HP StorageWorks XP12000 Disk Array owner's guide

This guide describes features, components, options, and general operations for the HP StorageWorks XP12000 Disk Array.

Contents

About this guide

This guide is for use by system administrators who have expertise in:

- Mass storage systems and software
- Data processing concepts
- Direct-access storage device subsystems and their basic functions
- Disk arrays and RAID technology
- Operating system commands and utilities

Unless otherwise noted, the term *disk array* refers to the HP StorageWorks XP12000 Disk Array (XP12000).

Related information

For related product documentation, see the HP web site at www.hp.com:

- *HP StorageWorks XP12000 Disk Array Site Preparation Guide*
- *HP StorageWorks RAID Manager XP User's Guide*
- *HP StorageWorks Cluster Extension XP Installation Guide*
- *HP StorageWorks Cluster Extension XP User Guide*
- *HP StorageWorks Disk Array XP Operating System Configuration Guide* (various operating systems)

For information about operating system commands and third-party products, refer to the manufacturer's documentation.

Document conventions and symbols

Table 1. Document conventions

Convention	Element
Blue text (Figure 1)	Cross-reference links
Bold	Menu items, button names, key names, tab names, and group box names
Italics	Text emphasis and document titles
Blue underlined sans serif font (www.hp.com)	Web site addresses

Caution   *Failure to follow directions could result in hardware or software damage.*

⚠ **Warning**

Failure to follow directions could result in personal injury or death.

Getting help

If you have additional questions, contact your HP support representative or visit the HP web site: www.hp.com

HP technical support

In North America, call technical support at 1-800-652-6672, available 24 hours a day, 7 days a week.

Outside North America, call technical support at the location nearest you. The HP web site lists telephone numbers for worldwide technical support at: http://www.hp.com/support. From this web site, select the country of origin.

Have the following information available before calling:

- Technical support registration number (if applicable)

- Product serial numbers

- Product model names and numbers

- Applicable error messages

- Operating system type and revision level

- Detailed questions

For continuous quality improvement, calls may be recorded or monitored.

HP storage web site

For the most current information about HP StorageWorks XP products, visit: http://h18006.www1.hp.com/storage/arraysystems.html.

For information about product availability, configuration, and connectivity, contact your HP support representative.

HP authorized reseller

To obtain the name of your nearest HP authorized reseller:

United States   1-800-345-1518

Canada   1-800-263-5868

elsewhere   See the HP web site for locations and telephone
                       numbers: www.hp.com

Revision history

September 2004	First edition
September 2004	Second edition
March 2005	Third edition
May 2005	Fourth edition

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Overview

The XP12000 disk array is part of the HP StorageWorks XP Disk Array family of products. These disk arrays provide reliable and secure data storage and protection, featuring redundant circuitry and RAID storage options for data security. These disk arrays also support multiple operating systems, platforms, and RAID groups. Advantages include:

- Continuous data availability,
- Nondisruptive service and upgrades,
- Connectivity,
- Scalability,
- Data integrity and high availability,

Continuous data availability

The HP StorageWorks Disk Array XP family includes the first RAID disk arrays to provide truly continuous data availability. XP disk arrays are designed for nonstop operation and continuous access to all user data.

The following XP12000 features ensure continuous data availability:

- No single point of component failure, which enables uninterrupted access to data

- Component and function redundancy, providing full fault tolerance for disk array microprocessors, control storage, cache, control and data buses, power supplies, and cooling fans

- Can sustain multiple component failures and still continue to provide full access to stored data

Note Although access to data is not compromised, the failure of a key component can cause a temporary reduction in disk array performance.

Nondisruptive service and upgrades

Without disrupting normal disk array operations (if alternate pathing is used), an HP support representative can:

- Remove, service, repair, or replace hardware subassemblies
- Use the built-in service processor (SVP) to upgrade microcode

Alternate paths can be established using host failover software, alternate Fibre Channel paths, or both.

Caution   *The disk array has no user-serviceable components. The SVP does not include a keyboard or monitor and is not a customer-accessible component. Only an HP support representative should open the cabinets.*

HP StorageWorks Continuous Track XP monitoring software detects internal hardware component problems and automatically reports them to the HP Storage Technology Center (STC) before they are noticed by operators and users. An HP support representative can then verify the problem and perform the appropriate maintenance activity, with no interruption to applications or hosts. For more information on Continuous Track XP, see "HP StorageWorks Continuous Track XP" (page 31).

Connectivity

The disk array uses these types of connections to connect to host systems:

- Fibre Channel
- ESCON
- FICON

Fibre Channel

The disk array supports:

- A maximum of seven[1] pairs of channel adapters that can support up to 224 Fibre Channel ports
- Up to 16,384 LDEVs that can be configured as up to 229,376 LUNs[2] through the Fibre Channel, which provides data transfer rates up to 2 Gb/s depending on the Fibre Channel interface option
- Fibre Channel arbitrated loop (FC-AL) and Fabric Fibre Channel topologies

ESCON

The disk array supports a maximum of four pairs of channel adapters that can support 64 ESCON ports for connection to mainframe hosts and up to 16,384 LDEVs.

FICON

The disk array supports a maximum of four pairs of channel adapters that can support up to 64 FICON ports and up to 16,384 LDEVs.

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1. When more than four FC pairs are installed, each additional pair reduces the maximum number of ACP pairs by one. For example, an array with six FC pairs can have a maximum of two ACP pairs installed.
2. The maximum number of LUNs is 1024 per installed FC port.

Scalability

The disk array is scalable to accommodate your current and future storage capacity needs.

The minimum XP12000 configuration includes one DKC containing 9 to 128 disk drives. You can expand the disk array to include one to four DKUs, each containing up to 256 disk drives. The maximum array configuration can contain 1152 disk drives providing up to 332 TB of storage capacity in a single array.

Your HP support representative can add DKUs and disk drives online with no interruptions to applications or hosts.

Data integrity and high availability

To provide the highest levels of data integrity and availability, the HP StorageWorks XP Disk Array family uses RAID technologies and redundant hardware throughout the disk arrays, including:

- RAID1, RAID5, RAID6
- Mirrored write cache
- Dual channel adapters (CHAs) and array control processors (ACPs)
- Dual and concurrently active data and control paths through the array
- Split power domains on internal data paths
- Hot-pluggable boards
- Hot-pluggable fans, power supplies, and controllers
- Online upgradable firmware

The following software features and products help to ensure that the disk array meets your requirements for high availability:

- XP12000 support
  - Capability to "phone home" to the multidisciplinary HP Storage Technology Center (STC); see "HP StorageWorks Continuous Track XP" (page 31)
  - Advanced remote diagnostics
  - Full solution (host-SAN-storage) support
- Full software and solution integration enabled by HP software products; see Chapter 4 for details

Summary of features

This section summarizes the main features and specifications of the disk array.

For the most current product information, visit the HP web site: www.hp.com.

Web-based array management

HP StorageWorks Command View XP allows you to manage multiple arrays from a single Windows-based management server, and allows access to that management server from remote web-based clients. See "Management server" (page 34).

Operating systems

The disk array supports these operating systems:
- HP-UX
- Linux
- Windows
- HP OpenVMS
- HP Tru64
- Sun Solaris
- IBM AIX
- MPE/iX
- Novell NetWare
- SGI IRIX64
- Guardian for HP NonStop servers
- VMware

The disk array also supports various mainframe operating systems through ESCON and FICON host interconnections. For the latest information on supported operating systems and versions, contact your HP support representative or visit the HP web site: www.hp.com.

External storage

The disk array supports the following types of external storage:

- HP StorageWorks XP48, XP512, XP128, and XP1024 disk arrays
- HP StorageWorks Modular Smart Array 1000
- Specific disk array models of other manufacturers. Consult your HP representative for detailed information.

For more information about HP external storage, see the *HP StorageWorks Command View XP for XP Disk Arrays User Guide*.

Included components

The XP12000 base product includes the following hardware, software, services, and support:

- One XP12000 DKC
- Basic redundant power supplies and base batteries for up to 64 GB of cache and up to 64 disk drives
- HP microcode
- Continuous Track XP
- Modem
- This owner's guide
- An XP operating system configuration guides CD
- RAID Manager library
- Site preparation services
- Installation and configuration services
- Proactive 24 support for one year
- Reactive hardware support, 24x7, for two years
- Software support for one year (included with software title)

Required additional components

- Cache memory
- Shared memory
- ACP pair
- CHIP pair
- Hard disk drives
- HP StorageWorks Command View XP (page 51)
- HP StorageWorks LUN Configuration and Security Manager XP (page 52)

Optional components

HP offers an extensive list of optional products and services tailored for XP disk arrays, including a full suite of software products. For more information, see Chapter 4 and contact your HP support representative.

