any time to abort this process
Are you ready to configure the SP at this time? (yes or no) [yes]: [enter]

3. Type yes to indicate the site is secured and press ENTER.

CAUTION: If you answer yes, the service processor will not be able to communicate with HP Central. A complete rebuild of the SP is required if the SP needs to establish communication link with HP Central.

Site Security Level

Enter Control-C at any time to abort this process

A Secure Site is a site where the customer will NEVER allow a 3PAR SP to access the public internet. Thus the SP public interface will be used only to access and monitor the 3PAR InServ attached to this SP.

Is this a Secure Site? (yes or no) [no]

yes

4. Type 1 to assign SP Mode option for file transfer/remote operations and press ENTER.

Type of transport control

Enter Control-C at any time to abort this process

You have two options for file transfer/remote operations:

1 ==> SP Mode where inbound/outbound access is via ssh session and control is via the Customer Controlled Access (CCA) setting.
2 ==> Secure Network Mode where inbound/outbound access is via https and is controlled by the 3PAR Secure Service Agent (SSAgent).
X  None of the above. Cancel and Exit

Please enter your selection [X]: 1

NOTE: Secure Network Mode cannot be enabled through Secure Site setup.

5. Type 1 to continue with the SPMOB and press ENTER.

Type of install

Enter Control-C at any time to abort this process

How do you want to configure this SP?

1 ==> Continue with spmob (new site install)
2 ==> Restore from a backup file (SP rebuild/replacement)
X  None of the above. Cancel and Exit

1
6. Type **No** to retain the current value or enter the current value of the Service Processor ID (SPID) if applicable and press **ENTER**.

<table>
<thead>
<tr>
<th>Do you need to change the Service Processor Id (SPID) from its current value of SPXXXXX? <em>(y or n)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
</tr>
</tbody>
</table>

7. Accept the default service processor name (in brackets) by pressing **ENTER**, or type an alternate name and press **ENTER**. The default service processor name is the SPID. Accepting the default name is recommended.

   | SP Network Parameters
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Control-C at any time to abort this process</td>
</tr>
<tr>
<td>Please enter the host name [SPXXXXX]: [enter]</td>
</tr>
</tbody>
</table>

8. Type the static IP address assigned to the service processor and press **ENTER**.

   | SP Network Parameters
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Control-C at any time to abort this process</td>
</tr>
<tr>
<td>Please enter the IP address for the public network interface: &lt;static.IP.address&gt;</td>
</tr>
</tbody>
</table>

9. Press **ENTER** to accept the default subnet mask, or type an alternate subnet mask for the service processor and press **ENTER**.

   | Please enter the netmask for this interface [255.255.255.0]: <subnet.mask.address> |

10. Press **ENTER** to accept the default gateway address shown in brackets, or type a default gateway address and press **ENTER**. The setup script suggests a default gateway address based upon the supplied IP address.

    | Please enter the IP address of a default gateway, or NONE [<static.IP.address.1>]: <default.gateway.address> |

11. Type **yes** to allow inbound and/or outbound file transfers and press **ENTER**.

    | Will this ethernet interface be used for inbound and/or outbound file transfers (yes or no)? [yes] |

12. Type **no** to not allow the service processor to be remotely controlled and press **ENTER**.

    | SP Network Parameters
    |---------------------------------------------------------------|
    | Enter Control-C at any time to abort this process |
Will this SP be allowed to be remotely controlled (yes or no)? [yes]  
(Replying 'yes' will allow Remote Operations sessions from a Connection Portal)  
no

13. Type no to not use the HP 3PAR Connection Portal and press ENTER.

SP Network Parameters  
Enter Control-C at any time to abort this process  
Will this SP use the 3PAR Connection Portal? (yes or no) [yes]

14. Answer the prompts about your proxy server.

SP Network Parameters  
Enter Control-C at any time to abort this process  
Does the connection to the CP require proxy services? (yes or no) [no]  
yes  
Please enter the name of the proxy server -OR- quit to abort setting a proxy  
<proxy.server.name>  
Please enter the IP address of the proxy server -OR- quit to abort setting a proxy  
<proxy.server.address>  
Please enter the protocol supported by the proxy server from the list  
HTTP  
SOCKS4  
SOCKS5  
-OR-  
quit to abort setting a proxy  
SOCKS5  
Please enter the port to contact on the proxy server [1080]  
-OR-  
quit to abort setting a proxy

15. Enter the IP address of your NTP server (if applicable). If an NTP server is not required, type none and press ENTER.

Network Time Server  
Enter Control-C at any time to abort this process  
Please enter the I/P address of an external NTP server,  
or a blank delimited list if more than one is desired,  
or 'none' if there will not be any time server [?]:  
Enter the IP address of an external NTP server  
<NTP.server.address>

16. Type yes to configure the service processor firewall in permissive mode and press ENTER.

SP Network Parameters  
Enter Control-C at any time to abort this process
The SP firewall protects the SP and the customer network from unauthorized use. It can be configured in 'permissive' mode to allow any host to connect to the SP via SSH and HTTP.

Do you wish to configure the SP firewall in 'permissive' mode? [yes/NO]

yes

NOTE: Configuring the SP firewall in permissive mode enables access to the SP from any host on the local area network.

17. Type yes to verify the supplied network information and press ENTER.

SP Network Parameters

Enter Control-C at any time to abort this process

The Host Name is: <spname>
- Public IP address: <static.IP.address>
- Netmask: <subnet.mask.address>
- Gateway: <default.gateway.address>

PERMISSIVE FIREWALL MODE SELECTED

NTP Server address:
Data Transfer media: ETHERNET
Remote Operations not allowed
Connection Portal: 3PAR default portal

Is this data correct? (yes or no)? [yes]

yes

18. Set up the time zone for the operating site:
   a. Select a country from the list, type the corresponding number <X>, and press ENTER.
   b. Select a continent or ocean from the list, type the corresponding number <X>, and press ENTER.
   c. Select a country from the region list, type the corresponding number <X>, and press ENTER

19. Verify the time zone setting is correct, type 1 and press ENTER. Choosing option 2 restarts the time zone configuration.

   NOTE: The system automatically makes the time zone change permanent. Disregard the instructions on the screen for appending the command to make the time zone change permanent.

20. Press ENTER to accept the default date in brackets, or type the current date in MM/DD/YYYY format and press ENTER.

21. Type the current time in HH:MM format or press ENTER to accept the default time indicated by the installation script.

22. Type yes to verify the indicated date and press ENTER.

23. Select the default SSH site keys.

Using the DEFAULT, installed Site key files:

If this is the INITIAL INSTALLATION of this 3PAR SP and InServ at this site, the DEFAULT keys should be used.
If this is a REPLACEMENT SP, or there is already an InServ running at this site with which this SP must communicate, do one of the following:

1) If you have external media containing the currently deployed key pair (on CD or floppy), then answer NO and provide the Keys to use.

2) If you do not have a copy of the current keys, answer YES and force a key-exchange by MANUALLY adding the cluster during the SP Moment of Birth, or by using "spmaint" option 6.4.2 AFTER the moment of birth to invoke (or force) a key exchange. You may have to manually add any existing InServ clusters in order to perform the key exchange.

Do you wish to use the DEFAULT, installed Site key files? (y or n)

CAUTION: If you receive any Password: prompts during this process, this indicates the nodes in the system have not been properly configured. Verify the IP addresses on the SP and controller nodes. Use the red crossover cable to connect the highest node port ETH 0 to SP ETH 0 to establish a private network. If the problem still exists, do not proceed any further. Contact HP 3PAR Technical Support for assistance.

24. Press ENTER to conclude MOB configuration.

InServ configuration is no longer done during the Moment Of Birth.

Use spmaint to install the InForm OS software on the SP and add the InServ configuration to the SP after a successful MOB.

Press ENTER to continue.

NOTE: After completing the SPMOB process, additional HP 3PAR InForm OS files must first be installed in order to communicate and add a storage system. To install InForm OS files, refer to “Installing HP 3PAR OS Files” (page 145).

NOTE: To add a cluster after installing InForm OS files, refer to “Adding a Storage System to the Service Processor” (page 146).
25. Monitor the system while the service processor uses the site key. When the system configuration process is complete, the following message appears:

(....)

*** starting final MOB phase

  Fix passwords
  enabling key change...
  Disabling sendmail...
  verifying postfix status...
  Setup to run all ST/SP tasks at boot time
  Cleanup MOB

Updating PAM settings

Rebooting....

The service processor automatically restarts.

Continue on to “Installing HP 3PAR OS Files” (page 145).

Installing HP 3PAR OS Files

After completing the SPMOB process, InForm OS files must first be installed onto the SP in order to communicate with a storage system.

To install the HP 3PAR OS files:

1. Insert the HP 3PAR OS Release Distribution CD into the SP CD-ROM drive.
2. Log in to the SP as SPVAR (password prompted).
3. From the SPMAINT main menu, type 1 for SP Control/Status and press ENTER.
4. Type 16 for Maintain SP Software and press ENTER.
5. Type 1 for Update SP Software Revision and press ENTER.
6. Type 2 for CDROM to install from the inserted CD and press ENTER.

**NOTE:** The duration of the installation process is approximately 5 minutes.

7. When prompted to update the SP, verify the software version is correct, type y and press ENTER to continue with the update process.

Mounting CDROM...

    tpdSPInFormOS3.1.1.xxx-3.1.1.xxx-xx.i386.rpm

    Do You wish to update the SP from /mnt/cdrom?

    (y or n)

    y

8. When the installation process completes, the SPMAINT main menu reappears. To verify the current software version after installation, type 1 for SP Control/Status and press ENTER.
9. Verify the installation is accurate and press ENTER to return to SPMAINT menu.

1.1 Display SP Version

SP Software Version

SP-2.5.1.GA-15

SP Base Image Version: 3.1-8
SP Version: 2.5.1.GA-15
SP Patches:
  InFormOS release (3.1.1): 3.1.1.226

More detail is available in the latest SPLOR or spconfig data.

press <enter/return> to continue

10. From the SPMAINT main menu, type 1 for SP Control/Status and press ENTER

11. Type 10 for Unmount a CDROM and press ENTER. Remove the CD and store in a secure place.

Continue on to Section (page 146).

Adding a Storage System to the Service Processor

After successfully completing the Service Processor Moment of Birth (SPMOB) with Secure Network Mode enabled, you must add the storage system to the configuration database of the service processor. Adding a storage system allows the SP to communicate, service and monitor the health of the system.

1. Connect the maintenance PC to the service processor as described in “Connecting to the Service Processor” (page 193).

2. Log into the service processor maintenance interface.

3. Type 3 for InServ Configuration Management menu and press ENTER.

SPXXXXX

1 SP Main

3PAR Service Processor Menu

Transfer media: ethernet Transfer status: No transfer yet

Enter Control-C at any time to abort this process

1 ==> SP Control/Status
2 ==> Network Configuration
3 ==> InServ Configuration Management
4 ==> InServ Product Maintenance
5 ==> Local Notification Configuration
6 ==> Site Authentication Key Manipulation
7 ==> Interactive CLI for an InServ
4. Type 2 to **Add a new InServ** and press **ENTER**.

SP - InServ Configuration Manipulation

Enter Control-C at any time to abort this process

1   ==> Display InServ information
2   ==> Add a new InServ
3   ==> Modify an InServ config parameters
4   ==> Remove an InServ
X   Return to the previous menu

2

5. Type the static IP address of the system (InServ) and press **ENTER**.

SP - InServ Configuration Manipulation

Enter Control-C at any time to abort this process

Please enter the IP address of the InServ you wish to add
-OR-
    Enter QUIT to abort:
<static.ip.address>

**NOTE:** If adding the storage system fails, exit from process and check the SP software version for compatibility. Update the SP with the proper InForm OS version before adding the system.
6. After successfully adding the system (InServ), press ENTER to return to the SP menu.

Adding <static.ip.address> to firewall rules on interface eth0

If you see any Password: prompts during this process it is an indication that the nodes in the InServ have NOT been properly configured!! DO NOT CONTINUE
IF THIS IS THE CASE! Contact 3PAR technical support!
communicating with <static.ip.address> using base key...
base key ok
interrogating <static.ip.address> for version number...
Version 2.5.1.X reported on <static.ip.address>
retrieving system data for <static.ip.address> ...
3PAR system name <InServ Name> found for <static.ip.address>
SYSID <InServ Name> found for <static.ip.address>
serial number <InServ serial #> found for <static.ip.address>
Writing configuration file for <static.ip.address> ...
verifying / adding cli service ids...
attempting to force current keys onto node...
replaced key on node 0 of cluster <InServ Name>
replaced key on node 0 of cluster <InServ Name> in altroot
replaced key on node 1 of cluster <InServ Name>
replaced key on node 1 of cluster <InServ Name> in altroot
Adding InServ to NTP configuration...
creating required file structures... adding InServ to SP database...
Config complete for <static.ip.address>..
Starting 'spcollect' tasks for InServ <InServ Name>
Starting 'spevent' task for InServ <InServ Name>
InServ add complete

Press <enter/return> to continue

Continue on to Verifying Service Processor Connectivity.