Hardware specifications

Table 2. Hardware specifications

Feature	Specification
Power	Single-phase or 3-phase
DKC/DKU	One XP12000 DKC Zero to four XP12000 DKUs
Maximum hard disk drives	1152
Maximum spare disk drives	40
Maximum parity groups/subsystem	280
Maximum disk drive capacity	332 TB
Maximum cache	128 GB
Available hard disk drives	146 GB 10K rpm Fibre Channel 73 GB 15K rpm Fibre Channel 300 GB 10K rpm Fibre Channel
Maximum shared memory	12 GB
ACP pairs	1 to 4
CHIP pairs	1 to 4
Configuration disk	XP12000-specific
SVP code	XP12000-specific
High-availability secondary SVP	Optionally available
RAID level	RAID 1 (2D+2D) RAID 1 (4D+4D) RAID 5 (3D+1P) RAID 5 (7D+1P) RAID 6 (6D+2P)
Maximum LDEVs	16,384[1]
Available LUNs	229,376
Maximum LUNs per port	1024

1 Contact HP for the firmware version required to achieve this maximum.

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XP12000 Hardware

The XP12000 is a high-performance RAID-capable disk array system used to store large quantities of data in an efficient and secure manner.

There is no single point of failure in the disk array. It includes redundant logic assemblies, controllers, disk drives, and power supplies, all of which can be removed or replaced without interrupting access to data.

Caution   *Only your HP support representative can remove or replace hardware.*

Physical components

The disk array includes the following major hardware components:

- One disk control frame (DKC), page 23
- Zero to four disk array frames (DKUs), page 32
- One service processor (SVP), page 30

To monitor and manage the array, a management server (page 34) is also required.

Figure 1 shows the disk array with the maximum of four DKUs.

Minimum disk subsystem

| 4th DKU (L2) | 3rd DKU (L1) | DKC | 1st DKU (R1) | 2nd DKU (R2) |
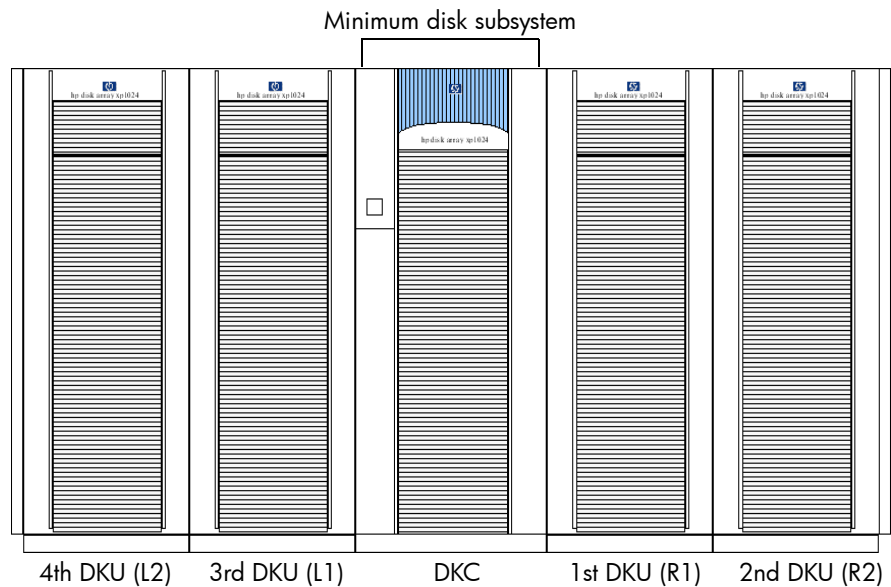
Figure 1. Disk array minimum/maximum configuration

Disk control frame

The DKC controls the disk array. It contains the control panel, connection hardware, power supplies, SVP, and control boards for the disk array. It also contains 9 to 128 disk drives.

Control panel

Once the disk array is powered on and running normally, no user operations are required at the control panel, except when instructed by your HP support representative.

Figure 2 shows the control panel location and layout. Table 3 explains the control panel functions.
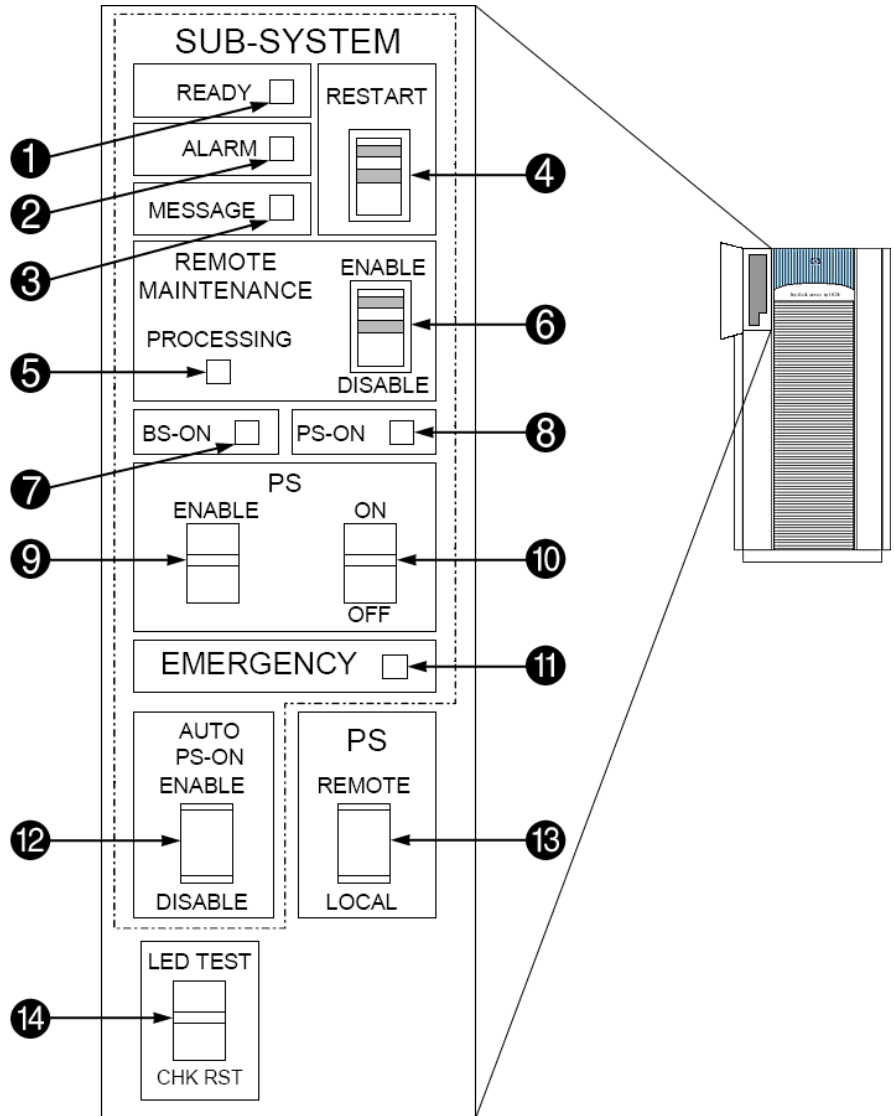
Figure 2. Control panel

Table 3. Control panel functions

Item	Label	Indicator	Description
1	SUB-SYSTEM READY	LED (Green)	During normal operation, this LED should be on. **On:** Input/output operation on the channel interface is enabled. **Off:** The system is not accepting data.
2	SUB-SYSTEM ALARM	LED (Red)	During normal operation, this LED should be off. **On:** One or more of the following: • The DC is under the voltage of the DKC part. • The DC is over current. • The temperature is abnormally high. • An unrecoverable failure has occurred. If the disk array is set up to "phone home" to STC, your HP support representative is notified automatically. If the disk array is not set up to "phone home," place a service call to HP to have the message evaluated to determine if any action is required. **Blinking:** The DC is under the voltage of the DKU part.
3	SUB-SYSTEM MESSAGE	LED (Amber)	During normal operation, this LED should be off. **On:** A service information message (SIM) has been issued from either storage cluster. If the disk array is set up to "phone home" to STC, your HP support representative is notified automatically. If the disk array is not set up to phone home, place a service call to HP to have the message evaluated to determine if any action is required. **Blinking:** An SVP failure has occurred. The disk array will continue to operate normally. Place a service call to HP to ensure notification. SVP failures might not be reported automatically to STC.