Verifying Service Processor Connectivity

After the service processor restarts following the SPMOB, verify service processor connectivity as follows:
1. When the service processor finishes restarting, open a Web browser and use the maintenance PC to communicate with the service processor through SPOCC. See “Logging in to SPOCC” (page 195) for specific instructions.
2. Select option 1 for SP Control/Status.
3. Select option 13 for Display SP status.
4. Verify the global procedures spcollect and spevent are running and the spevent is running for all configured clusters (storage systems) and press ENTER. If these global events are not running, contact HP 3PAR Technical Support for assistance. See “Verifying the SP Status” (page 149).
Figure 84 Verifying the SP Status
5. Verify the service processor outbound communication ability and that the service processor can transfer files by clicking **Support > SP Network Configuration Menu > Connection Portal Control > Test CP Connection**. See “Verifying the Service Processor’s Outbound Communication” (page 150).

**Figure 85 Verifying the Service Processor’s Outbound Communication**

A new window opens displaying the communication details (“Viewing the Service Processor Communication Details” (page 150)).

**Figure 86 Viewing the Service Processor Communication Details**

6. In the SPOCC window, click **Logout** to end the session.

**Adding Workstations to the Public Firewall Rules**

After verifying service processor connectivity, add the management workstation (host) IP address to the service processor public firewall rules. This allows access to the service processor. For example, you can use a management workstation to connect to the service processor in order to stop or start external communications.

**NOTE:** It is also possible to perform the following procedure directly from the SPOCC interface using the same menus and procedures indicated as follows. The screens may appear different from the examples.
1. Connect the maintenance PC to the service processor as described in “Connecting to the Service Processor” (page 193).
2. If necessary, log into the service processor maintenance interface.
3. Select option 2 for Network Configuration and press ENTER.
4. Select option 3 for Firewall Manipulation and press ENTER.
5. Select option 3 for Alter Public network firewall rules and press ENTER.
6. Select option 1 for Add a new host and press ENTER.
7. Type the IP address or range of at least one management workstation to be added and press ENTER.

8. Verify the address and then type y and press ENTER.
9. To add other management workstations, repeat step 6 through 8. When finished adding workstations, type x and press ENTER.
10. Select option 1 for Display Firewall Status and press ENTER to confirm settings.
11. Type x and press ENTER to return to the SPMAINT main menu.

Exporting Test LUNs

For the final step in verifying the storage system installation, create two or three test LUNs and confirm that the attached host or hosts can access them. After you have created the test LUNs and verified the host can access them, notify the system administrator that the storage system is ready for use.

NOTE: Before you can export test LUNs, it is necessary to determine the host Fibre Channel connection types and set the appropriate port personas for all target ports, or ports that connect to host computers. See the HP 3PAR Implementation Guides where appropriate.

Defining Hosts

In order to define hosts and set port personas, access the CLI shell on the service processor.
To set the personas for ports connecting to host computers:

1. From the service processor CLI session, verify connection to a host before defining a host:

   192.168.46.249 cli% showhost

2. Define a new system host as follows:

   192.168.46.249 cli%
   createhost -persona <hostpersona> <hostname> <WWN>...

   where <hostpersona> is the host persona ID number and <hostname> is the name of the test host and <WWN> is the WWN of an HBA in the host machine. The HBA must be physically connected to the storage system.

3. After defining a system host for each physically connected WWN, verify host configuration information for the storage system:

   192.168.46.249 cli%
   showhost

4. Use the controlport command to set each target port:

   192.168.46.249 cli%
   controlport config <connmode> [-ct loop | point] <node:slot:port>

   where <connmode> is the name of the disk, host, or rcfc. The -ct subcommand sets the connection type and is optional: Use loop for the disk; loop or point for the host; point for rcfc. The <node:slot:port> specifies the controller node, PCI slot, and PCI adapter port to be controlled.

5. When finished setting each connected target port, verify all ports are set correctly.

   192.168.46.249 cli%
   showport -par

Creating and Exporting Test Volumes

1. From the service processor CLI session, create a common provisioning group test to verify the system can create and export virtual volumes.

   192.168.46.249 cli% createcpg test_cpg

2. Create a virtual volume.

   192.168.46.249 cli% createvv test_cpg test_vv 10G
3. Create a VLUN of the virtual volume for export to the host.

```
192.168.46.249 cli%
   createnvlun
   test_vv
   test_lun_num <hostname>
```

4. Verify the host can access the VLUN.
5. Repeat step 1 through 4 for each host.
6. From the service processor, type `exit` to stop the CLI session, then type `x` and press `ENTER` to return to the service processor main menu.
7. Type `x` and press `Enter` again to exit service processor maintenance. Type `exit` and press `ENTER` to log off the service processor.
8. Disconnect the Ethernet cable between the service processor and the maintenance PC.
Part III Deinstallation
8 Deinstalling the Storage System

This chapter describes methods for deinstalling a T-Class Storage System. Use these procedures when removing storage systems from an operating site and when relocating systems without data to an alternate site.

Preparing for deinstallation

Prior to deinstalling a storage system:

- Obtain the drive magazine transport containers and packaging materials
  One transport container holds up to 30 magazines
- Obtain storage system shipping containers, one per cabinet to be deinstalled
- Obtain the storage system cabinet key, if necessary
  A key is necessary to unlock the rear door of each cabinet
- Obtain the storage system fascia key, if necessary
  A key may be necessary to unlock the front fascias of each cabinet
- Verify that the System Administrator has prepared the storage system for system shutdown
- Complete the storage system inventory

Storage System Inventory

To complete the storage system inventory, record the following information for each system to be deinstalled:

- Customer name and site information
- System serial numbers (use the `showsys -d` CLI command)
- Software currently running on the system
- HP 3PAR Operating System version (use the `showversion -b -a` CLI command)
- Drive cage firmware version (use the `showcage` CLI command)
- Disk drive firmware version (use the `showpd -i` CLI command)
- HP 3PAR CBIOS version (use the `shownode -verbose` CLI command)
- Storage system hardware configuration
- Number of cabinets
- Number of controller nodes
- Amount of data cache in the controller nodes (use the `shownode` CLI command)
- Amount of control cache in the controller nodes (use the `shownode` CLI command)
- Number and type of Fibre Channel adapters in each node (use the `showport -i`)
- Number of drive cages
- Number of drive magazines (use the `showcage -d` CLI command)
- Number and sizes of drives on the magazines (use the `showpd` CLI command)
- Physical condition of system hardware and cabinet (note presence of scratches, dents, missing screws, broken bezels, damaged ports, and so on)
- Destination address or addresses and list of the equipment going to each address
Deinstalling the Storage System

This section provides instructions for deinstalling storage systems.

1. Connect the maintenance PC to the highest numbered controller node, as described in “Connecting the Maintenance PC” (page 191), and log in as the console user.

   ```
   3PAR(TM) InForm(R) OS <version> <sernum>-<nodeID> ttyS0
   (none) login: console
   Password: <password>
   ```

   **NOTE:** Press **CTRL+C** at any time to cancel deinstallation.

2. From the console menu, type **9** to select the **Perform a deinstallation** menu option.

   ```
   3PAR Console Menu enodec1c7 3.x.x.xx
   1. Out Of The Box Procedure
   2. Run ootb-stress-analyzer
   3. Re-enter network configuration
   4. Update the CBIOS
   5. Enable or disable CLI error injections
   6. Perform an IDE rescue
   7. Set up the system to wipe and rerun ootb
   8. Cancel a wipe
   9. Perform a deinstallation
   10. Update the system for recently added hardware (admithw)
   11. Check system health (checkhealth)
   12. Exit
   >9
   ```

   **WARNING:**

   Running this script will result in complete loss of data on this system.

   Are you sure you want to continue? (y/n)

   Y

   Deinstallation process will be started in 10 seconds. Once the cluster has rebooted, log back in and run deinstall_finish.

   A warning message indicating all data on this system will be lost appears. Type **y** to begin the deinstallation process and the system reboots.

3. After the system reboots, log in again as the console user.

   ```
   3PAR(TM) InForm(R) OS <version> <sernum>-<nodeID> ttyS0
   (none) login: console
   ```
4. From the console menu, type 9 to select the **Perform a deinstallation** menu option.

5. When prompted, proceed with either shutting down the system or initializing the system chunklets.

**NOTE:** Depending on the size of the system disks, initializing the chunklets may take several hours.

**NOTE:** If you do not wait for the chunklets to be initialized, data still resides on the disks, but cannot be accessed easily. While the chunklets are initialized, zeros are written over the existing data. Contact your HP Technical Support Representative for additional information.

6. In the Service Processor menu, type 1, to select the **SP Control/Status** option.

```
1       SP Main

3PAR Service Processor Menu
Transfer media: ethernet  Transfer status: Ok
Enter Control-C at any time to abort this process
1 ==>  SP Control/Status
2 ==>  Network Configuration
3 ==>  InServ Configuration Management
4 ==>  InServ Product Maintenance
5 ==>  Local Notification Configuration
6 ==>  Site Authentication Key Manipulation
7 ==>  Interactive CLI for an InServ
8 ==>  Execute a command on a node
X Exit
```

7. In the SP Control Functions menu, type 18 to select the **deinstall SP (Back-in-the-box)** option.

```
1       SP CONTROL

3PAR Service Processor Menu
Transfer media: ethernet  Transfer status: Ok
SP Control Functions
Enter Control-C at any time to abort this process
1 ==>  Display SP Version
2 ==>  Reboot SP
3 ==>  Halt SP
4 ==>  Stop InServ related Processes
5 ==>  Start InServ related Processes
6 ==>  File Transfer Monitor
7 ==>  SP File Transfer Trigger
8 ==>  Reset Quiesce state in Transfer process
9 ==>  Mount a CDROM
10 ==>  Unmount a CDROM
11 ==>  SP Date/Time maintenance
12 ==>  Manage NTP configuration
13 ==>  Display SP status
14 ==>  SP User Access Control
```
8. When prompted, halt the service processor.
9. Set all power breakers on the PDUs (eight per cabinet) to the OFF position ("Setting a Power Breaker on the PDU to the OFF Position" (page 158)).

Figure 87 Setting a Power Breaker on the PDU to the OFF Position

⚠️ **CAUTION:** For safety purposes, drive magazines must be sufficiently grounded before removal.

10. Unplug the storage system main power cords.
11. For T400 and drive expansion cabinets, coil all main powers cords and insert them into the lower access opening at the bottom of the cabinet, as shown in "Coiling Main Power Cords" (page 159). Use a cable tie wrap to secure the cords inside the cabinet. For T800 node cabinets, you must remove the side panels in order to store the cables in the sides of the cabinet.

**NOTE:** It may be necessary to remove the side covers of the cabinet if the PDU power cables are routed through the top. If the node cabinet contains an T800 node-chassis, the cables will not fit at the bottom of the cabinet. The side panels must be removed and the two power cords should be tie-wrapped and stored on both sides of the cabinet between the mounting rails and the side panel cover.
12. Disconnect all external connections from the host computer or computers to the storage system and remove these cables from the cabinet, leaving the internal Fibre Channel and service processor connections intact when possible.

13. Insert dust plugs into all system Fibre Channel ports and secure all Fibre Channel, Ethernet, and serial cables remaining inside the cabinet with the cable management system ("Securing Cables with the Cable Management Clips" (page 160)).

**NOTE:** When dressing the cables to the node ports, provide several inches of slack (a service loop) so the node disk can be serviced from the front of the system without disconnecting cables.
14. Locate the wrist grounding strap provided with the storage system. Attach the grounding strap clip directly to an unpainted surface of the rack.

15. Use a #2 Phillips screwdriver to loosen the screws securing the drive magazine handles to the drive magazines ("Loosening the Screw on the Drive Magazine" (page 160)).
16. Place the drive magazine transport container or shipping containers near the storage system. Before opening the 30–magazine container, secure the wheels on the bottom of the container by engaging the brakes on the front wheels.\(^5\)

To open the container, un latch the rotary latches by raising the levers and turning them counterclockwise one half turn (“Unlatching the Drive Magazine Transport Container” (page 161)).

\[\text{Figure 91 Unlatching the Drive Magazine Transport Container}\]

![Figure 91 Unlatching the Drive Magazine Transport Container]

\(\Delta\) **CAUTION:** The transport container contains ESD-safe materials to prevent damage to disk drives in transit. Do not use any other container to transport drive magazines.

17. Remove a drive magazine by pulling the drive magazine handle down to disengage the magazine from the chassis. Then pull the magazine straight out.
18. Load each drive magazine into an ESD bag and then into the transport container.
19. Return the wrist grounding strap to the cabinet and close the rear door of the storage system.

---

5. For systems shipped internationally and for systems with fewer than 15 drive magazines, the magazines are shipped in boxes that hold three magazines each.
20. Raise the leveling feet on the cabinet.

To raise a leveling foot, use an adjustable wrench to turn the locking nut clockwise until it is as low as possible ("Releasing the Locking Nut" (page 76)).

**Figure 92 Releasing the Locking Nut**

Use an adjustable wrench, turn the leveling foot counterclockwise until it is as high as possible ("Raising a Leveling Foot" (page 162)). Use the wrench to completely lock the locking nut.

**Figure 93 Raising a Leveling Foot**
Packing the Storage System in the Type 1 Shipping Container

**NOTE:** Refer to “Unpacking the Cabinet” (page 42) for information about Type 1 shipping containers.

1. With at least one person pushing from the rear of the cabinet and a second person guiding the cabinet from the front, wheel the cabinet to the loading area.
2. Place a pink poly antistatic bag over the storage system. These bags come shipped inside the wooden crate.
3. Locate the front of the shipping container (“The Front of the Shipping Container” (page 163)) and unlatch the four rotary latches securing the front panel.

![Figure 94 The Front of the Shipping Container](image)

To unlatch a rotary latch, raise the lever and turn counterclockwise one half turn, as shown in “Unlatching a Rotary Latch” (page 164).
4. Lower the front panel of the shipping container to form a ramp and remove any packing material inside. With at least one person facing the container and one or more people guiding the storage system from behind, push the cabinet up the ramp and guide it into the container ("Guiding the Cabinet Into the Container" (page 165)).

△ **CAUTION:** You must place the storage system into the container with the back of the storage system facing the container ramp, as shown in “Guiding the Cabinet Into the Container” (page 165) and “Raising the Ramp to Close the Cabinet” (page 166).
Figure 96 Guiding the Cabinet Into the Container
5. Replace the foam packing at the front of the container, then raise the ramp and secure the latches ("Raising the Ramp to Close the Cabinet" (page 166)).

\textbf{Figure 97 Raising the Ramp to Close the Cabinet}

\textbf{WARNING!} To avoid possible injury or damage to equipment, you must use a pallet jack or similar device to move the cabinet after loading it into the shipping container.

\textbf{Packing the Storage System in the Type 2 Shipping Container}

\textbf{NOTE:} Refer to “Unpacking the Cabinet” (page 42) for information about Type 2 shipping containers.

1. With at least one person pushing from the rear of the cabinet and a second person guiding the cabinet from the front, wheel the cabinet to the loading area.
2. Place a pink poly antistatic bag over the storage system. These bags come shipped inside the wooden crate.
3. Locate the front of the shipping container ("The Front of the Shipping Container" (page 167)) and unlatch the four rotary latches that secure the front panel.
To unlatch a rotary latch, raise the lever and turn counterclockwise one half turn, as shown in "Unlatching a Rotary Latch" (page 167).

4. Lower the front panel of the shipping container to form a ramp and remove any packing material inside.

5. Attach the pull straps to the inside walls of the shipping container to assist with future cabinet removal ("Preparing the Shipping Container" (page 168)).
6. With at least one person facing the container and one or more people guiding the storage system from behind, push the cabinet up the ramp and guide it into the container.

⚠️ **CAUTION:** You must place the storage system into the container with front of the storage system (bezels) facing outward.

7. Replace the foam packing at the front of the container ("Replacing Packing Foam" (page 169)).
8. Raise the ramp and secure the latches.

⚠️ **WARNING!** To avoid possible injury or damage to equipment, you must use a pallet jack or similar device to move the cabinet after loading it into the shipping container.
9 Support and Other Resources

Contacting HP

For worldwide technical support information, see the HP support website:
http://www.hp.com/support

Before contacting HP, collect the following information:

- Product model names and numbers
- Technical support registration number or Service Agreement ID (if applicable)
- Product serial numbers
- Error messages
- Operating system type and revision level
- Detailed questions

Specify the type of support you are requesting:

<table>
<thead>
<tr>
<th>HP 3PAR storage system</th>
<th>Support request</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 3PAR StoreServ 7200, 7400, and 7450 Storage systems</td>
<td>StoreServ 7000 Storage</td>
</tr>
<tr>
<td>HP 3PAR StoreServ 10000 Storage systems</td>
<td></td>
</tr>
<tr>
<td>HP 3PAR T-Class storage systems</td>
<td></td>
</tr>
<tr>
<td>HP 3PAR F-Class storage systems</td>
<td></td>
</tr>
<tr>
<td>HP 3PAR or 3PAR Storage</td>
<td></td>
</tr>
</tbody>
</table>

HP 3PAR documentation

### For information about:

<table>
<thead>
<tr>
<th>See:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supported hardware and software platforms</td>
</tr>
<tr>
<td>The Single Point of Connectivity Knowledge for HP Storage Products (SPOCK) website: <a href="http://www.hp.com/storage/spock">http://www.hp.com/storage/spock</a></td>
</tr>
<tr>
<td>Locating HP 3PAR documents</td>
</tr>
<tr>
<td>The HP 3PAR StoreServ Storage site: <a href="http://www.hp.com/go/3par">http://www.hp.com/go/3par</a></td>
</tr>
<tr>
<td>To access HP 3PAR documents, click the Support link for your product.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HP 3PAR storage system software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage concepts and terminology</td>
</tr>
<tr>
<td>HP 3PAR StoreServ Storage Concepts Guide</td>
</tr>
<tr>
<td>Using the HP 3PAR Management Console (GUI) to configure and administer HP 3PAR storage systems</td>
</tr>
<tr>
<td>HP 3PAR Management Console User’s Guide</td>
</tr>
<tr>
<td>Using the HP 3PAR CLI to configure and administer storage systems</td>
</tr>
<tr>
<td>HP 3PAR Command Line Interface Administrator’s Manual</td>
</tr>
<tr>
<td>CLI commands</td>
</tr>
<tr>
<td>HP 3PAR Command Line Interface Reference</td>
</tr>
<tr>
<td>Analyzing system performance</td>
</tr>
<tr>
<td>HP 3PAR System Reporter Software User’s Guide</td>
</tr>
<tr>
<td>Installing and maintaining the Host Explorer agent in order to manage host configuration and connectivity information</td>
</tr>
<tr>
<td>HP 3PAR Host Explorer User’s Guide</td>
</tr>
<tr>
<td>Creating applications compliant with the Common Information Model (CIM) to manage HP 3PAR storage systems</td>
</tr>
<tr>
<td>HP 3PAR CIM API Programming Reference</td>
</tr>
<tr>
<td>For information about:</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Migrating data from one HP 3PAR storage system to another</td>
</tr>
<tr>
<td>Configuring the Secure Service Custodian server in order to</td>
</tr>
<tr>
<td>monitor and control HP 3PAR storage systems</td>
</tr>
<tr>
<td>Using the CLI to configure and manage HP 3PAR Remote Copy</td>
</tr>
<tr>
<td>Updating HP 3PAR operating systems</td>
</tr>
<tr>
<td>Identifying storage system components, troubleshooting</td>
</tr>
<tr>
<td>information, and detailed alert information</td>
</tr>
<tr>
<td>Installing, configuring, and maintaining the HP 3PAR Policy Server</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
## For information about:

<table>
<thead>
<tr>
<th>Planning for HP 3PAR storage system setup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware specifications, installation considerations, power requirements, networking options, and cabling information for HP 3PAR storage systems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HP 3PAR 7200, 7400, and 7450 storage systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 3PAR StoreServ 7000 Storage Site Planning Manual</td>
</tr>
<tr>
<td>HP 3PAR StoreServ 7450 Storage Site Planning Manual</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HP 3PAR 10000 storage systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 3PAR StoreServ 10000 Storage Physical Planning Manual</td>
</tr>
<tr>
<td>HP 3PAR StoreServ 10000 Storage Third-Party Rack Physical Planning Manual</td>
</tr>
</tbody>
</table>

### Installing and maintaining HP 3PAR 7200, 7400, and 7450 storage systems

<table>
<thead>
<tr>
<th>Installing 7200, 7400, and 7450 storage systems and initializing the Service Processor</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 3PAR StoreServ 7000 Storage Installation Guide</td>
</tr>
<tr>
<td>HP 3PAR StoreServ 7450 Storage Installation Guide</td>
</tr>
<tr>
<td>HP 3PAR StoreServ 7000 Storage SmartStart Software User’s Guide</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maintaining, servicing, and upgrading 7200, 7400, and 7450 storage systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 3PAR StoreServ 7000 Storage Service Guide</td>
</tr>
<tr>
<td>HP 3PAR StoreServ 7450 Storage Service Guide</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Troubleshooting 7200, 7400, and 7450 storage systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 3PAR StoreServ 7000 Storage Troubleshooting Guide</td>
</tr>
<tr>
<td>HP 3PAR StoreServ 7450 Storage Troubleshooting Guide</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maintaining the Service Processor</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 3PAR Service Processor Software User Guide</td>
</tr>
<tr>
<td>HP 3PAR Service Processor Onsite Customer Care (SPOCC) User’s Guide</td>
</tr>
</tbody>
</table>

## HP 3PAR host application solutions

<table>
<thead>
<tr>
<th>Backing up Oracle databases and using backups for disaster recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 3PAR Recovery Manager Software for Oracle User’s Guide</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Backing up Exchange databases and using backups for disaster recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 3PAR Recovery Manager Software for Microsoft Exchange 2007 and 2010 User’s Guide</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Backing up SQL databases and using backups for disaster recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 3PAR Recovery Manager Software for Microsoft SQL Server User’s Guide</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Backing up VMware databases and using backups for disaster recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 3PAR Management Plug-in and Recovery Manager Software for VMware vSphere User’s Guide</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Installing and using the HP 3PAR VSS (Volume Shadow Copy Service) Provider software for Microsoft Windows</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 3PAR VSS Provider Software for Microsoft Windows User’s Guide</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Best practices for setting up the Storage Replication Adapter for VMware vCenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 3PAR Storage Replication Adapter for VMware vCenter Site Recovery Manager Implementation Guide</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Troubleshooting the Storage Replication Adapter for VMware vCenter Site Recovery Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 3PAR Storage Replication Adapter for VMware vCenter Site Recovery Manager Troubleshooting Guide</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Installing and using vSphere Storage APIs for Array Integration (VAAI) plug-in software for VMware vSphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 3PAR VAAI Plug-in Software for VMware vSphere User’s Guide</td>
</tr>
</tbody>
</table>

## Servicing HP 3PAR storage systems

<table>
<thead>
<tr>
<th>For information about:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintaining the HP 3PAR Service Processor</td>
</tr>
<tr>
<td>Service Activities</td>
</tr>
<tr>
<td>--------------------</td>
</tr>
<tr>
<td>Initializing and using the Service Processor</td>
</tr>
<tr>
<td>Upgrading the Service Processor</td>
</tr>
<tr>
<td>Troubleshooting the Service Processor</td>
</tr>
</tbody>
</table>

**Remotely servicing all storage systems**

<table>
<thead>
<tr>
<th>Service Activities</th>
<th>Related Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remotely servicing HP 3PAR storage systems</td>
<td>HP 3PAR Secure Service Collector Remote Operations Guide</td>
</tr>
</tbody>
</table>

**Servicing 7200 and 7400 storage systems**

<table>
<thead>
<tr>
<th>Service Activities</th>
<th>Related Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintaining, servicing, and upgrading 7200 and 7400 storage systems</td>
<td>HP 3PAR StoreServ 7000 Storage Service Guide: Service Edition</td>
</tr>
<tr>
<td>Troubleshooting 7200 and 7400 storage systems</td>
<td>HP 3PAR StoreServ 7000 Storage Troubleshooting Guide: Service Edition</td>
</tr>
</tbody>
</table>

**Servicing 10000 storage systems**

<table>
<thead>
<tr>
<th>Service Activities</th>
<th>Related Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using the Installation Checklist</td>
<td>HP 3PAR StoreServ 10000 Storage Installation Checklist (for HP 3PAR Cabinets): Service Edition</td>
</tr>
<tr>
<td>Upgrading 10000 storage systems</td>
<td>HP 3PAR StoreServ 10000 Storage Upgrade Guide: Service Edition</td>
</tr>
<tr>
<td>Maintaining 10000 storage systems</td>
<td>HP 3PAR StoreServ 10000 Storage Maintenance Manual: Service Edition</td>
</tr>
<tr>
<td>Installing and uninstalling 10000 storage systems</td>
<td>HP 3PAR StoreServ 10000 Storage Installation and Deinstallation Guide: Service Edition</td>
</tr>
</tbody>
</table>

**Servicing T-Class storage systems**

<table>
<thead>
<tr>
<th>Service Activities</th>
<th>Related Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using the Installation Checklist</td>
<td>HP 3PAR T-Class Storage System Installation Checklist (for HP 3PAR Cabinets): Service Edition</td>
</tr>
<tr>
<td>Upgrading T-Class storage systems</td>
<td>HP 3PAR T-Class Storage System Upgrade Guide: Service Edition</td>
</tr>
<tr>
<td>Installing and uninstalling the T-Class storage system</td>
<td>HP 3PAR T-Class Installation and Deinstallation Guide: Service Edition</td>
</tr>
</tbody>
</table>

**Servicing F-Class storage systems**

<table>
<thead>
<tr>
<th>Service Activities</th>
<th>Related Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using the Installation Checklist</td>
<td>HP 3PAR F-Class Storage System Installation Checklist (for HP 3PAR Cabinets): Service Edition</td>
</tr>
<tr>
<td>Upgrading F-Class storage systems</td>
<td>HP 3PAR F-Class Storage System Upgrades Guide: Service Edition</td>
</tr>
<tr>
<td>Maintaining F-Class storage systems</td>
<td>HP 3PAR F-Class Storage System Maintenance Manual: Service Edition</td>
</tr>
<tr>
<td>Installing and uninstalling the F-Class storage system</td>
<td>HP 3PAR F-Class Storage System Installation and Deinstallation Guide: Service Edition</td>
</tr>
</tbody>
</table>
Typographic conventions

Table 24 Document conventions

<table>
<thead>
<tr>
<th>Convention</th>
<th>Element</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bold text</strong></td>
<td>• Keys that you press&lt;br&gt;• Text you typed into a GUI element, such as a text box&lt;br&gt;• GUI elements that you click or select, such as menu items, buttons, and so on</td>
</tr>
<tr>
<td><strong>Monospace text</strong></td>
<td>• File and directory names&lt;br&gt;• System output&lt;br&gt;• Code&lt;br&gt;• Commands, their arguments, and argument values</td>
</tr>
<tr>
<td><strong>&lt;Monospace text in angle brackets&gt;</strong></td>
<td>• Code variables&lt;br&gt;• Command variables</td>
</tr>
<tr>
<td><strong>Bold monospace text</strong></td>
<td>• Commands you enter into a command line interface&lt;br&gt;• System output emphasized for scannability</td>
</tr>
</tbody>
</table>

⚠️ **WARNING:** Indicates that failure to follow directions could result in bodily harm or death, or in irreversible damage to data or to the operating system.