Table 3. Control panel functions (continued)

Item	Label	Indicator	Description
4	SUB-SYSTEM RESTART	Switch	If a blocked path occurs between a host and a disk drive, this switch is used to unfence the fenced drive path and to release Write Inhibit. During normal operation, this switch should be in the upper position. Restarting the subsystem performs a soft reset to try to recover. If the system restart does not unblock the path, an HP support representative will be notified. **Caution:** *Do not change the switch position unless directed to do so by HP service personnel.*
5	REMOTE MAINTENANCE PROCESSING	LED (Amber)	During normal operation, this LED may be on if remote maintenance is allowed (the REMOTE MAINTENANCE ENABLE/DISABLE switch (6) is in the ENABLE position). **On:** Remote maintenance is in progress. An HP support representative is probably working on the system, but the system is online and accepting data.
6	REMOTE MAINTENANCE ENABLE/DISABLE	Switch	Used to permit remote service maintenance. During normal operation, this switch should be in the ENABLE position. **Disable:** No one can provide remote maintenance. **Enable:** An HP support representative can provide remote maintenance. **Caution:** *Do not change the switch position unless directed to do so by HP service personnel.*

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Table 3. Control panel functions (continued)

Item	Label	Indicator	Description
7	BS-ON	LED (Amber)	During normal operation, this LED should be on. **On:** The disk array is plugged in and receiving power from the primary AC outlet. The SVP is receiving power from the outlet. **Off:** The disk array is not receiving power from the primary AC outlet. Check the electrical outlets in your building.
8	PS-ON	LED (Green)	During normal operation, this LED should be on. **On:** The PS ON/OFF switch is on. If the SUB-SYSTEM READY light (1) is also on, the disk array is ready to receive data. **Off:** The PS ON/OFF switch is off and the disk array is not ready to receive data.
9	PS ENABLE	Switch	Used to enable the PS ON/OFF switch (10). During normal operation, this switch should be in the "Disable" position (opposite the ENABLE position). **Enable:** The PS ON/OFF switch can be used. **"Disable":** The PS ON/OFF switch cannot be used. **Caution:** *Do not change the switch position unless directed to do so by HP service personnel.*

Table 3. Control panel functions (continued)

Item	Label	Indicator	Description
10	PS ON/OFF	Switch	Used to power on/off the disk array. During normal operation, this switch should be in the ON position. The switch functions only if: • The PS ENABLE switch (9) is in the ENABLE position. *and* • The PS REMOTE/LOCAL switch (13) is in the LOCAL position. **Caution:** *Do not change the switch position unless directed to do so by HP service personnel.*
11	EMERGENCY	LED (Red)	During normal operation, this LED should be on. **On:** The UNIT EMERGENCY POWER OFF switch on the back of the disk array cabinet is in the ON position. **Off:** The UNIT EMERGENCY POWER OFF switch is in the OFF position. Place a service call to HP to have an HP support representative reset the switch.

Table 3. Control panel functions (continued)

Item	Label	Indicator	Description
12	AUTO PS-ON ENABLE/DISABLE	Switch	Used to enable the automatic power on restart feature, which specifies how the disk array is powered on when the AC power is turned on or restored after a power outage.
			Enable: When the AC power is turned on, the disk array is powered on automatically.
			Caution: *As with all sophisticated electronic equipment, unstable power conditions during a restart can cause problems. This switch should be in the ENABLE position **only** if the power to the disk array is subject to power conditioning equipment, such as a UPS, to ensure that the power restored to the disk array is stable. If your site does not have a UPS, keep this switch in the DISABLE position. After a power outage, follow the manual restart procedure only after power has been restored and verified to be stable.*
			Disable: The disk array must be powered on manually, using the PS ON/OFF switch (10) or the host power control interface (PCI) (*mainframe only*).
			Caution: *Do not change the switch position unless directed to do so by HP service personnel.*

Table 3. Control panel functions (continued)

Item	Label	Indicator	Description
13	PS REMOTE/LOCAL	Switch	Determines how the disk array is powered on or off. During normal operation, this switch may be in either position, depending on your operating environment.
			Remote: Disk array is powered on/off by the instructions of the host PCI (*mainframe only*).
			Local: Disk array is powered on/off by the PS ON/OFF switch (10).
			Caution: *Do not change the switch position unless directed to do so by HP service personnel.*
14	LED TEST/CHK RST	Switch	Used by an HP support representative to test the functioning of the LEDs on the control panel or to reset various alarms. During normal operations, this switch should be in the middle position between LED TEST and CHK RST.
			Caution: *Do not change the switch position unless directed to do so by HP service personnel.*

Unit emergency power off switch

The UNIT EMERGENCY POWER OFF switch is located on the back of the DKC cabinet. For information on using this switch, see "Emergency power-off" (page 44).

Service processor (SVP)

The SVP is a blade processor connected inside the DKC. The SVP:

- Collects performance data on the disk array for diagnostic testing and analysis; see "Service information messages" (page 64)
- Provides your HP support representative with access to the disk array

Your HP support representative uses the SVP to configure, maintain, and upgrade the disk array software and hardware. The SVP does not include a keyboard or monitor and is not a customer-accessible component.

To protect your security, the SVP does not have access to any user data stored on the disk array.

Note   If you have extreme availability requirements, an optional second SVP is available.

Disk drives

The DKC must contain at least nine hard disk drives and can contain up to 128. For more information, see "Disk drives" (page 32) and Table 2 (page 20).

HP StorageWorks Continuous Track XP

Continuous Track XP is a program in the disk array that detects and reports problems even before they are noticed by operators and users. Continuous Track XP "phones home" to the HP Storage Technology Center (STC), providing:

• Periodic "well" checkups

This checkup records the health of the disk array on a day-to-day basis. Every 24 hours, Continuous Track XP calls STC (your HP support representative sets the time of the call). When a successful connection is made, status information is transferred from the disk array to STC. If any configuration changes have been made, configuration information is also sent.

• Incidental "sick" calls

When an error occurs, a service information message (SIM) is generated, stored in the disk array for use by your HP support representative, and reported to STC. For more information, see Chapter 5.

Note   The "phone home" capability may be turned off, if desired. Continuous Track XP still monitors the disk array, but does not automatically notify HP if a problem occurs.

Disk array frames

DKUs are optional cabinets that allow you to expand the disk array's storage capacity. DKUs contain physical disk drives. The disk array can include up to four DKUs. Four DKUs fully populated with disk drives provide up to 332 TB of storage capacity.

Disk drives

Each DKU can contain up to 256 hard disk drives. A variety of disk capacities are available; see Table 2 (page 20). Ask your HP support representative about currently available disk drives. The disk array automatically detects and corrects disk errors, and an HP support representative can replace any of the disk drives without disrupting user activity.

The disk array must contain at least one spare disk drive and can contain up to 40. Any of the spare disk drives can back up any other disk drive of equal rotational speed and equal or lesser capacity, in any DKU, even if the failed disk and the spare disk are in different array domains.

RAID options

The disk array supports RAID1, RAID5, or RAID6 array groups.

Backup batteries

In each frame (DKC and DKU), internal nickel-hydride batteries provide backup power for the cache memory, shared memory, ACPs, CHIPs, and disk drives. If AC input power is lost, the backup batteries enable the disk array to continue normal operations for up to one minute. If power is not restored within one minute, the disk array executes either the De-Stage or Backup battery operation mode.
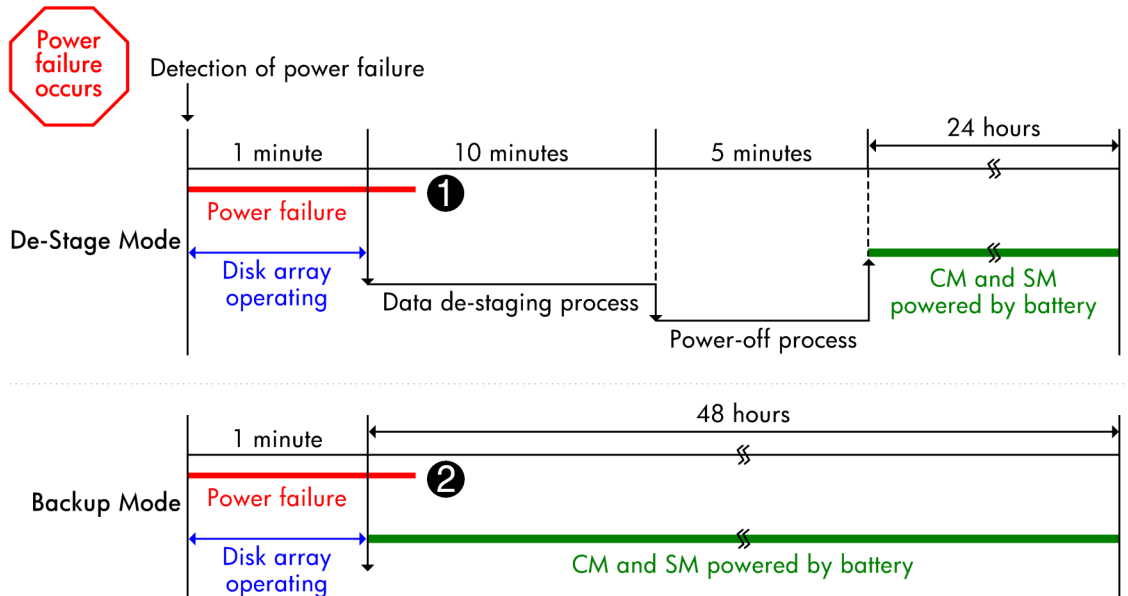
Figure 3. Battery operation modes

❶	If power is restored during the de-staging process, the disk array continues with the data de-staging and power-off processes.
❷	If power is restored during the battery backup period, the disk array either automatically restarts or must be restarted manually, depending on the setting of the AUTO PS-ON ENABLE/DISABLE switch (page 29) on the control panel. For more information, see "Recovering from an unplanned power outage" (page 47).

HP representatives will help you determine the best battery mode for your configuration, and will configure the selected mode during installation.

Management server

The management server is a Windows-based host connected to the array via a private LAN connection. HP Command View XP and HP LUN Configuration and Security Manager XP are required for you to monitor and manage disk array operations and are installed on the management server. Additional HP StorageWorks XP Disk Array software may also be installed on this host; see Chapter 4 for information on optional HP software products.

To protect your security, Command View XP for the management server does not have access to any user data stored on the disk array.

Specific hardware requirements for the management server (such as processor speed, storage capacity, and memory) vary depending on the optional software installed and the number of DKUs in the array. You may use an existing host (such as your storage administrator's PC) as the management server, provided that it meets system requirements for the required and optional software and your array configuration.