⚠️ **CAUTION:** Indicates that failure to follow directions could result in damage to equipment or data.

**NOTE:** Provides additional information.

**Required**
Indicates that a procedure must be followed as directed in order to achieve a functional and supported implementation based on testing at HP.

**HP 3PAR branding information**

- The server previously referred to as the "InServ" is now referred to as the "HP 3PAR StoreServ Storage system."
- The operating system previously referred to as the "InForm OS" is now referred to as the "HP 3PAR OS."
- The user interface previously referred to as the "InForm Management Console (IMC)" is now referred to as the "HP 3PAR Management Console."
- All products previously referred to as “3PAR” products are now referred to as "HP 3PAR" products.
10 Documentation feedback

HP is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (docsfeedback@hp.com). Include the document title and part number, version number, or the URL when submitting your feedback.
A Regulatory compliance notices

Regulatory compliance identification numbers

For the purpose of regulatory compliance certifications and identification, this product has been assigned a unique regulatory model number. The regulatory model number can be found on the product nameplate label, along with all required approval markings and information. When requesting compliance information for this product, always refer to this regulatory model number. The regulatory model number is not the marketing name or model number of the product.

Product specific information:
HP ____________
Regulatory model number: ____________
FCC and CISPR classification: ____________

Federal Communications Commission notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (for example, personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.

FCC rating label

The FCC rating label on the device shows the classification (A or B) of the equipment. Class B devices have an FCC logo or ID on the label. Class A devices do not have an FCC logo or ID on the label. After you determine the class of the device, refer to the corresponding statement.

Class A equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

Class B equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit that is different from that to which the receiver is connected.
• Consult the dealer or an experienced radio or television technician for help.

Declaration of Conformity for products marked with the FCC logo, United States only

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions regarding this FCC declaration, contact us by mail or telephone:
• Hewlett-Packard Company P.O. Box 692000, Mail Stop 510101 Houston, Texas 77269-2000
• Or call 1-281-514-3333

Modification

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user’s authority to operate the equipment.

Cables

When provided, connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Canadian notice (Avis Canadien)

Class A equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la class A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Class B equipment

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la class B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union notice

This product complies with the following EU directives:
• Low Voltage Directive 2006/95/EC
• EMC Directive 2004/108/EC

Compliance with these directives implies conformity to applicable harmonized European standards (European Norms) which are listed on the EU Declaration of Conformity issued by Hewlett-Packard for this product or product family.

This compliance is indicated by the following conformity marking placed on the product:

![CE Mark](image)

This marking is valid for non-Telecom products and EU harmonized Telecom products (e.g., Bluetooth).

Certificates can be obtained from [http://www.hp.com/go/certificates](http://www.hp.com/go/certificates).
Japanese notices

Japanese VCCI-A notice

この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。VCCI-A

Japanese VCCI-B notice

この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。取扱説明書に従って正しい取り扱いをして下さい。VCCI-B

Japanese VCCI marking

Japanese power cord statement

製品には、同梱された電源コードをお使い下さい。
同梱された電源コードは、他の製品では使用出来ません。

Korean notices

Class A equipment

A급 기기 (업무용 정보통신기기)

이 기기는 업무용으로 전자파적합등록을 한 기기이오니
판매자 또는 사용자는 이 점을 주의하시기 바라며,
당사 응용관에 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

Class B equipment

B급 기기 (가정용 정보통신기기)

이 기기는 가정용으로 전자파적합등록을 한 기기로서
주거지역에서는 물론 모든후지역에서 사용할 수 있습니다.
Taiwanese notices

BSMI Class A notice

警告使用者:

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，請小心操作，並適當地使用防護設施。

Taiwan battery recycle statement

![Taiwan battery recycle symbol]

Turkish recycling notice

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Vietnamese Information Technology and Communications compliance marking

Recycling notices

English recycling notice

Disposal of waste equipment by users in private household in the European Union

This symbol means do not dispose of your product with your other household waste. Instead, you should protect human health and the environment by handing over your waste equipment to a designated collection point for the recycling of waste electrical and electronic equipment. For more information, please contact your household waste disposal service.
Bulgarian recycling notice

Изхвърляне на отпадъчно оборудване от потребители в частни домакинства в Европейския съюз

Този символ върху продукта или опаковката му показва, че продуктът не трябва да се изхвърля заедно с другите битови отпадъци. Вместо това, трябва да предпазите човешкото здраве и околната среда, като предадете отпадъчното оборудване в предназначен за събирането му пункт за рециклиране на неизползвано електрическо и електронно оборудване. За допълнителна информация се свържете с фирмата по чистота, към услуги използвате.
Finnish recycling notice

Kotitalousjätteiden hävittäminen Euroopan unionin alueella

Tämä symboli merkitsee, että laitetta ei saa hävittää muiden kotitalousjätteiden mukana. Sen sijaan sinun on suojattava ihmisten terveyttä ja ympäristöä toimittamalla käytöstä poistettu laite sähkö- tai elektroniikkajätteen kierrätyspisteeseen. Lisätietoja saat jätehuolloyhtiöltä.

French recycling notice

Mise au rebut d’équipement par les utilisateurs privés dans l’Union Européenne

Ce symbole indique que vous ne devez pas jeter votre produit avec les ordures ménagères. Il est de votre responsabilité de protéger la santé et l’environnement et de vous débarrasser de votre équipement en le remettant à une déchetterie effectuant le recyclage des équipements électriques et électroniques. Pour de plus amples informations, prenez contact avec votre service d’élimination des ordures ménagères.

German recycling notice

Entsorgung von Altgeräten von Benutzern in privaten Haushalten in der EU

Greek recycling notice

Απόρριψη άχρηστου εξοπλισμού από ιδιώτες χρήστες στην Ευρωπαϊκή Ένωση

Αυτό το σύμβολο σημαίνει ότι δεν πρέπει να απορρίπτετε το προϊόν με τα λοιπά οικιακά απορρίμματα. Αντίθετα, πρέπει να προστατεύετε την ανθρώπινη υγεία και το περιβάλλον παραδίδοντας τον άχρηστο εξοπλισμό σας σε εξοπλισμοδοτημένο σημείο συλλογής για την ανακύκλωση άχρηστου ηλεκτρικού και ηλεκτρονικού εξοπλισμού. Για περισσότερες πληροφορίες, επικοινωνήστε με την υπηρεσία απόρριψης απορριμμάτων της περιοχής σας.

Hungarian recycling notice

A hulladék anyagok megsemmisítése az Európai Unió háztartásáiban

Ez a szimbólum azt jelzi, hogy a készüléket nem szabad a háztartási hulladékkal együtt kidobni. Evhelyett a leselétezett berendezéseknek az elektromos vagy elektronikus hulladék átvételére kijelölt helyen történő beszolgáltatásával megóvja az emberi egészséget és a környezetet. További információt a helyi köztisztasági vállalattól kaphat.

Italian recycling notice

Smaltimento di apparecchiature usate da parte di utenti privati nell'Unione Europea

Questo simbolo avvisa di non smaltire il prodotto con i normali rifiuti domestici. Rispettare la salute umana e l'ambiente conferendo l'apparecchiatura dismessa a un centro di raccolta designato per il riciclo di apparecchiature elettroniche ed elettriche. Per ulteriori informazioni, rivolgersi al servizio per lo smaltimento dei rifiuti domestici.

Latvian recycling notice

Europos Sąjungos namų ūkio vartotojų įrangos atliekų šalinimas

Šis simbolis nurodo, kad gaminio negalima išmesti kartu su kitomis buitinėmis atliekomis. Kad apsaugotumete žmonių sveikatą ir aplinką, pasenusią nenaudojamą įrangą turite nuvežti į elektrinių ir elektroninių atliekų surinkimo punktą. Daugiau informacijos teiraukitės buitinės atliekų surinkimo tarnybos.
Lithuanian recycling notice

Nolietotų įkūrų iznicināšanas noteikumi ietotājiem Eiropas Savienības privātajās mājsaimniecībās

Šis simbols norāda, ka ierīci nedrikst utilizēt kopā ar citiem mājsaimniecības atkritumiem. Jums jārūpējas par cilvēku veselību un vides aizsardzību, nododot lietotu aprīkojumu atkritumu darītājiem iepriekšējo pārstrādājumu laikā. Lai iegūtu plašāku informāciju, lūdzu, sazinieties ar savu mājsaimniecības atkritumu likvidēšanas dienestu.

Polish recycling notice

Utylizacja zużytego sprzętu przez użytkowników w prywatnych gospodarstwach domowych w krajach Unii Europejskiej

Ten symbol oznacza, że nie wolno wyrzucać produktu wraz z innymi domowymi odpadkami. Obowiązkiem użytkownika jest ochrona zdrowia ludzkiego i środowiska przez przekazanie zużytego sprzętu do wyznaczonego punktu zajmującego się recyklingiem odpadów powstałych ze sprzętu elektrycznego i elektronicznego. Więcej informacji można uzyskać od lokalnej firmy zajmującej wywozem nieczystości.

Portuguese recycling notice

Descarte de equipamentos usados por utilizadores domésticos na União Europeia

Este símbolo indica que não deve descartar o seu produto juntamente com os outros lixos domiciliares. Ao invés disso, deve proteger a saúde humana e o meio ambiente levando o seu equipamento para descarte em um ponto de recolha destinado à reciclagem de resíduos de equipamentos elétricos e eletrónicos. Para obter mais informações, contacte o seu serviço de tratamento de resíduos domésticos.

Romanian recycling notice

Casarea echipamentului uzat de către utilizatorii casnici din Uniunea Europeană

Acest simbol înseamnă să nu se arunce produsul cu alte deșeuri menajere. În schimb, trebuie să protejeți sănătatea umerii și mediul predând echipamentul uzat la un punct de colectare desemnat pentru reciclarea echipamentelor electrice și electronice uzate. Pentru informații suplimentare, vă rugăm să contactați serviciul de eliminare a deșeurilor menajere local.
Battery replacement notices

Dutch battery notice

Verklaring betreffende de batterij

⚠️ WAARSCHUWING: dit apparaat bevat mogelijk een batterij.

- Probeer de batterijen na het verwijderen niet op te laden.
- Stel de batterijen niet bloot aan water of temperatuur boven 60°C.
- De batterijen mogen niet worden beschadigd, gedemonteerd, geplet of doorboord.
- Zorg dat u geen kortsluiting veroorzaakt tussen de externe contactpunten en laat de batterijen niet in aanraking komen met water of vuur.
- Gebruik ter vervanging alleen door HP goedgekeurde batterijen.

Batterijen, accu’s en accumulators mogen niet worden gedeponeerd bij het normale huishoudelijke afval. Als u de batterijen/accu’s wilt inleveren voor hergebruik of op de juiste manier wilt vernietigen, kunt u gebruik maken van het openbare inzamelingssysteem voor klein chemisch afval of ze terugsturen naar HP of een geautoriseerde HP Business of Service Partner.

Neem contact op met een geautoriseerde leverancier of een Business of Service Partner voor meer informatie over het vervangen of op de juiste manier vernietigen van accu’s.
Avis relatif aux piles

⚠️ AVERTISSEMENT : cet appareil peut contenir des piles.

- N’essayez pas de recharger les piles après les avoir retirées.
- Évitez de les mettre en contact avec de l’eau ou de les soumettre à des températures supérieures à 60°C.
- N’essayez pas de démonter, d’écarter ou de percer les piles.
- N’essayez pas de court-circuiter les bornes de la pile ou de jeter cette dernière dans le feu ou l’eau.
- Remplacez les piles exclusivement par des pièces de recharge HP prévues pour ce produit.

Les piles, modules de batteries et accumulateurs ne doivent pas être jetés avec les déchets ménagers. Pour permettre leur recyclage ou leur élimination, veuillez utiliser les systèmes de collecte publique ou renvoyez-les à HP à votre Partenaire Agréé HP ou aux agents agréés.

Contactez un Revendeur Agréé ou Mainteneur Agréé pour savoir comment remplacer et jeter vos piles.

Hinweise zu Batterien und Akkus

⚠️ VORSICHT: Dieses Produkt enthält unter Umständen eine Batterie oder einen Akku.

- Vorsuchen Sie nicht, Batterien und Akkus außerhalb des Geräts wieder aufzuladen.
- Schützen Sie Batterien und Akkus vor Feuchtigkeit und Temperaturen über 60°.
- Verwenden Sie Batterien und Akkus nicht missbräuchlich, nehmen Sie sie nicht auseinander und vermeiden Sie mechanische Beschädigungen jeglicher Art.
- Vermeiden Sie Kurzschlüsse, und setzen Sie Batterien und Akkus weder Wasser noch Feuer aus.
- Ersetzen Sie Batterien und Akkus nur durch die von HP vorgesehenen Ersatzteile.

Batterien und Akkus dürfen nicht über den normalen Hausmüll entsorgt werden. Um sie der Wiederverwertung oder dem Sondernmüll zuzuführen, nutzen Sie die öffentlichen Sammelstellen, oder setzen Sie sich bezüglich der Entsorgung mit einem HP Partner in Verbindung.

Weitere Informationen zum Austausch von Batterien und Akkus oder zur sachgemäßen Entsorgung erhalten Sie bei Ihrem HP Partner oder Servicepartner.
Istruzioni per la batteria

⚠️ AVVERTENZA: Questo dispositivo può contenere una batteria.
- Non tentare di ricaricare le batterie se rimosse.
- Evitare che la batteria entri in contatto con l'acqua o siano esposte a temperature superiori a 60°C.
- Non smontare, schiacciare, forare o utilizzare in modo improprio la batteria.
- Non accorciare i contatti esterni o gettare in acqua o sul fuoco la batteria.
- Sostituire la batteria solo con i ricambi HP previsti a questo scopo.

Le batterie e gli accumulatori non devono essere smaltiti insieme ai rifiuti domestici. Per procedere al riciclaggio o al corretto smaltimento, utilizzare il sistema di raccolta pubblico dei rifiuti o restituirli a HP, ai Partner Ufficiali HP o ai relativi rappresentanti.

Per ulteriori informazioni sulla sostituzione e sullo smaltimento delle batterie, contattare un Partner Ufficiale o un Centro di assistenza autorizzato.

Japanese battery notice

バッテリに関する注意

⚠️ 警告: 本製品はバッテリを内蔵している場合があります。
- バッテリを取り外している場合は、充電しないでください。
- バッテリを水にさらしたり、60℃（140°F）以上の温度にさらさないでください。
- バッテリを誤用、分解、破壊したり、穴をあけたりしないでください。
- 外部極を短絡させたり、火や水に投棄しないでください。
- バッテリを交換する際は、HP指定の製品と交換してください。

バッテリ、バッテリパック、蓄電池は一般の家庭廃棄物と一緒に廃棄しないでください。
リサイクルまたは適切に廃棄するため、公共の収集システム、HP、HPパートナー、またはHPパートナーの代理店にお送りください。

バッテリ交換および適切な廃棄方法についての情報は、HPのサポート窓口にお問い合わせください。
Declaración sobre las baterías

⚠️ ADVERTENCIA: Este dispositivo podría contener una batería.

- No intente recargar las baterías si las extrae.
- Evite el contacto de las baterías con agua y no las exponga a temperaturas superiores a los 60 ºC (140 ºF).
- No utilice incorrectamente, ni desmonte, aplaste o pinche las baterías.
- No cortocircuite los contactos externos ni la arroje al fuego o al agua.
- Sustituya las baterías sólo por el repuesto designado por HP.

Las baterías, los paquetes de baterías y los acumuladores no se deben eliminar junto con los desperdicios generales de la casa. Con el fin de tirarlo al contenedor de reciclaje adecuado, utilice los sistemas públicos de recogida o devuélvalos a HP, un distribuidor autorizado de HP o sus agentes.

Para obtener más información sobre la sustitución de la batería o su eliminación correcta, consulte con su distribuidor o servicio técnico autorizado.
### B Current and Voltage Requirements

Table 25 (page 189) lists power requirements for storage system components.

**NOTE:** All measurements listed in “Storage System Power Requirements” (page 189) are based on testing conducted at 208 VAC.

**Table 25 Storage System Power Requirements**

<table>
<thead>
<tr>
<th>Component</th>
<th>Max. Watts per Cabinet (fully populated)</th>
<th>Max. BTUs/hour per cabinet (fully populated)</th>
<th>Input Voltage (VAC)</th>
<th>Frequency (Hz)</th>
<th>Circuit Breaker Max</th>
<th>Drive Chassis (no magazines)</th>
<th>Power Connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Meter Cabinet</td>
<td>9,984(^1)</td>
<td>34,066.82</td>
<td>200 - 240</td>
<td>50 - 60</td>
<td>30A per PDU (de-rated to 24A)</td>
<td>200</td>
<td>(4) L6-30P (4) IEC-60309 Plug</td>
</tr>
<tr>
<td>Node Pair (fully populated)</td>
<td>Transactional(^2)</td>
<td>Idle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watts</td>
<td>705</td>
<td>630</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTUs/hour (fully populated)</td>
<td>2,406</td>
<td>2,150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive Chassis (no magazines)</td>
<td>200</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive Magazine (^3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 x 50 GB SSD Drive Magazine</td>
<td>Watts: 14</td>
<td>BTUs/hour: 48</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 x 100 GB SSD Drive Magazine</td>
<td>Watts: 34</td>
<td>BTUs/hour: 117</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 x 200 GB SSD Drive Magazine</td>
<td>Watts: 35</td>
<td>BTUs/hour: 120</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 x 146 GB FC Drive Magazine</td>
<td>Watts: 76</td>
<td>BTUs/hour: 259</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 x 300 GB FC Drive Magazine</td>
<td>Watts: 60</td>
<td>BTUs/hour: 205</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 x 400 GB FC Drive Magazine</td>
<td>Watts: 60</td>
<td>BTUs/hour: 205</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 25 Storage System Power Requirements (continued)

<table>
<thead>
<tr>
<th>Drive Magazine Configuration</th>
<th>Watts</th>
<th>BTUs/hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 x 600 GB FC Drive Magazine</td>
<td>73</td>
<td>249</td>
</tr>
<tr>
<td>4 x 1 TB NL Drive Magazine</td>
<td>59</td>
<td>193</td>
</tr>
<tr>
<td>4 x 2 TB NL Drive Magazine</td>
<td>44</td>
<td>152</td>
</tr>
</tbody>
</table>

1. Theoretical maximum based on branch circuit capacity.
2. Under maximum load.
3. Up to 10 drive magazines (40 drives) per drive chassis.

**NOTE:** Some hard drives with smaller capacities may consume more power due to prior generation of manufacturer design and configuration variables.
C Connecting the Maintenance PC

Many storage system installation and upgrade procedures require a direct serial connection to a controller node from a maintenance PC. Installation and upgrade procedures also require a connection from the maintenance PC to the storage system service processor.

This appendix describes how to obtain a direct serial connection to a controller node from a maintenance PC running a version of Windows Operating System (2000 or above). It also describes all recommended methods of communicating with the service processor through the maintenance PC.

The method you select depends on the resources available to you. 3PAR does not provide the third-party software described in this appendix, nor does it support connection methods not described in this appendix.

**NOTE:** PUTty, SecureCRT®, and HyperTerminal are third party software and HP makes no representations or warranties with respect to such software.

**NOTE:** In this and other chapters, the command-line examples use bold type to indicate user input and <angle brackets> to denote variables. Examples may not match the exact output of your system.

Connecting to a Controller Node

The maintenance PC connects directly to a controller node through a serial cable using a terminal emulation software compatible with a Windows operating systems (e.g. HyperTerminal, PuTTY, SecureCRT or Reflection X).

The following example of instructions uses HyperTerminal to connect to the controller node.

Use the following table to configure the connection settings of a compatible terminal emulation software.

**Table 26 Standard terminal emulation connection settings for maintenance PC to a controller node**

<table>
<thead>
<tr>
<th>Connection Settings</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>COM Port</td>
<td>default</td>
</tr>
<tr>
<td>Bits per second</td>
<td>57600</td>
</tr>
<tr>
<td>Data bits</td>
<td>8</td>
</tr>
<tr>
<td>Parity</td>
<td>None</td>
</tr>
<tr>
<td>Stop bits</td>
<td>1</td>
</tr>
<tr>
<td>Flow Control</td>
<td>Xon/Xoff</td>
</tr>
</tbody>
</table>

To connect the maintenance PC to a controller node:

1. Remove the bezel that covers the controller node chassis.
2. Insert a standard Category 5 Ethernet cable into the maintenance port of one of the controller nodes as shown in (“Location of the Maintenance Port” (page 192)).
NOTE: A cable with adapter (P/N 180-0055) should be connected to the service processor. Disconnect the ethernet cable from the RJ-45 to DB-9 adapter attached to the service processor (P/N 180-0059).

3. Attach a DB9 female to RJ45 serial adapter assembly (P/N 180–0055) to the free end of the Ethernet cable and then insert it into the DB9 serial port (COM1) of the maintenance PC.

NOTE: See “Serial Cable Pinouts” (page 200) for serial cable pinout diagrams.

4. Power on the maintenance PC.
5. On the taskbar, choose Start > Programs > Accessories > Communications > HyperTerminal.
6. In the Connection Description dialog box, enter a session name in the Name box for which you are configuring the maintenance PC, and then click OK.
7. In the Connect To dialog box, select serial port COM1 from the Connect using list, and then click OK.
8. In the **COM1 Properties** dialog box, select **57600** from the **Bits per second** list and select **Xon/Xoff** from the **Flow control** list, then click **OK**. HyperTerminal initiates a serial connection session with the controller node to which the maintenance PC is physically connected.

9. Press **Enter** to display the login prompt in the terminal window. A display similar to the one shown in “HyperTerminal Login Prompt” (page 193) appears.

![HyperTerminal Login Prompt](image)

10. In the HyperTerminal main window, click **File** and then choose **Properties** to see the session **Properties** dialog box.

11. Click the **Settings** tab. From the Emulation list, select either ANSI or VT100 to set the session emulation type, then click **OK**.

12. Enter your login ID and password to begin maintenance procedures.

**NOTE:** If you do not have a login ID and password, contact your Authorized Service Provider.

### Connecting to the Service Processor

The maintenance PC can connect to the service processor either through a serial connection or through the Local Area Network (LAN).

After establishing a connection, use a terminal emulation program to communicate with the service processor.

The following example of instructions uses HyperTerminal to connect to the service processor. Use the following table to configure the connection settings of a compatible terminal emulation software.

<table>
<thead>
<tr>
<th>Table 27 Standard terminal emulation connection settings for maintenance PC to a service processor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connection Settings</strong></td>
</tr>
<tr>
<td><strong>COM Port</strong></td>
</tr>
<tr>
<td><strong>Bits per second</strong></td>
</tr>
</tbody>
</table>
Table 27 Standard terminal emulation connection settings for maintenance PC to a service processor (continued)

<table>
<thead>
<tr>
<th>Connection Settings</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data bits</td>
<td>8</td>
</tr>
<tr>
<td>Parity</td>
<td>none</td>
</tr>
<tr>
<td>Stop bits</td>
<td>1</td>
</tr>
<tr>
<td>Flow Control</td>
<td>Xon/Xoff</td>
</tr>
</tbody>
</table>

**Ethernet Connection**

To connect the maintenance PC to the service processor through the private Local Area Network using an Ethernet cable, you must first configure the LAN settings on the maintenance PC.

To configure the LAN settings on the maintenance PC:

1. Unlock and open the rear door of the storage system cabinet.
   - If necessary, insert a crossover Category 5 Ethernet cable (RJ45 to RJ45) into the proper Ethernet port.
   - For the service processor (“Wintec Service Processor Ethernet Ports” (page 194) or “Supermicro Service Processor Ethernet Ports” (page 194) or “Supermicro II Service Processor Ethernet Ports” (page 194)), use port ETH1 at the rear of the service processor.

2. Connect the free end of the crossover Ethernet cable to the Ethernet port in the maintenance PC.
3. Power on the maintenance PC.
4. Right-click the My Network Places desktop icon to bring up the shortcut menu.
5. Click Properties.
   - The Network and Dial-up Connections window appears (“Network and Dial-Up Connections Window” (page 195)).
6. Right-click the **Local Area Connection** icon to bring up the Local Area Connections Properties menu.