The management server can be connected to up to eight disk arrays using a private LAN connection, as shown in Figure 4.

Management server

Private LAN connection

DKC

Fibre Channel, ESCON, or FICON connection

Host
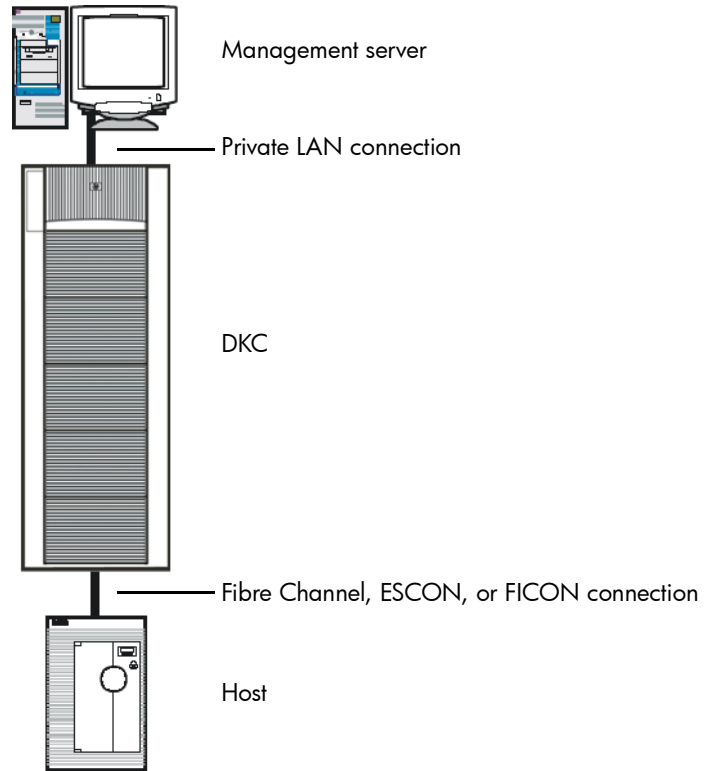
Figure 4. Connections to the disk array

Specifications

This section provides some general specifications for the XP12000. For complete specifications, see the *HP StorageWorks XP12000 Disk Array Site Preparation Guide*, available on the HP web site: www.hp.com.

Temperature

Table 4. Temperature specifications

Temperature range type	Range
Recommended operating temperature range	21° to 24° C 70° to 75° F
Operating temperature	16° to 32° C 61° to 89° F
Nonoperating temperature range	–10° to +43° C 14° to 109° F
Shipping and storage temperature (product packed in factory packing)	–25° to +60° C –13° to +140° F
Temperature shock immunity (maximum rate of temperature change)	10° C per hour 18° F per hour
Over-temperature warning	At 40° C At 104° F
Over-temperature shutdown	At 60° C At 140° F

Humidity

Take care to protect the disk array from excessive humidity. You should not observe condensation in or around the product under any conditions. There is no procedure for recovery from moisture condensation.

Table 5. Humidity specifications

Humidity range type	Noncondensing relative humidity (RH)
Recommended operating humidity range at 22° C (71° F)	50% to 55%
Operating humidity range at 22° C (71° F)	20% to 80%
Nonoperating humidity range	8% to 90%
Shipping and storage humidity range (product packed in factory packing)	5% to 95%

Mechanical vibration

Maximum operating acceleration is 0.05G at a frequency range of 10 to 300 Hz.

AC line voltage requirements

This section lists the AC power recommendations for each power cord. Each DKC or DKU has two or four power cords. In case of a failure of the power source for one cord, the power requirements, and therefore the current requirement for the remaining power cord, will double.

For details on electrical specifications, cabling, and connectors, see the *HP StorageWorks XP12000 Disk Array Site Preparation Guide*.

50-amp, single-phase DKC

Table 6. 40-Amp, 50 or 60 Hz, single-phase DKC operation

Parameter	Nominal rated voltage (Vac)				
	200	208[1]	220	230	240
Rated line current per power cord (Arms)	22.6	21.7	20.5	19.6	18.8
Number of power cords	2	2	2	2	2
Recommended circuit breakers	50A	50A	50A	50A	50A
Number of circuit breakers	2	2	2	2	2

1 60 Hz only.

30-amp, single-phase DKC

Table 7. 30-Amp, 50 or 60 Hz, single-phase DKC operation

Parameter	Nominal rated voltage (Vac)				
	200	208[1]	220	230	240
Rated line current per power cord (Arms)	11.3	10.9	10.3	9.8	9.4
Number of power cords	4	4	4	4	4
Recommended circuit breakers	30A	30A	30A	30A	30A
Number of circuit breakers[2]	4	4	4	4	4

1 60 Hz only.

2 Units with only two power cords require only two circuit breakers.

30-amp, three-phase DKC

Table 8. 30-Amp, 50 or 60 Hz, three-phase DKC operation

Parameter	Nominal rated voltage (Vac)							
	200	**208[1]**	**220**	**230**	**240**	**380**	**400**	**415**
Rated line current per power cord (Arms)	13	12.5	11.9	11.3	10.9	6.9	6.5	6.3
Number of power cords	2	2	2	2	2	2	2	2
Recommended circuit breakers	30A	30A	30A	30A	30A	30A	30A	30A
Number of circuit breakers	2	2	2	2	2	2	2	2

1   60 Hz only.

50-amp, single-phase DKU

Table 9. 50-Amp, 50 or 60 Hz, single-phase DKU operation

Parameter	Nominal rated voltage (Vac)				
	200	**208[1]**	**220**	**230**	**240**
Rated line current per power cord (Arms)	18	17.3	16.4	15.7	15
Number of power cords	2	2	2	2	2
Recommended circuit breakers	50A	50A	50A	50A	50A
Number of circuit breakers	2	2	2	2	2

1   60 Hz only.

30-amp, single-phase DKU

Table 10. 30-Amp, 50 or 60 Hz, single-phase DKU operation

Parameter	Nominal rated voltage (Vac)				
	200	208[1]	220	230	240
Rated line current per power cord (Arms)	9	8.7	8.2	7.8	7.5
Number of power cords	4	4	4	4	4
Recommended circuit breakers	30A	30A	30A	30A	30A
Number of circuit breakers[2]	4	4	4	4	4

1   60 Hz only.

2   Units with only two power cords require only two circuit breakers.

30-amp, three-phase DKU

Table 11. 30-Amp, 50 or 60 Hz, three-phase DKU operation

Parameter	Nominal rated voltage (Vac)							
	200	208[1]	220	230	240	380	400	415
Rated line current per power cord (Arms)	10.4	10	9.4	9	8.7	5.5	5.2	5
Number of power cords	2	2	2	2	2	2	2	2
Recommended circuit breakers	30A	30A	30A	30A	30A	30A	30A	30A
Number of circuit breakers	2	2	2	2	2	2	2	2

1   60 Hz only.

3

XP12000 Operations

During normal operations, the disk array does not require your intervention and you should not attempt to open the disk array cabinets.

The disk array reports any service information messages (SIMs) to the SVP and the management server. If the array is set up to "phone home," the SVP automatically reports SIMs to the HP Storage Technology Center (STC). For more information on automatic reporting, see "HP StorageWorks Continuous Track XP" (page 31). For more information on SIMs, see Chapter 5.

General safety guidelines

Carefully read these safety guidelines and follow them when working with the disk array.

- Fully understand and follow all hazard warnings in this guide and on warning labels on the disk array. These hazard warnings help you to prevent or reduce the risk of death, personal injury, or product damage. Hazard warnings include alert headings consisting of an alert symbol and the word *Caution* or *Warning*:

Caution   *This indicates a hazardous situation which, if not avoided, will or can result in serious product damage or loss of data.*

⚠ Warning

This indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.

- Replace any warning label that becomes dirty or starts peeling off.
- Keep in mind that the hazard warnings in this guide and on the disk array cannot cover every possible hazard because it is impossible to predict and evaluate all potentially hazardous circumstances. Be alert and use common sense. If you have any questions, contact your HP support representative.
- Follow the safety guidelines and procedures in all documentation for this and related products.

Caution   *Disk array maintenance must be done only by trained and qualified HP support representatives. Only an HP support representative can power off the disk array.*

Caution   *Do not perform any procedures not described in this guide. If you have any questions or concerns, contact your HP support representative.*

⚠️ **Warning**

Do not touch areas marked HAZARDOUS, even with the power off. These areas contain high-voltage power.

Caution *If you detect any abnormal noise, smell, or smoke coming from the disk array, immediately power off the disk array by pulling the UNIT EMERGENCY POWER OFF switch on the back of the disk array cabinet. See "Emergency power-off" (page 44).*

Caution *Do not power off the system unless it is an emergency situation and you follow the emergency power-off procedure (page 44).*

Caution *Keep the front and rear doors closed at all times.*

Caution *Keep the tops and sides of the cabinets clear to allow air to flow properly.*

Caution *Use the supplied power cord. The power cord may not be used with other products.*

Powering down the disk array

Two situations may arise when you need to power down the disk array:

- Emergency power-off
- Planned power-off

Emergency power-off

In an emergency, it is critical to remove power to the disk array as quickly as possible.