7. Click **Properties**.

   The **Local Area Connection Properties** dialog box appears.

8. In the **Local Area Connection Properties** dialog box, double-click **Internet Protocol (TCP/IP)**.

   The **Internet Protocol (TCP/IP) Properties** dialog box appears.

9. In the **Internet Protocol (TCP/IP) Properties** dialog box, click the **Use the following IP address** button and then type the following IP addresses:

**Table 28 IP Addresses**

<table>
<thead>
<tr>
<th>IP address</th>
<th>10.255.155.49</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subnet mask</td>
<td>255.255.255.248</td>
</tr>
<tr>
<td>Default gateway</td>
<td>none</td>
</tr>
</tbody>
</table>

10. Click **OK**.

11. Click **OK** in the Advanced TCP/IP Settings dialog box to finish configuring the LAN connection.

**Logging in to SPOCC**

After the Ethernet connection is configured to the service processor, log in to the Service Processor Onsite Customer Care (SPOCC) interface from the maintenance PC using a supported Web browser. SPOCC is one of two service processor user interfaces; SPMAINT is the other. These interfaces
enable you to perform various administrative and diagnostic tasks in support of both the storage system and the service processor.

To log in to SPOCC using a Web browser:

1. Type the IP address of the service processor in the Web browser and then press Enter.

   **NOTE:** If using the crossover cable to the service processor ETH1 (Int) port, use IP address 10.255.155.54.

   The Service Processor Login screen appears.

2. Click the Login button.
3. Enter your userID and password and click OK.

   **NOTE:** If you do not have a user name and password, contact HP 3PAR Technical Support for assistance.

### Using a Secure Shell Protocol

After you configure the Ethernet connection to the service processor, you can also initiate a secure shell session using PuTTY or SecureCRT. The following sections describe the various methods for obtaining a secure connection to the service processor.

#### Using PuTTY

To initiate a secure shell session between the maintenance PC and the service processor using PuTTY

1. Go to the permanent location where you extracted putty.zip and double-click the putty.exe file.
2. In the PuTTY Configuration dialog box that appears, type the host name or service processor IP address in the Host Name (or IP address) box, click the SSH protocol button, then click Open ("PuTTY Configuration Dialog Box" (page 197)).
3. If connecting to the service processor for the first time, the PuTTY Security Alert dialog box appears. Click Yes.
   The PuTTY main window appears.
4. Type your user ID and press ENTER, then type your password and press ENTER.
   **NOTE:** If you do not have a username and password, contact HP 3PAR Technical Support for assistance.

**Using SecureCRT**

To initiate a secure shell session between the maintenance PC and the service processor using SecureCRT:

1. On the taskbar, choose Start > Programs > SecureCRT.
2. In the SecureCRT window, click the Quick Connect icon (“SecureCRT Window” (page 198)).
3. In the **Quick Connect** dialog box that appears, select the **ssh2** option from the **Protocol** list. Type the IP address of the storage system in the **Hostname** box. Type your user ID in the **Username** box, and then click **Connect**.

4. In the **Enter Password** dialog box, type your password and click **OK**.

**NOTE:** If you do not have a user ID and password, contact HP 3PAR Technical Support for assistance.

**Using a Serial Connection**

To connect the maintenance PC to the service processor using HyperTerminal through a serial connection:

1. Unlock the rear door of the cabinet. Open the door by unlatching the three latches located at the top, center, and bottom of the door.

2. Locate the service processor. Attach the DB9 female serial adapter (P/N 180–0055), that is at the free end of the blue Ethernet cable, to the Serial port (COM1) on your maintenance PC ("Attaching the Blue Ethernet Cable" (page 199)). A standard Category 5 Ethernet cable with the appropriate RJ–45 to DB9 adapters at each end should already be connected to the service processor DB9 Serial port ("Wintel Service Processor Serial Port with Adapter" (page 199) or "Supermicro Service Processor Serial Port with Adapter" (page 199) or "Supermicro II Service Processor Serial Port with Adapter" (page 199)).
3. Power on the maintenance PC.
4. On the taskbar, choose **Start > Programs > Accessories > Communications > HyperTerminal**.
5. In the **Connection Description** dialog box, enter a session name in the **Name** box for the maintenance PC you are configuring, then click **OK**.
6. In the **Connect To** dialog box, select serial port **COM1** from the **Connect using** list, and then click **OK**.
7. In the **COM1 Properties** dialog box, select **38400** from the **Bits per second** list and select **Xon/Xoff** from the **Flow control** list, then click **OK**.
   HyperTerminal establishes a serial connection with the service processor to which the maintenance PC is physically connected.
8. Press **ENTER** to display the login prompt in the terminal window.
9. In the HyperTerminal main window, click **File** and then click **Properties**. The New Sessions Properties dialog box opens.
10. Click the **Settings** tab. From the Emulation list, select either **ANSI** or **VT100** to set the session emulation type, then click **OK**.
11. Enter your login ID and password to begin the maintenance procedures.

**NOTE:** If you do not have a login ID and password, contact HP 3PAR Technical Support for assistance.

## Serial Cable Pinouts

The following tables and diagrams illustrate the serial cable pinouts for the crossover DB9 female serial to RJ45 adapter assembly (P/N 180–0055) and the straight-through DB9 female to RJ45 serial adapter (P/N 180–0059).

### Crossover Adapter Assembly

The following table lists cable pinouts for the crossover DB9 female serial to RJ45 adapter assembly (P/N 180–0055). This connector inserts into the COM port on the maintenance PC.

**Table 29 Crossover DB9 Female Serial to RJ45 Serial Connector Pinouts**

<table>
<thead>
<tr>
<th>Color</th>
<th>DB9 (Female) Pin</th>
<th>RJ45 Pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Orange</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Green</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Figure 115 (page 200) illustrates the pin locations and connections for the crossover DB9 female serial to RJ45 adapter assembly (P/N 180–0055).

**Figure 115 Crossover DB9 Female Serial to RJ45 Serial Connector Pinouts**

### Straight-Through Adapter

The following table lists connector pinouts for the straight-through DB9 to RJ45 adapter (P/N 180–0059). This connector inserts into the serial port on the service processor.
### Table 30 Straight-Through DB9 Female to RJ45 Adapter Serial Cable Pinouts

<table>
<thead>
<tr>
<th>Color</th>
<th>DB9 (Female) Pin</th>
<th>RJ45 Pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Black</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Green</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Figure 116 (page 201) illustrates the pin locations and connections for the straight-through DB9 female to RJ45 adapter (P/N 180–0059).

**Figure 116 Straight-Through DB9 to RJ45 Serial Connector Pinouts**

![Diagram of DB9 to RJ45 connector pinouts]
D Performing Node Rescue

This appendix describes the following methods for recovering a node that has been shut down or recently added to the system. It is possible to “rescue” a node with the following methods:

- **Node to node rescue:** this enables rescue of a node by manually connecting it to a working node.
- **CLI node rescue:** this launches the startnoderescue command from a command line interface (CLI) to trigger detection and rescue of the blank or shut-down node.

### Node-to-Node CLI Rescue

The method enables you to rebuild a node disk (performing node-rescue) using a working node and the CLI command `startnoderescue`.

Requirements include:

- Two Ethernet connections to the same network.
- One node in the storage system (the rescuer) node must have a functioning network connection and the system must be able to process HP 3PAR OS CLI commands.
- The node-to-be-rescued (the target) node must have an Ethernet cable connected to the Administrative network port (E0) and be connected to the same network as the rescuer-node in the storage system.

#### Figure 117 Node-to-Node Rescue Port Connections

- The node to be rescued must be at the BIOS prompt. If the node is running it must be halted using `shutdownnode halt <node_ID>`.

To rescue a node using another functioning rescuer node, do the following:

1. Start an spmaint session.
2. From SPMAINT, enter the Interactive CLI shell for the storage system.
3. Enter the CLI command `shownet` to determine which node has the **ACTIVE** Ethernet connection. This is the *rescuer*. For example, `node-1` has the active network connection in the following output:

   ```
   cli% shownet
   IP Address         Netmask/PrefixLen   Nodes   Active
   192.168.56.206    255.255.255.0         01       1
   ```

4. If necessary, remove the Ethernet cable from port E0 of another node in the system.
5. Connect an Ethernet cable (or the one temporarily removed in step-3) to port E0 of the target-node.
6. Enter the CLI command `startnoderescue -node target_node`, where `target_node` is the Node ID (slot number) of the node being rescued.
7. Monitor the progress of `startnoderescue` by using the `showtask` CLI command.
   a. Look for the ID number of the most recent `node_rescue` task, which is usually at the bottom of the list. That task-ID will be used below. For example:

   ```
   cli% showtask
   Id  Type           Name             Status Phase Step  ------StartTime-----   --FinishTime---      Priority- User---
   2488 node_rescue node_0_rescue active 1/1 0/1 2012-12-03 15:18 PST       n/a     sys:3parsy
   
   NOTE: Depending on the number of adapters and amount of memory in the node, the node could take 10-20 minutes before it becomes part of the system.
   ```

   b. Enter `showtask -d task-ID` to see the current and detailed status of the `node_rescue` operation. For example:

   ```
   cli% showtask -d 2488
   Id  Type           Name             Status Phase Step  ------StartTime-----   --FinishTime---      Priority- User---
   248 node_rescue node_0_rescue active 1/1 0/1 2012-12-03 15:18 PST       n/a     sys:3parsy
   
   Detailed status:
   2012-12-03 15:18:09 PST Created    task.  
   2012-12-03 15:18:09 PST Updated    Running node rescue for node 0 as 1:1474  
   2012-12-03 15:18:17 PST Updated    Using IP 169.254.194.207  
   2012-12-03 15:18:17 PST Updated    Informing system manager to not autoreset node 0.  
   2012-12-03 15:18:38 PST Updated    Resetting node 0.  
   2012-12-03 15:18:48 PST Updated    Attempting to contact node 0 via internal serial port.  
   2012-12-03 15:18:55 PST Updated    Setting boot parameters.  
   2012-12-03 15:19:08 PST Updated    Waiting for node 0 to boot the node rescue kernel.  
   2012-12-03 15:20:50 PST Updated    Kernel on node 0 has started. Waiting for node to retrieve install details.  
   2012-12-03 15:22:08 PST Updated    File sync has begun. Estimated time to complete this step is 5 minutes on a lightly loaded system.  
   2012-12-03 15:25:53 PST Updated    Remote node has completed file sync, and will reboot.  
   2012-12-03 15:25:53 PST Updated    Waiting for node to rejoin cluster.
   ```

c. When `startnoderescue` successfully completes the status of the task will be `done`. If it should fail, that status would be indicated. For the successful example:

   ```
   cli% showtask -d 2488
   Id  Type           Name             Status Phase Step  ------StartTime-----   --FinishTime---      Priority- User---
   248 node_rescue node_0_rescuedone -- -- 2012-12-03 15:18 PST  2012-12-03 15:32 PST n/a     sys:3parsy
   
   Detailed status:
   2012-12-03 15:18:09 PST Created    task.  
   2012-12-03 15:18:09 PST Updated    Running node rescue for node 0 as 1:1474  
   2012-12-03 15:18:09 PST Updated    Running node rescue for node 0 as 1:1474  
   2012-12-03 15:20:50 PST Updated    Kernel on node 0 has started. Waiting for node to retrieve install details.  
   2012-12-03 15:25:53 PST Updated    Remote node has completed file sync, and will reboot.  
   2012-12-03 15:32:04 PST Updated    Node 0 rescue complete.  
   2012-12-03 15:32:04 PST Completed scheduled task.
   ```

8. Enter the CLI command `shownode` to make sure the node is online (`InCluster`) to the storage system.
9. If necessary, move the administrative Ethernet cable to the node from which it was removed.
10. Exit from SPMAINT.
11. If you disconnected the I/O cables, reconnect them.
CAUTION: Before proceeding with the controller node rescue, verify with the system administrator before disconnecting all host cables or shutting down the host.

NOTE: This SPMAINT node-rescue procedure should only be used if all nodes in the 3PAR system are down and needs to be rebuilt from the HP 3PAR OS image on Service Processor. The SP-to-node rescue procedure is supported with HP 3PAR OS version 3.1.2 or higher and HP 3PAR Service Processor 4.2 or higher.

To perform SP-to-node rescue:
1. At the rear of the storage system, uncoil the red crossover Ethernet cable connected to the SP (ETH) private network connection and connect this cross-over cable to the E0 port of the node that is being rescued.

   ![Figure 118 Connecting the Ethernet Cable](image)

   **NOTE:** Connect the crossover cable to the following ETH port of a specific SP brand:
   - HP 3PAR Service Processor DL320e: ETH port 2
   - Supermicro II: ETH port 1

2. Connect the maintenance PC to the SP using the serial connection and start an `spmaint` session.
3. Go to **3 StoreServ Configuration Management > 1 Display StoreServ information** to perform the pre-rescue task of obtaining the following information:
   - HP 3PAR OS Level on the StoreServ system
   - StoreServ system network parameters including netmask and gateway information

   **NOTE:** Copy the network information on to a separate document for reference to complete the subsequent steps of configuring the system network.

4. In the **3PAR Service Processor Menu**, complete the following:
   a. Choose 4 ==>
   b. Choose 11 ==>
   c. Enter \( y \) to confirm to action before continuing with node rescue.
d. Choose 1 ➞ Configure Node Rescue, then select the desired system. At this point, you will be prompted for the node rescue configuration information.

1. Verify the current HP 3PAR OS level and enter \( y \) to use the level.
2. Enter \( y \) to continue to setup node rescue.

**NOTE:** The process may take a few minutes.

3. Press Enter to accept the default \[/dev/tpddev/vvd/0\].
4. Enter \( y \) to specify the time zone. Continue to follow the time zone setup prompts.
5. Confirm the HP 3PAR OS level and enter \( y \) to continue.

5. Choose 2 ➞ SP-to-Node Rescue.

**NOTE:** The process of establishing communication between the SP and StoreServ system may take several minutes.

6. Establish a serial connection to the node being rescued. If necessary, disconnect the serial cable from SP.
7. Connect a serial cable from the laptop to the serial port on the node being rescued (S0).

![Diagram showing Node, E0, C0, Eth1, Service Processor, and Field Engineer Laptop]

**NOTE:** Connect the crossover cable to the following ETH port of a specific SP brand:
- HP 3PAR Service Processor DL320e or DL360e: ETH port 2
- Supermicro II: ETH port 1

**NOTE:** If necessary, check the baud rate settings before establishing a connection.
8. Press **CTRL+W** to establish a `whack>` prompt.
   a. Type `nemoe cmd unset node_rescue_needed` and press **Enter**. The output will display the message `no output`.
   b. Type `boot rescue` and press **Enter**.
   c. Monitor the console output process. The node will continue to run POST then it will stop and display instructions for running node-rescue (see output on the following page). Enter `y` to continue.

   **NOTE:** If `y` is not entered, you will need to redo step 8.

   The system installs the OS. This process takes approximately 10 to 15 minutes (rescue and rebuild of disk = 5 minutes) + (reboot = 5-10 minutes). When complete, the node restarts and becomes part of the cluster.

   ---

   This is the procedure for manually rescuing a 3PAR InServ node (i.e., rebuilding the software on the node’s internal disk). The system will install the base OS, BIOS, and InForm OS for the node before it joins the cluster.

   You must first connect a Category 5 crossover Ethernet cable between the SP’s private/internal network (Eth-1) and the E0 Ethernet port of the node to be rescued. Note that the diagram below does not represent the physical port numbers or configuration of all node types.

   ![Diagram of node connections]

   New Node
   
   Service Processor
   
   Eth-0 Eth-1(Int)
   
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17. Execute the `shownode` command to verify that all nodes have joined the cluster.

```
cli% shownode
Control Data Cache
Node --Name--- -State- Master InCluster ---LED--- Mem(MB) Mem(MB) Available(%)  
0 1000163-0 OK No Yes GreenBlnk 4096 6144 100
1 1000163-1 OK Yes Yes GreenBlnk 4096 6144 100
```

18. Execute the `shutdownsys reboot` command and enter `yes` to reboot the system.
    When the system reboot is complete, reestablish an SPMAINT session to perform additional CLI commands.

19. Reconnect the host and host cables if previously removed or shutdown.

20. Issue the `checkhealth -svc -detail` command to verify the system is healthy.

21. In the SP window, issue the `exit` command and select X to exit from the 3PAR Service Processor Menu and to log out of the session.

22. Disconnect the serial cable from the maintenance PC and the red cross-over Ethernet cable from the node and coil and replace the cable behind the SP. If applicable, reconnect the customer’s network cable and any other cables that may have been disconnected.

23. Close and lock the rear door.
This appendix described standard and split mode node to drive cage cabling for two and four node systems. For information about node numbering and drive cage numbering, see Chapter 2 (page 23). For information about PCI cards, their installation order, and their usage, see Appendix F (page 210).

**CAUTION:** Do not use patch panels for connecting controller node(s) and drive chassis. Using patch panels may cause weakening of signal integrity and possible communication failure.

### Standard Cabling

The following figures display standard cabling for two and four node systems. For six and eight node systems, continue the cabling pattern.

#### Figure 119 Standard Node to Drive Cage Cabling (2 Node System)
Figure 120 Standard Node to Drive Cage Cabling (4 Node System)

NOTE: “Standard Node to Drive Cage Cabling (4 Node System)” (page 209) represents a logical relationship. In practice, the node pair physically lowest in the cabinet is connected to the physically lowest drive cages.
This appendix describes the Fibre Channel adapter installation order for T-Class storage system controller node hardware upgrades. Use this appendix to determine which PCI slots to use for installing additional Fibre Channel, iSCSI, and Ethernet adapters.

Three types of adapters are used in a T-Class system:

- **Fibre Channel adapters.** External connections to some hosts as well as all internal connections between controller nodes and drive chassis require the use of Fibre Channel adapters. Fibre Channel adapters have four ports (quad-port adapters).
- **iSCSI adapters.** T-Class nodes can optionally use iSCSI adapters for host connections.
- **Ethernet adapters.** HP 3PAR Remote Copy using Ethernet requires one pair of Ethernet adapters in the primary system and another pair of Ethernet adapters in a backup or target storage system.

There are six PCI slots to hold a maximum of six adapters each (Figure 121 (page 210)).

**Figure 121 Controller Node Fibre Channel ports (Quad-Port Fibre Channel Adapters)**

![Diagram of Fibre Channel ports](image)

Table 31 (page 211) summarizes the adapter installation order for T-Class controller nodes. Numbers denote PCI slots (see Figure 121 (page 210)) and numbers in parentheses denote PCI slots to be used only when necessary.
**Table 31 Adapter Installation Order and Usage Based on Controller Node Type**

<table>
<thead>
<tr>
<th>Usage (Adapter Type)</th>
<th>Installation Order by PCI Slot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive chassis connections (Fibre Channel adapters)</td>
<td>0, 2, 4</td>
</tr>
<tr>
<td>Hosts connections (Fibre Channel adapters, iSCSI adapters)</td>
<td>5, 3, 1, 4&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Remote Copy (Ethernet and Fibre Channel adapters)</td>
<td>4, 3</td>
</tr>
</tbody>
</table>

<sup>1</sup> If not used for host connection or Remote Copy connection.

**PCI Slot Installation Order**

The exact order for installing Fibre Channel adapters into the PCI slots of T-Class nodes depends on the number of adapters used and the types of connections required (host or drive cage). In addition, the presence of iSCSI and Ethernet adapters can impact the use of the remaining PCI slots.

The following guidelines apply to T-Class nodes.

**Fibre Channel Adapters**

Fibre Channel adapters are used for drive chassis and host connections.

**Drive Cage Connections**

For T-Class nodes, the optimal Fibre Channel adapter loading order for drive cage connections are PCI slots 0, 2, and 4.

**Host Connections**

- For T-Class nodes, the optimal Fibre Channel adapter loading order for host connections is PCI slots 5, 3, 1, and then slot 4 (when available).
- When making more than one connection from a single host, you should connect to ports in Fibre Channel adapters installed in different nodes. Optimally, these nodes should be horizontally adjacent, such as nodes 0 and 1 or nodes 2 and 3.

**Ethernet Adapters**

When present, Ethernet adapters should be installed in PCI slot 4 or 3 of the highest numbered controller node pair of each storage system.

**iSCSI Adapters**

When present, iSCSI adapters should be installed in PCI slots 5, 3, and 4 of the controller node.

**Node Connection Matrix**

See **Table 32 (page 212)** to determine the correct Fibre Channel adapter configuration for the controller nodes in a system. The diagrams in the right column of the table represent the PCI slots in each controller node. In these diagrams, an **X** represents a PCI slot not occupied by a Fibre Channel adapter.

**NOTE:** The following diagrams may not be accurate when Ethernet adapters or iSCSI adapters are installed.
There are three internal PCI busses in each controller node. As can be seen in Figure 122 (page 213), the preferred PCI card installation order spreads out on different PCI busses.
Figure 122 PCI Bus/PCI Slot Association

PCI 1  PCI 2  PCI 3

SLOT 0  SLOT 1  SLOT 2  SLOT 3  SLOT 4  SLOT 5
This appendix provides information on choosing the necessary sparing options when setting up your T-Class Storage System.

- To view your systems current sparing algorithm settings, issue the `showsys -param` command.
- To set up or modify your systems sparing algorithm, issue the `setsys SparingAlgorithm <sparing_option>` command, where `<sparing_option>` is an option listed in “Options for CLI command” (page 214).

### Table 33 Options for CLI command

<table>
<thead>
<tr>
<th>Sparing Option</th>
<th>Sparing Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>Allocates one disk of spare chunklets for every 40 disks with a required minimum of four disks of spares.</td>
</tr>
<tr>
<td>Minimal</td>
<td>Allocates one disk of spare chunklets for every 40 disks with no required minimum disks of spares.</td>
</tr>
<tr>
<td>Maximal</td>
<td>Allocates one disk worth of spare chunklets per drive cage of the largest size disk in the system to provide cage level high availability.</td>
</tr>
<tr>
<td>Custom</td>
<td>Allows the user to allocate a specific number of chunklets for spare space (customize the number of spare chunklets).</td>
</tr>
</tbody>
</table>
active VLUN  The connection of a virtual volume and a LUN for a particular host on a particular port. An active VLUN is created when a VLUN template is applied to the current system state. See also VLUN template.

admin space  See snapshot administration space.

admin volume  The base volume that is used by the system to store administration data such as the system event log. The admin volume is created as part of the storage system installation and setup process.

administration space  See snapshot administration space.

AL_PA  See arbitrated loop physical address.

alert  An event that requires intervention by the user.

arbitrated loop physical address (AL_PA)  A unique 8-bit value used to identify Fibre Channel devices on an arbitrated loop.

backup node  See virtual volume backup node.

base volume  The original virtual volume from which a series of snapshots can be created.

battery backup unit (BBU)  A unit containing two strings of batteries. Each battery backup unit supplies two controller nodes with enough current to write the cache to IDE drives in the event of a power interruption.

battery tray  An enclosure that inserts into a EIA-standard rack to house a maximum of four battery backup units.

BBU  See battery backup unit.

cabinet  An enclosure that houses the components of a storage system. A cabinet is made up of a frame on four wheels, cosmetic panels, a rear door, an EIA-standard rack, PDU's, power cords, and bezels.

cache memory page (CMP)  A 16-KB block of control cache memory where I/O requests are stored.

cage  See drive cage.

chassis bay  A space in a rack into which a battery tray, drive chassis, controller node, or service processor is inserted.

child volume  A virtual volume (virtual or physical copy) made from a parent volume.

chunklet  A 256-MB block of contiguous space on a physical disk.

chunklet logging  An action by the system that occurs when a chunklet is unavailable (for example, the disk is not ready). The chunklet is placed in logging mode, where data that is supposed to be written to the chunklet is instead written to a log. If the chunklet becomes available again, the system places the chunklet in playback mode, where the data is read from the log and written to the appropriate chunklet.

clean chunklet  A chunklet to which no data has been written.

cluster  A group of controller nodes connected to the same storage system midplane. The nodes in a cluster operate as a unified system, separate from any other clusters that can share the same service processor.

CMP  See cache memory page.

common provisioning group (CPG)  A set of logical disks from which virtual volumes and virtual copies can be created that are capable of allocating storage on demand.

control cache  Memory modules that support the microprocessors located in a controller node.

control cache DIMM  A single control cache memory module.

controller node  An individual device that works together with other controller nodes to cache and manage data in a storage system and to provide hosts with a coherent, virtualized view of the storage.
controller node
chassis

copy space

See snapshot data space

copy-on-write

A technique for preserving data by making a copy of it before executing a command that would overwrite it.

copy-on-write snapshot

A snapshot of a virtual volume made with the copy-on-write technique. Consists of a pointer to the source volume and a record of every change made to the source volume since the snapshot was created.