Caution *Performing the emergency power-off procedure immediately shuts down the disk array, neglecting the array's normal power-off sequence. Jobs in process are aborted and their integrity after recovery is not guaranteed.*

*Use this power-off method **only** in an emergency.Only a qualified HP support representative can reset the switch and restore power to the disk array.*

Emergency situations in which you should consider performing the emergency power-off procedure are:

- A physical location catastrophe such as a flood, hurricane, tornado, or earthquake
- Any circumstance that presents the threat of injury or death to a person
- You detect any abnormal loud noise, smell, or smoke coming from the disk array

To power off the disk array in an emergency:

1. Locate the UNIT EMERGENCY POWER OFF switch on the back side of the DKC.
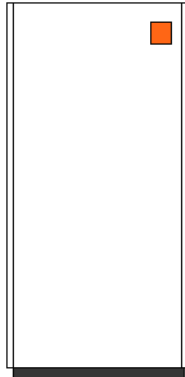
Rear view of DKC

Figure 5. Unit emergency power off switch

2. Pull the switch up and then out towards you.

   The disk array shuts down immediately. The UNIT EMERGENCY POWER OFF switch mechanically locks itself in the off position to prevent anyone from restoring power in a potentially hazardous situation.

⚠ **Warning**

The UNIT EMERGENCY POWER OFF switch provides only partial power-off capability. AC input power remains present at the primary circuit.

3. When the emergency situation is over, call the HP support center. Only a qualified HP support representative can reset the switch and restore power to the disk array.

Planned power-off

Occasionally, you may need to plan a site power outage, such as during alterations to the data center, inspections, or work by the electric company. If a scheduled power outage will affect the disk array, contact your HP support representative to schedule the power-off of the disk array.

Caution   *Only a trained HP support representative can shut down and power off the disk array.* ***Do not attempt to power down the disk array other than during an emergency, using the UNIT EMERGENCY POWER OFF switch.***

Recovering from an unplanned power outage

Unplanned power outages occur when the primary building power is lost due to electrical blackouts, thunderstorm activity, or similar occurrences, and input AC power is not received by the disk array. The disk array will maintain its state and recover when power is restored.

The disk array cache is powered by backup batteries that will maintain the array state for up to 48 hours, depending on the selected battery operation mode. For more information, see "Backup batteries" .

Manual restart of the disk array after power is restored

Caution *After power is restored to your site and before restoring power to the disk array, HP recommends that you have an electrician verify the power to ensure that all phases are restored and input power to the disk is stable.*

Contact your HP representative for help recovering from a power outage.

To restart the disk array manually:

1. On the DKC control panel [Figure 2], move the PS ENABLE switch to the ENABLE position.

2. Move the PS ON/OFF switch to the ON position.

   The following LED power sequence occurs:

   - BS-ON turns amber.

   - PS-ON turns green.

   - SUB-SYSTEM MESSAGE may turn amber if the disk array is not configured to "phone home," signifying a SIM was generated because the disk array lost power unexpectedly.

   - SUB-SYSTEM READY turns green, indicating the system is ready.

Caution *Powering on the disk array can take upwards of 10 minutes, depending on the number of disks installed in the disk array. Power-on is complete only when the SUB-SYSTEM READY LED turns green.*

3. Move the PS ENABLE switch to "DISABLE" (opposite ENABLE).

Automatic restart when power is restored

Caution *As with all sophisticated electronic equipment, unstable power conditions during a restart can cause problems. HP recommends the use of automatic power on restart **only** if the power to the disk array is subject to power conditioning equipment, such as a UPS, to ensure that the power restored to the disk array is stable. If your site does not have a UPS, HP recommends that the disk array be configured for manual restart, meaning the POWER ENABLE switch on the control panel (page 24) is in the DISABLE position. After a power outage, follow the manual restart procedure (page 47) only after power has been restored and verified to be stable.*

With automatic restart enabled, the disk array automatically restarts and returns to service when power is restored after a power outage.

During the automatic restart, the following LED power sequence occurs:

- BS-ON turns amber.
- PS-ON turns green.
- SUB-SYSTEM MESSAGE may turn amber if the disk array is not configured to "phone home," signifying a SIM was generated because the disk array lost power unexpectedly.
- SUB-SYSTEM READY turns green, signifying the system is ready.

Caution *Powering on the disk array can take upwards of 10 minutes, depending on the number of disks installed in the disk array. Power-on is complete only when the SUB-SYSTEM READY LED turns green.*

To enable automatic restart:

1. On the DKC control panel [Figure 2 (page 24)], move the AUTO PS-ON ENABLE/DISABLE switch to the ENABLE position.

4

HP StorageWorks XP Disk Array Family of Software Products

This chapter describes HP's suite of software products designed to help you get the most from your disk array. HP StorageWorks XP Disk Array software:

- Augments critical array capabilities
- Helps optimize your IT resources
- Improves overall storage availability
- Simplifies disaster recovery
- Improves data security

Before installing a software package, refer to the software product documentation to verify equipment requirements.

To learn more about HP software products, or to obtain software updates, visit the HP web site: www.hp.com.Storage area management software

HP OpenView Storage Area Manager suite

OpenView Storage Area Manager provides comprehensive, centralized management across distributed, heterogeneous storage networks. The Storage Area Manager product suite includes the following applications:

- Storage Node Manager
- Storage Accountant
- Storage Allocater
- Storage Builder
- Storage Optimizer

Storage Area Manager provides:

- Automatic discovery and mapping of supported devices in the storage network, including hosts, interconnect devices, bridges, storage devices, and NAS devices
- Integrated device, capacity, performance, allocation, and cost management
- Support for Storage Management Initiative Specification (SMI-S) devices
- Monitoring and management of all discovered devices
- Centralized monitoring, management, and planning for Oracle and Microsoft Exchange applications
- Event management including the ability to set thresholds and configure triggers to perform automated actions when event criteria is met
- Reports to identify wasted or unused storage space
- Reports to identify trends to analyze and predict storage demand
- Integration with third-party reporting tools

Device and configuration management software

HP StorageWorks Command View XP

Command View XP provides a common management platform from which you can manage the XP family of disk arrays. The Command View management server can manage multiple XP arrays—even globally distributed arrays—from a single management server. Command View XP provides:

- Web-browser based GUI or command line interface
- Three levels of security
  - User authentication and authorization
  - Host IP authentication and authorization
  - Secure socket layer support for encrypted connection between the XP array and host
- Visual representation of host and storage resources
- Graphical representation of status, storage allocations, and health of XP array subcomponents
- Common user interface from which all XP management applications launch
- Event level integration into the leading network and system management solutions such as OpenView Network Node Manager, CA Unicenter TNG, Tivoli, and BMC Patrol

Note   Command View XP is required for XP12000 disk arrays.

HP StorageWorks LUN Configuration and Security Manager XP

LUN Configuration and Security Manager XP software combines LUN configuration and security into a single, integrated, and flexible product solution. With it, you can add and delete paths, create custom-sized volumes, and configure foolproof LUN security that provides controlled, secure access to data stored on the XP disk array—preventing unauthorized servers from accessing your data. It also configures arrays to meet changing storage requirements and enables users to share a single Fibre Channel array among multiple servers.

LUN Configuration and Security Manager XP allows you to:

- Create, define, and configure LUNs on the disk array
- Consolidate LUNs (combine up to 36 LUNs)
- Create small size LUNs to accommodate data locked into cache
- Establish security at the LUN level so that you can enable multiple server connectivity to the disk array
- Hide LUNs assigned to one server from other servers during IOSCAN operations
- Configure LUSE and create custom volume sizes

Note   LUN Configuration and Security Manager XP is required for XP128, XP1024, and XP12000 disk arrays.

HP StorageWorks LUN Security XP Extension

LUN Security XP Extension helps you manage business critical or sensitive data by providing a highly secure method of LDEV access control, allowing you to protect critical data from being changed.

Key features and benefits include:

- Creation of read-only volumes
- Protection of datasets from write and read access
- Protection from local and remote replication activities

- Data read only by authorized applications
- Access attributes assigned to each logical volume
- Global masking for protection from all host servers
- Rejection of file system device inquiry requests
- Reporting of access failures to host server
- Allows XP disk array deployment in data retention[1] solutions that assist in meeting SEC-related data integrity requirements[2]
- Firmware-based solution accessible from HP StorageWorks Command View XP

HP StorageWorks External Storage XP

HP StorageWorks External Storage XP enables you to connect low-cost and/or legacy external storage utilizing the superior functionality of XP disk arrays.

Key features and benefits include:

- Accessed as a full privilege internal XP disk array LUN
- Use without restrictions:
  - As a regular XP disk array LUN
  - As part of a Flex Copy XP or Business Copy
  - With full solutions support
- Facilitates data migration
- Reduces costs by allowing less expensive secondary storage

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1. Once the retention period is set, it cannot be changed.

2. Purchase and deployment of this product does not by itself ensure that regulatory/legal requirements for data retention will be met, and compliance is not implicitly or explicitly guaranteed.

Performance management software

HP StorageWorks Cache LUN XP

Cache LUN XP lets you reserve areas of memory cache on the XP disk arrays to store frequently accessed information. It improves file access times and enables faster data transfers. Assigning information to on-board cache speeds up access to your data because cache-resident data is available at host data transfer speeds for both read and write operations.

Cache LUN XP redirects I/O requests from the XP disk drives to data locked in the array's cache. It's transparent, simple to implement, and it delivers immediate performance gains. Cache memory for Cache LUN XP can be set as low as one logical block or 512 MB. As your needs grow, you can increase cache volumes in increments of one logical block to a maximum of 1,024 cached volumes. The software also integrates with Command View XP for web-based anytime, anywhere access.

HP StorageWorks Auto LUN XP

Auto LUN XP provides monitoring and disk usage analysis for your disk array based on user thresholds. Auto LUN develops a plan to migrate impacted data volumes to lower usage LUNs, using the data acquired during monitoring. You can perform the migration manually or automatically.

HP StorageWorks Performance Advisor

Performance Advisor is an Internet application used to monitor real-time performance of the HP StorageWorks XP family of disk array products. Using a simple, browser-based interface, you can quickly customize performance data collection and set performance alarms. Performance Advisor provides real-time and historical data on:

- LDEV I/Os
- Front-end and back-end port utilization

- Internal bus utilization

- Cache usage

You can easily integrate with VantagePoint's DSI log and user PerfView to view your performance metrics.

HP StorageWorks Performance Control XP

Performance Control XP is a performance allocation and management tool for XP disk arrays. It lets you allocate storage performance resources to hosts by means of policies you define.

It ensures that critical business processes have all the XP disk array performance they need to meet business objectives. You can ensure that processes such as backups and data warehouse loads get the array bandwidth necessary to meet deadlines. Performance Control XP enables sophisticated service provider solutions based on distinct levels of service.

Performance Control XP has a rich feature set for flexible policy definition, scheduling, monitoring, and analysis.

Replication software

HP StorageWorks Business Copy

Business Copy allows you to make up to nine ongoing copies of data. These copies are maintained on the local disk array. Use Business Copy for nonproduction activities such as backup, batching, and system testing.

HP StorageWorks Continuous Access

Continuous Access software allows you to make ongoing synchronous copies of array data to a remote site up to 27 miles (43 kilometers) away.

HP StorageWorks Continuous Access Extension

Continuous Access Extension is similar to Continuous Access, but operating in asynchronous mode. This can produce increased performance in remote copying. Copy operations are sequenced-stamped to ensure they are executed and sorted correctly at the remote disk array.

You must purchase Continuous Access Extension as an upgrade if you are currently using the Continuous Access in synchronous mode, but would prefer to use asynchronous mode.

HP StorageWorks Flex Copy XP

Flex Copy XP enables bidirectional, server-independent data transfer between HP Disk Array XP12000/1024/128 and MSA 1000 storage systems. Data can be transferred locally within a single data center or over metropolitan distances in a distributed storage network, without consuming server or LAN performance resources. This capability allows for more efficient, cost-effective leverage of business-critical data in a wide range of storage solutions, resulting in enhanced IT effectiveness and better return-on-investment in storage infrastructures. These storage solutions include nearline/array-based storage backup, data distribution and concentration, and hierarchical storage management.

Multipathing/high availability software

HP StorageWorks Secure Path

Secure Path is a family of high availability multipathing software products providing continuous data access from the disk array to host servers running Windows Server 2003, Windows 2000, Windows NT, Linux, Sun Solaris, Novell NetWare, IBM AIX, and HP-UX.

Redundant hardware, advanced RAID technology and Secure Path's automated failover capability enhance fault tolerance and availability. Secure Path effectively eliminates controllers, disk drives, interconnect hardware and host bus adapters as single points of failure. Secure Path:

- Ensures increased business efficiency by maintaining high availability of business critical data and by simplifying the task of path management

- Monitors path status, and in the case of a path failure, automatically re-routes data to an alternate path

- Allows easy path management from a single application with graphical displays and task automation

HP StorageWorks Data Integrity Check for XP

Data Integrity Check for XP corrects extraneous data problems in the I/O path from server to array. It provides XP disk arrays with an added level of protection when deployed in Oracle database environments, eliminating data corruption-related downtime and ensuring business continuity. It comprises flexible tools for solution configuration and management and supports raw disk, LVM, and VxVM environments.

The software is compatible with HP-UX, Sun Solaris, and MC/Service Guard for HP-UX.

Key features and benefits include:

- Enhanced data protection in Oracle environments
- Implementation on Oracle's Hardware Assisted Resilient Data (HARD) framework
- Correction of any random data corruption in the I/O path from server to array
- Averts unplanned downtime
- Increases uptime and business continuity

Mainframe software

Resource Manager XP and Data Exchange XP merge open systems and mainframe storage with the XP family of arrays for maximum flexibility, scalability, and ease of management. Together, these products can free your network of host-to-host data conversion traffic.

HP StorageWorks Resource Manager XP

Resource Manager XP allows you to share data stored on the disk array with mainframe systems and open system servers. This can reduce and optimize your storage maintenance and management overhead.

Resource Manager XP allows an XP array to connect to a mainframe system via an ESCON link.

HP StorageWorks Data Exchange XP

Data Exchange XP provides high-speed bidirectional data sharing between mainframe systems and open systems. File translations are provided through a file conversion utility.

Business continuity solutions

HP OpenView Data Protector

Backup and restore with HP OpenView Data Protector.

- Offers new levels of recovery with a service-driven management approach
- Enterprise-wide data protection
- Eliminate recovery windows with instant recovery, system disaster recovery, and direct backup

HP StorageWorks Cluster Extension XP

Cluster Extension XP offers protection against system downtime from a variety of faults, failures, and disasters. It enables flawless integration of an XP disk array's remote mirroring capabilities with high-availability server clustering solutions, including clusters covering metropolitan distances and based on SUN, AIX, Linux, and Microsoft systems (similar functionality exists for HP-UX servers with HP cluster software).

This extended-distance solution allows for more robust disaster recovery topologies as well as automatic failover, failback, and redirection of mirrored pairs for fast recovery. A host-based utility, Cluster Extension XP requires Continuous Access and Continuous Access Extension.

Key features and benefits include:

- Automatic failover/failback disaster recovery solutions for Serviceguard for Linux, Windows with Microsoft Cluster Server (MSCS), Solaris with Veritas Cluster Server (VCS), and AIX with IBM's HACMP cluster software
- Seamless integration of remote mirroring with server clusters
- A fully scripted turnkey solution for disaster recovery
- Allows consolidated disaster recovery across heterogeneous server clusters

- Speeds recovery implementation
- Simplifies automatic failover and failback; no user intervention is required

HP StorageWorks Fast Recovery Solution for Windows 2003

Fast Recovery Solution (FRS) for Windows 2003 enables quick recovery of Microsoft Exchange and SQL databases. Using the Business Copy secondary volumes, FRS can recover these databases in minutes rather than hours.

Key features and benefits include:

- Management of recovery databases using secondary volumes
- An easy-to-use GUI
- Integrity check features
- Log file recovery
- Reduces downtime with quick recovery
- Saves time and money
- Compatible with any backup solution
- Eliminates access conflicts with backup devices

HP StorageWorks Rapid Backup Solution with Direct Backup XP

Rapid Backup Solution with Direct Backup XP provides a zero downtime and serverless backup solution for XP disk array customers wanting to use an array-based data mover to backup data directly from the disk array to the tape library within a SAN.

Rapid Backup Solution with Direct Backup XP uses Business Copy to make a point-in-time copy of data, then uses the Direct Backup Engine (or data mover) on the XP disk array to move the data copy to tape.

Key features and benefits include:

- Integrated data mover (Direct Backup Engine XP within the StorageWorks Disk Array XP) maximizes system performance, providing efficient backup and restore of mission-critical data within a SAN

- The tight integration of Business Copy with backup software enables zero downtime and impact upon applications during backup operations

- Leverages existing LAN and SAN networks to provide a lower cost of ownership

- Supports multiple platforms and applications to meet your business needs

5

Troubleshooting

Service information messages

The disk array generates service information messages (SIMs) to identify
normal operations, service requirements, and failures. SIMs are generated
by the SVP and the CHIP (Client Host Interface Processor) and ACP
(Array Control Processor) microprocessors. Your HP support
representative uses the SIMs to monitor and troubleshoot the disk array.
You can view SIMs on the disk array's management server .

Failure detection and reporting process

If a failure occurs in the disk array, the failure is detected and reported to the system log, the SIM log, and the HP STC, as shown in Figure 6 and explained in Table 12 (page 65).
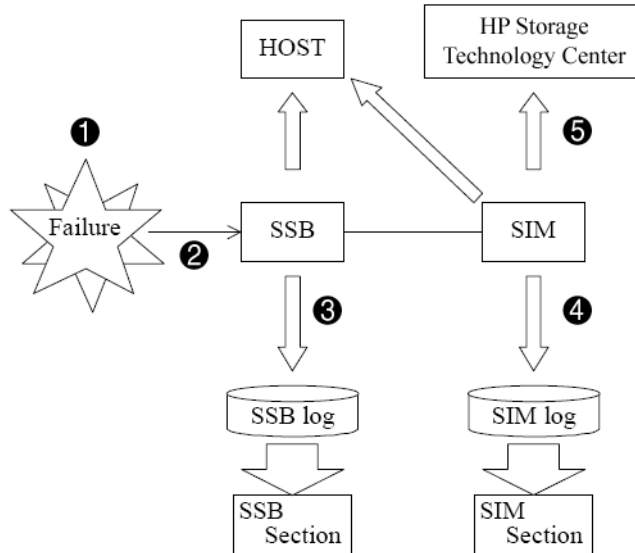
Figure 6. Failure detection and reporting process

Table 12. Failure detection and reporting process

Item	Description
1	A failure is detected in the disk array.
2	The failure is reported to the system.
3	The system stores the failure information in the system log.
4	The generated SIMs are stored on the disk array for use by HP support representatives, and logged on the management server as remote SIMs (R-SIMs). If the disk array is not set up to "phone home," when a SIM is generated, the amber message LED on the disk array control panel turns on. Call HP to determine the reason for the message.