Customer Controlled Access

A software tool that restricts connections between the service processor and the HP technical support center. Customer Controlled Access is independent of the user’s network firewall and works whether the connections are made through the Internet or through a point-to-point modem connection.

data cache

The dual in-line memory modules (DIMMs) that support the 3PAR ASIC located in a controller node.

data cache DIMM

A single data cache memory module.

data cache riser card

A printed circuit board with DIMM sockets that hold data cache memory modules.

destination volume

The virtual volume to which data is copied.

disk port

See Initiator.

disk scrub

An action by the system that periodically reads and writes to the system IDE disk to ensure that the disk is working properly.

dmag

See drive magazine.

drive bay

A space in a drive chassis into which a drive magazine is inserted.

drive cage

A storage system component that consists of a drive cage midplane, two drive cage FC-AL modules, two power supplies, and up to 20 physical disks in a maximum of five drive magazines. A metal divider in the center of a drive chassis separate two drives cages from each other.

drive cage FC-AL module

An electronic circuit board that contains a pair of FC-AL connections. Each FC-AL interface module, located in a drive chassis, connects a drive cage to a controller node or to another drive cage.

drive cage midplane assembly

An enclosure that houses a drive cage midplane and its two power supplies.

drive chassis

Two drive cages housed side-by-side in an enclosure that takes up 4U of an EIA-standard rack.

drive chassis cabinet

A cabinet that is connected to a node cabinet and does not contain controller nodes.

drive chassis housing

The enclosure that houses the components of a drive chassis.

drive magazine

An electronic circuit board mounted on a mechanical structure that is inserted into a drive bay in a drive cage. A drive magazine holds up to four physical disks.

drive magazine filler panel

A panel used to seal off an empty drive bay. All slots in a drive cage must be sealed for EMI and airflow considerations.

drive mount

A metal bracket used to secure a physical disk to a drive magazine. Each disk requires two drive mounts.

Ethernet adapter

A PCI host bus adapter (HBA) located in a controller node. The Ethernet adapter connects a controller node to a network for the purpose of transferring data through the network.

event

A normal system occurrence.

export

To make a virtual volume available to a particular instance of a host (that is, a host WWN that is actually present on a port) by creating an association between the name of the virtual volume and a LUN for that host on that port. See also LUN, VLUN, and VLUN template.

FC-AL

Stands for Fibre Channel Arbitrated Loop. FC-AL is a fast serial bus interface standard used to connect storage devices to system.

FC-AL module

See drive cage FC-AL module.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fibre Channel adapter</strong></td>
<td>A Fibre Channel PCI host bus adapter (HBA) located in a controller node. The Fibre Channel adapter connects a controller node to a host or to a drive chassis.</td>
</tr>
<tr>
<td><strong>host</strong></td>
<td>A set of WWNs of the physical ports on a system.</td>
</tr>
<tr>
<td><strong>host definition</strong></td>
<td>The name of the host plus a list of the WWNs that make up the host.</td>
</tr>
<tr>
<td><strong>host port</strong></td>
<td>See target.</td>
</tr>
<tr>
<td><strong>host-sees VLUN template</strong></td>
<td>A rule that allows a particular host connected to any port to see a virtual volume as a specified LUN.</td>
</tr>
<tr>
<td><strong>HP 3PAR Remote Copy</strong></td>
<td>An HP product that allows the user to copy virtual volumes from one storage system to another.</td>
</tr>
<tr>
<td><strong>HP 3PAR Thin Provisioning</strong></td>
<td>An HP product that allows the user to allocate only the physical resources that are actually needed while presenting an arbitrarily large volume that can have its physical resources allocated on demand.</td>
</tr>
<tr>
<td><strong>HP 3PAR Virtual Copy</strong></td>
<td>The HP product used to create copy-on-write snapshots (virtual copies) of virtual volumes.</td>
</tr>
<tr>
<td><strong>HP 3PAR Virtual Copy DBA</strong></td>
<td>A data protection solution that has been enhanced to provide fast and efficient Oracle backups and restores.</td>
</tr>
<tr>
<td><strong>IMP</strong></td>
<td>Stands for Initiator Mode Prohibited. This is a system setting. When IMP is enabled, a port cannot be set to initiator mode.</td>
</tr>
<tr>
<td><strong>independent electrical circuit</strong></td>
<td>An electrical circuit that does not share a circuit breaker with another electrical circuit.</td>
</tr>
<tr>
<td><strong>initiator mode</strong></td>
<td>The firmware setting for a port that is connected to a drive cage.</td>
</tr>
<tr>
<td><strong>initiator, initiator port</strong></td>
<td>A port that is connected to a drive cage. Also known as a disk port because it sends commands to the physical disks.</td>
</tr>
<tr>
<td><strong>local system</strong></td>
<td>See primary system.</td>
</tr>
<tr>
<td><strong>logging logical disks</strong></td>
<td>RAID 10 logical disks created by the system during initial system setup used to temporarily store data during physical disk replacement procedures. Each controller node has a 20 GB logging logical disk.</td>
</tr>
<tr>
<td><strong>logical disk</strong></td>
<td>An arrangement of rows of RAID sets. Logical disks are mapped to virtual volumes.</td>
</tr>
<tr>
<td><strong>logical disk backup node</strong></td>
<td>The controller node that takes over for the logical disk owner node if the logical disk owner node fails.</td>
</tr>
<tr>
<td><strong>logical disk owner node</strong></td>
<td>The controller node that coordinates all transfers to and from a logical disk, maintains the mapping information, and coordinates the recovery of failed physical disks.</td>
</tr>
<tr>
<td><strong>logical unit number LUN</strong></td>
<td>See LUN.</td>
</tr>
<tr>
<td><strong>LUN</strong></td>
<td>Stands for Logical Unit Number. A number used to access a virtual volume that has been assigned to a particular host on a particular port. See also export, VLUN, and VLUN template.</td>
</tr>
<tr>
<td><strong>magazine, mag</strong></td>
<td>See drive magazine.</td>
</tr>
<tr>
<td><strong>maintenance PC</strong></td>
<td>A laptop computer running Windows 2000 used by a field technician to initiate direct communication with the storage system service processor and controller nodes.</td>
</tr>
<tr>
<td><strong>mapped, mapping</strong></td>
<td>The correspondence of one element in the system to another element.</td>
</tr>
<tr>
<td><strong>master node</strong></td>
<td>See virtual volume master node.</td>
</tr>
<tr>
<td><strong>matched-set VLUN template</strong></td>
<td>A rule that allows a particular host connected to a particular port to see a virtual volume as a specified LUN.</td>
</tr>
<tr>
<td><strong>message code</strong></td>
<td>A keycode that identifies a system alert.</td>
</tr>
<tr>
<td><strong>midplane</strong></td>
<td>See storage system midplane.</td>
</tr>
<tr>
<td><strong>mirror</strong></td>
<td>One member of a group of mirrored chunklets, which is also known as a RAID 1 set.</td>
</tr>
<tr>
<td><strong>mirror depth</strong></td>
<td>See set size.</td>
</tr>
<tr>
<td><strong>node</strong></td>
<td>See controller node.</td>
</tr>
<tr>
<td><strong>node cabinet</strong></td>
<td>A cabinet that houses the midplane and controller nodes.</td>
</tr>
<tr>
<td><strong>node chassis</strong></td>
<td>See controller node chassis.</td>
</tr>
</tbody>
</table>
owner, owner node  See logical disk owner node.

parent volume A virtual volume from which a child volume (virtual or physical copy) is made.

parent-child relationship The relationship between two virtual volumes in which the parent volume contains information needed to reconstruct the child volume.

parity set See RAID 5 set.

parity set position The group of chunklets that occupy the same position within a RAID 5 logical disk parity set.

PCI load card An electronic circuit board that is inserted into a controller node’s PCI slot. The PCI load card allows the node to recognize an unoccupied PCI slot.

PDU See power distribution unit.

physical copy A point-in-time copy of an entire virtual volume.

physical disk A dual-ported Fibre Channel disk mounted onto a drive magazine.

physical parent The source volume for a physical copy.

port-presents VLUN template A rule that allows any host connected to a particular port to see a virtual volume as a specified LUN.

power bank A group of four connected AC outlets within the power distribution unit. There are two power banks in each PDU.

power distribution unit (PDU) A device that takes in AC power from a main power source (for example, an electrical wall outlet) and distributes the power to the power supplies in a storage system.

power supply A device that converts current from an AC line into appropriate DC levels and provides that power to a storage system component.

preserved data Data that is suspended in the system’s cache memory because of backend failure.

preserved data logical disks RAID 10 logical disks created by the system during initial system setup to store preserved data.

primary system A storage system from which virtual volumes are copied from during a remote copy operation. See also 3PAR Remote Copy, remote copy, and secondary system.

rack The EIA-standard rack within a cabinet that holds the components of a storage system.

rack filler panel A panel used to seal off an empty 1U, 2U, or 4U space on the rack. All empty spaces in the rack must be sealed for EMI and airflow considerations.

rack unit (U) The standard unit of height for an EIA-standard rack or components housed in an EIA-standard rack: equivalent to 1.75 in. (4.45 cm).

RAID Redundant array of independent disks.

RAID 0 set Striped rows of chunklets on two or more physical disks. A RAID 0 set offers no data redundancy.

RAID 1 set A group of mirrored chunklets.

RAID 5 set A group of parity-protected chunklets. Also known as a parity set.

region A subdivision of a virtual volume whose size is a multiple of 32 MB.

remote copy Copying virtual volumes from a storage system designated as primary to another storage system designated as backup. See also HP 3PAR Remote Copy, primary system, and secondary system.

remote system See backup system.

row A grouping of RAID 1 or RAID 5 sets. Data is striped across the rows of RAID 10 and RAID 50 logical disks.

row size The number of sets in a row.

safety breaker The device used to power on and power off the power distribution unit. The safety breaker also prevents power surges in the AC line from damaging a storage system.

second virtual volume backup node The controller node that takes over for the virtual volume backup node if the virtual volume node fails.
secondary system  A storage system to which virtual volumes are copied to during a remote copy operation. See also HP 3PAR Remote Copy, remote copy, and primary system.

service processor  A device inserted into a rack that enables HP Customer Satisfaction personnel to locally and remotely monitor and service storage system.

set  A grouping of mirrored or parity-protected chunklets.

set size  The number of chunklets in a set. Also known as mirror depth for RAID 1 sets and parity set for RAID 5 sets.

snapshot  A physical or virtual copy of a virtual volume.

snapshot administration space  The space on a virtual volume that is used to track changes to the data since a snapshot of a virtual volume was created.

snapshot data space  The space on a virtual volume that holds the data that has been changed since the first virtual copy was created.

source volume  The virtual volume from which a copy is made.

spare, spare chunklet  A chunklet that is reserved for use in case of a failure in the system.

sparing  The automatic relocation of chunklets on a physical disk to free or spare chunklets when a logging logical disk becomes full.

stale data  Data on a virtual copy that is no longer valid because of insufficient snapshot administration and snapshot data spaces available to record new changes to a base volume.

stale snapshot  A snapshot that does not track the most recent changes to its source volume.

started virtual volume  A virtual volume that either passed autocheck upon system startup or was created since the system was last restarted. Started virtual volumes are ready for read/write operations.

step size  The number of contiguous bytes that the system accesses before moving to the next chunklet.

stopped virtual volume  A virtual volume that has not been started and is therefore not ready for read/write operations.

storage system midplane  An electronic circuit board that contains sockets into which power supplies and controller nodes are plugged.

table of contents (TOC)  The space on a physical disk that contains the internal description of the system. The TOCs on all physical disks in the system contain the same information.

target, target port  The port that is connected to and receives commands from a host computer. Also known as a host port.

template  See VLUN template.

thin provisioning  See 3PAR Thin Provisioning.

thinnly provisioned virtual volume (TPVV)  A virtual volume with no user space, that instead maps on demand to snapshot data space, as allocated through the mapping of the TPVV to a common provisioning group (CPG), on a copy-on-write basis.

TOC  See table of contents.

U  See rack unit.

user space  The space on a virtual volume that represents the size of the virtual volume seen by the host to which the virtual volume has been exported as a virtual LUN.

virtual copy  A snapshot created using the copy-on-write technique.

virtual volume  The mapping of data from one or more logical disks.

virtual volume backup node  The controller node that takes over for the virtual volume master node if the virtual volume master node fails.

virtual volume master node  The controller node that is responsible for a virtual volume from its creation to its deletion. When the system builds a virtual volume, the system begins with the logical disk connected to the master node.

VLUN  Stands for volume-LUN. A virtual volume-LUN pairing expressed as either an active VLUN or as a VLUN template.
**VLUN template**  
A rule that sets up the association between the name of the virtual volume and a LUN-host, LUN-port, or LUN-host-port combination. The three types of VLUN templates are host-sees, port-presents, and matched-set. See also active VLUN and LUN.

**World-Wide Name (WWN)**  
A unique 64-bit value used to identify Fibre channel devices on an arbitrated loop. The WWN consists of a prefix issued by the IEEE to uniquely identify the company and a suffix that is issued by the company.

**WWN**  
See World-Wide Name.

**zone**  
A unit of physical disk space reserved by a controller node for snapshot or snapshot administration data. A single zone can occupy space on more than one disk.
Index

B
battery replacement notices, 185

C
Canadian notice, 178
conventions
text symbols, 174

D
Declaration of Conformity, 178
Disposal of waste equipment, European Union, 180
documentation
providing feedback on, 175

E
European Union notice, 178

F
Federal Communications Commission notice, 177

J
Japanese notices, 179

K
Korean notices, 179

R
recycling notices, 180
regulatory compliance
Canadian notice, 178
European Union notice, 178
identification numbers, 177
Japanese notices, 179
Korean notices, 179
recycling notices, 180
Taiwanese notices, 180

S
symbols in text, 174

T
Taiwanese notices, 180
text symbols, 174