Table 12. Failure detection and reporting process (continued)

Item	Description
5	If the disk array is set up to "phone home," Continuous Track XP reports the SIMs to STC through a dedicated dialup connection.

SIMs are classified according to severity: service, moderate, serious, or acute.

- **Service and moderate levels**—Do not require immediate attention and are addressed during routine maintenance. These failures are often corrected before the failure becomes apparent.
- **Serious and acute levels**—Reported immediately to STC to ensure that the problem is addressed as soon as possible. |

For more information on Continuous Track XP, see "HP StorageWorks Continuous Track XP" .

6

Regulatory Statements

FCC EMC statement (USA)

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 instruction manual, 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 his or her own expense. The end user of this product should be aware that any changes or modifications made to this equipment without the approval of Hewlett-Packard could result in the product not meeting the Class A limits, in which case the FCC could void the user's authority to operate the equipment.

Hewlett-Packard's device certification tests were conducted with HP computer systems and HP shielded cables, such as those you received with your product. Changes or modifications not expressly approved by Hewlett-Packard could void the user's authority to operate the equipment. Cables used with this device must be properly shielded to comply with the requirements of the FCC.

IEC statement (worldwide)

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

EMC statement (Canada)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Spécification ATI Classe A (France)

DECLARATION D'INSTALLATION ET DE MISE EN EXPLOITATION d'un matériel de traitement de l'information (ATI), classé A en fonction des niveaux de perturbations radioélectriques émis, définis dans la norme européenne EN 55022 concernant la Compatibilité Electromagnétique.

VCCI EMC statement (Japan)

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準
に基づくクラス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。

BSMI EMC statement (Taiwan)

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,在這種情況下,使
用者會被要求採取某些適當的對策的對策

RRL EMC statement (Korea)

사용자 안내문 : **A** 급 기기

이 기기는 업무용으로 전자파적합등록을 받은 기기이오니, 판매자 또는
사용자는 이 점을 주의 하시기 바라며, 만약 잘못 구입 하셨을 때에는
구입한 곳에서 비업무용으로 교환 하시기 바랍니다.

Harmonics conformance (Japan)

高調波ガイドライン適合品

German noise declaration

XP12000: Schalldruckpegel Lp = 70 dB(A)

Am Arbeitsplatz (operator position)

Normaler Betrieb (normal operation)

Nach ISO 7779:1988 / EN 27779:1991 (Typprüfung)

Laser safety

When equipped with native Fibre Channel adapters, this product contains a laser internal to the Optical Link Module (OLM) contained on the 8-port Fibre Channel Adapter board and 8-port FICON board, and on the 16-port Fibre Channel Adapter board and 16-port FICON board for connection to a fibre communications network.

In the USA, the OLM is certified as a Class 1 laser product conforming to the PRT requirements contained in the Department of Health and Human Services (DHHS) regulation 21 CFR, Subchapter J. The certification is indicated by a label on the plastic OLM housing. Outside the USA, the OLM is certified as a Class 1 laser product conforming to the requirements contained in IEC 825-1:1993 and EN 60825-1:1994, including Amendment 11:1996.

The following figure shows the Class 1 information label that appears on the plastic housing of the OLM.

CLASS 1 LASER PRODUCT

Complies with

21 CFR 1040.10 and 1040.11
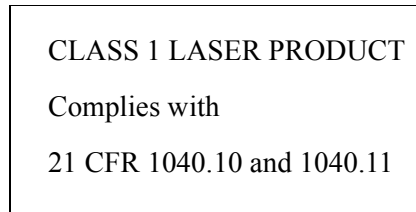
Each communications port consists of a transmitter and receiver optical subassembly. The transmitter subassembly contains an internal semiconductor laser diode in the wavelength range of 770 to 850 nanometers. In the event of a break anywhere in the fibre path, the OLM control system prevents laser emissions from exceeding Class 1 levels. Class 1 laser products are not considered hazardous.

Warning

There are no user maintenance operations, service operations, or adjustments to be performed on the Optical Link Module.

Japan DENAN law cordset caution

Please use the supplied power cord. The power cord may not be used with other products.

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。

Glossary

ACP Array control processor. The ACP handles the passing of data between the cache and the physical drives held in the DKUs. ACPs work in pairs, providing a total of eight SCSI buses. Each SCSI bus associated with one ACP is paired with a SCSI bus on the other ACP pair element. In the event of an ACP failure, the redundant ACP takes control. Both ACPs work together sharing the load.

AL Arbitrated loop.

AL-PA Arbitrated loop physical address.

allocation The ratio of allocated storage capacity versus total capacity as a percentage. "Allocated storage" refers to those LDEVs that have paths assigned to them. The allocated storage capacity is the sum of the storage of these LDEVs. Total capacity refers to the sum of the capacity of all LDEVs on the disk array.

array group A group of 4 or 8 physical hard disk drives (HDDs) installed in an XP disk array and assigned a common RAID level. RAID1 2d+2d array groups are made up of 4 HDDs. A RAID1 4d+4d group is two 4 HDD array groups concatenated together. RAID5 array groups are made up of 4 or 8 HDDs, depending on whether they are RAID5 3d+1p or RAID5 7d+1p, respectively. All RAID6 array groups are made up of 8 HDDs.

BC The HP StorageWorks Business Copy XP software program, which enables you to maintain up to nine internal copies of logical volumes on the disk array.

BS Basic supply.

BTU British thermal unit.

°C	Degrees centigrade/Celsius.
C-Track	The HP StorageWorks Continuous Track XP software program, which detects internal hardware component problems on a disk array and automatically reports them to the HP STC.
CA	The HP StorageWorks Continuous Access XP software program, which enables you to create and maintain duplicate copies of the data stored on a local disk array.
ca	Cache.
cache	Very high speed memory that is used to speed I/O transaction time. All reads and writes to the XP array family are sent to the cache. The data is buffered there until the transfer to/from physical disks (with slower data throughput) is complete. The benefit of cache memory is that it speeds I/O throughput to the application. The larger the cache size, the greater amount of data buffering can occur and the greater throughput to the applications. XP arrays support a range of cache memory. In the event of power loss, battery power allows the contents of the cache boards to survive for up to 48 hours.
CDE	Common desktop environment.
CE	Customer engineer.
CFW	Cache fast write.
CH	Channel.
channel adapter (CHA)	The channel adapter (CHA) provides the interface between the disk array and the external host system. Occasionally this term is used synonymously with the term channel host interface processor (CHIP).
channel host interface processor (CHIP)	Synonymous with the term channel adapter (CHA).
channel processor (CHP)	The processors located on the channel adapter (CHA).

CHPID	Channel path identifier.
CKD	Count key data.
CL	Cluster.
command device	A volume on the disk array that accepts CA or BC control operations which are then executed by the disk array.
configuration file	A file that defines the pair configurations.
consistency group ID (CTGID)	The group identifier for which the disk array guarantees the sequence of asynchronous data transfer for the asynchronous CA volume group.
control unit	To organize the storage space attached to the DKC, you can group similarly configured logical devices (LDEVs) with unique control unit images (CUs). CUs are numbered sequentially. The disk array supports a certain number of CUs, depending on the disk array model. Each CU can manage multiple LDEVs. Therefore, to uniquely identify a particular LDEV requires both the CU number and the LDEV number.
CSA	Canadian Standards Association.
CU	Control unit.
CVS	Custom volume size (also called virtual LVI).
daemon	A process that runs in the background and performs a specific operation at predefined times in response to certain events.
DASD	Direct access storage device.
DCR	Dynamic cache residency.
DE	HP StorageWorks Data Exchange XP.
DFDSS	Data Facility Dataset Services.
DFSMS	Data Facility System Managed Storage.
DFW	DASD fast write.
disk adapter (DKA)	Synonymous with the term ACP.

disk control frame (DKC)	The disk control frame (DKC) refers to the array hardware that houses the channel adapters and service processor (SVP).
disk array frame (DKU)	The disk array frame (DKU) refers to the array hardware that houses the physical disks in the array.
disk recovery and restore unit (DRR)	The unit located on the ACP that is responsible for data recovery and restoration in the event of a cache failure.
disk group	The physical disk locations associated with a parity group.
disk type	The manufacturing label burned into the physical disk controller firmware. In most cases, the disk type is identical to the disk model number.
DMP	Dynamic multipathing.
dr	Drive.
DSF	Device support facilities.
DW	Duplex write.
DWL	Duplex write line.
ECKD	Extended count key data.
EFS	The IRIX standard file system.
emulation modes	The logical devices (LDEVs) associated with each RAID group can have one of the following emulation modes. These modes change the behavior of the disks and determine their size.

OPEN-3:	2.46 GB
OPEN-8:	7.38 GB
OPEN-9:	7.42 GB
OPEN-E:	13.56 GB
OPEN-K:	Not available on XP12000 arrays
OPEN-L:	36 GB
OPEN-M:	Not available on XP12000 arrays
OPEN-V:	User-defined custom size

EOF	End of field.

EPO	Emergency power-off.
EREP	Error reporting.
ESA	Enterprise Systems Architecture.
ESCON	Enterprise System Connection (the IBM trademark for optical channels).
expanded LUN	A LUN is normally associated with only a single LDEV. The LUSE feature allows a LUN to be associated with 1 to 36 LDEVs. Essentially, LUSE makes it possible for applications to access a single large pool of storage. The LUSE feature is available when the HP StorageWorks LUN Configuration Manager product is installed.
ExSA	Extended serial adapter.
failover	Disconnecting a failed portion and replacing it with another normal portion or alternative portion in order to continue functioning.
° F	Degrees Fahrenheit.
FAL	File access library (part of the Data Exchange software).
FBA	Fixed-block architecture.
FC	Fibre Channel.
FC-AL	Fibre Channel arbitrated loop.
FCC	Federal Communications Commission.
FCP	Fibre Channel Protocol.
FCU	File conversion utility (part of the Data Exchange software).
FDR	Fast dump/restore.
fence level	A level for selecting rejection of a write I/O request from the host according to the condition of mirroring consistency.
F/M	Format/message.
ft.	Foot or feet.
FWD	Fast wide differential.

fx	The IRIX disk utility.
GB	Gigabytes.
GLM	Gigabyte link module.
HA	High availability.
HBA	Host bus adapter.
HCD	Hardware configuration definition.
HORCM_CMD	A section of the RAID Manager instance configuration file that defines the disk devices used by RAID Manager to communicate with the disk array.
HORCM_DEV	A section of the RAID Manager instance configuration file that defines the volumes of the instance.
HORCM_INST	A section of the RAID Manager instance configuration file that defines how RAID Manager groups link to remote RAID Manager instances.
HORCM_MON	A section of the RAID Manager instance configuration file that defines the instance you are configuring.
host mode	Each port can be configured with various options referred to as host modes. These modes are represented as two-digit hexadecimal numbers. The first digit, usually 0, represents different things on different arrays. The second hex digit represents the host system type. For example, the 8 in mode 08 represents an HP-UX host.
hot standby	Using two or more servers as a standby in case of a primary server failure.
HP	Hewlett-Packard Company.
H/W	Hardware.
Hz	Hertz.
ICKDSF	A DSF command used to perform media maintenance.
IDCAMS	Access method services (a component of Data Facility Product).
IML	Initial microprogram load.
in.	Inches.

I/O	Input/output (applies to an operation or device).
IOCP	Input/output configuration program
instance	An independent copy of RAID Manager. Instances are local or remote and can run on the same host.
JCL	Job control language.
KB	Kilobyte.
kcal	Kilocalorie.
kg	Kilogram.
km	Kilometer.
kVA	Kilovolt-ampere.
kW	Kilowatt.
LAN	Local area network.
lb.	Pound.
LCP	Local control port.
LD, LDEV	Logical device. An LDEV is created when a RAID group is carved into pieces according to the selected host emulation mode (that is, OPEN-3, OPEN-8, OPEN-9). The number of resulting LDEVs depends on the selected emulation mode. The term LDEV is often used synonymously with the term volume.
LED	Light emitting diode.
local disk	A local disk in the host.
local instance	The instance currently being configured or the instance to which commands are issued.
LPAR	Logical partition.
LCP	Link control processor or local control port.
LRU	Least recently used.

LU	Logical unit.
LUN	Logical unit number. A LUN results from mapping a SCSI logical unit number, port ID, and LDEV ID to a RAID group. The size of the LUN is determined by the emulation mode of the LDEV, and the number of LDEVs associated with the LUN. For example, a LUN associated with two OPEN-3 LDEVs has a size of 4,693 MB.
LUSE	Logical unit size expansion.
LVI	Logical volume image.
LVM	Logical Volume Manager.
LVM mirror	A disk duplicating function provided by Logical Volume Manager (LVM) (capable of triplicating disks).
m	Meters.
MB	Megabytes.
MCU	Main control unit.
mirroring consistency	The consistency (usability) of data in a volume (for example, S-VOL).
mm	Millimeters.
MP	Microprocessor.
MPLF	Multipath Locking Facility.
MR	Magnetoresistive.
ms, msec	Milliseconds.
mutual hot standby system	Two servers that are poised to cover for each other if necessary.
MVS	Multiple Virtual Storage (including MVS/370, MVS/ESA, MVS/XA).
NHAS	Novell High Availability Server.
node	Logically speaking, an environment where instances can be executed. Physically, a processor, which is an element of a cluster system.

NVS	Nonvolatile storage.
OFC	Open Fibre Control.
OLM	Optical link module.
ORM	Online read margin.
OS	Operating system.
P/DAS	PPRC/dynamic address switching.
PA	Physical address.
parity group	A parity group is a mode of disk operation and configuration. It is synonymous with the term "array group."
partition	Dividing a specific physical disk according to the HP-UX kernel or device driver layer into two or more areas as if there are two or more physical disks.
path	Paths are created by associating a port, a target, and a LUN ID to one or more LDEVs.
PCI	Power control interface or peripheral component interconnect.
PM	HP StorageWorks Performance Manager XP software.
port	The number of supported ports on an XP disk array is dependent upon the number of supported I/O slots and the number of ports available per I/O adapter. The XP family of disk arrays supports SCSI, Fibre Channel (FC/AL), ESCON, and FICON I/O interfaces. *I/O support can vary with the selected disk array.*
	Ports are named based upon their port group and port letter. Examples of port names include CL1-A through CL1-R and CL2-A through CL2-R (letters I and O are skipped).
P-P	Point-to-point.
PPRC	Peer-to-peer remote copy.
PS	Power supply.

P-VOL	The primary or main volume that contains the data to be copied.
RS	Russellstoll®, a brand of electrical plugs and receptacles manufactured by Thomas & Betts Corporation.
RAID	Redundant array of inexpensive disks.
RAID group	See "array group."
RAID level	A RAID Level is one of the ways that disk drives are grouped together in a RAID to improve performance, data availability/reliability or both. RAID levels are defined from RAID0 to RAID6. HP StorageWorks Disk Arrays in the XP product family support RAID1, RAID5 and RAID6. Not all of these RAID levels are supported by all XP family members. Consult the owner's guide or your HP representative for the details of which RAID levels are supported by your specific XP disk array.
RAM	Random access memory.
remote instance	The instance to which the local instance communicates as configured in the HORCM_INST section of the RAID Manager instance configuration file.
RISC	Reduced instruction set computer.
RM	HP StorageWorks RAID Manager XP.
RM instance configuration file	A file that defines the link between a volume and a RAID Manager instance. This file consists of four sections: HORCM_MON, HORCM_CMD, HORCM_DEV, and HORCM_INST.
R-SIM	Remote service information message.
R/W, r/w	Read/write.
S/390	IBM System/390 architecture.
SAM	System Administration Manager.
script file	A file containing a shell script.
SCSI	Small computer system interface.
sec.	Second.
seq.	Sequential.

SGI	Silicon Graphics Incorporated.
shell script	A command sequence executed by a UNIX shell.
Sidefile	An area of cache used to store the data sequence number, record location, record length, and queued control information before transmit over the ESCON link.
SIM	Service information message.
SMI-S	Storage Management Initiative Specification.
SMIT	System Management Interface Tool.
SMS	System managed storage.
SNMP	Simple Network Management Protocol.
special files	Files that indicate physical devices and that are different from regular files in the UNIX system. The functions of the device drivers (that is, access to system peripherals) become available through these special files.
SSID	Storage subsystem identification.
STC	HP Storage Technology Center.
SVP	Service processor, which is the laptop PC that is built into the DKC. The SVP provides a direct interface into the disk array. *SVP use is reserved for HP support representatives only.*
S-VOL	Secondary or remote volume. The copy volume that receives the data from the primary volume.
takeover	The actions of a standby server that takes over processing from the previously active server.
TB	Terabyte.
TCP/IP	Transmission control protocol/Internet protocol
TID	Target ID.
TPF	Transaction processing facility.
TSO	Time-sharing option (an IBM System/370 operating system option).

UCB	Unit control block.
UL	Underwriters' Laboratories.
VDE	Verband Deutscher Elektrotechniker.
VM	Virtual machine (an IBM S/390 system control program).
VOLID	Volume ID.
volser	Volume serial number.
Volume	Synonymous with LDEV.
XRC	Extended Remote Copy.
VSE	Virtual Storage Extension (an IBM S/390 operating system).
VTOC	Volume table of contents.
XA	System/370 Extended Architecture.
XDF	Extended distance feature (for ExSA channels).
XF	IRIX extended file system.
XLV	Extended logical volume manager.

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