



HP Extended Tape Library Architecture



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Agenda

- Solution architect needs
- HP Extended tape library architecture concepts
- HP ESL E-Series interfaces and internal data paths
- HP ESL E-Series Enterprise tape library
- E-Series connectivity at launch
- Any questions?
- Reference material

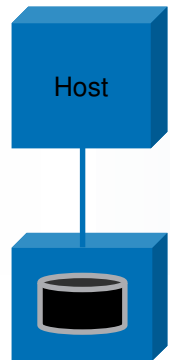


Solution architects needs:

- **Customers and Analysts tell us that:**
 - Library reliability is high priority
 - Library remote management is a must
 - Library integration into a SAN can be complex, error prone, not robust and is difficult to maintain.
 - Library troubleshooting can be equally difficult
 - Behavioral incompatibility within the SAN infrastructure leads to resetting of components and interruption of critical backups
- **Solution architects need this technology!**

Evolution of disk network storage

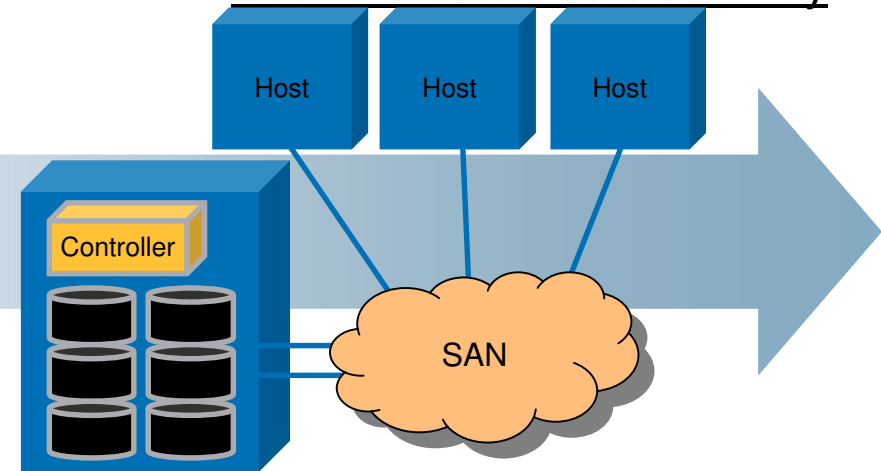
Direct-attach disk drive



JBOD



Network-attached disk array



Attributes of well-designed network storage:

- Consolidated
- Scalable
- Reliable
- Secure
- Shareable
- Manageable

Today's tape libraries

- Native-FC tape libraries provide JBOD equivalent capability
- Additional capability available with router-based tape libraries
- Need more security, reliability, shareability and manageability

HP Extended Tape Library architecture



- HP extended tape library architecture is what will differentiate HP tape Libraries from all other tape libraries in the market place.
- Available on all current & future Enterprise HP Libraries
Makes HP Tape Libraries Truly SAN aware
- Single pane of glass control & monitoring of multiple libraries
- Wide range of future enhancements

Improving reliability in a storage network - Terminology



- Interface Controller

- Manages concurrent access to library tape drives from a SAN
- Security – blocks disruptive I/O
- Caching – responds when tape drives are busy
- Behaviour – intelligently handles SAN events
- SAN aware event reporting
- Track and detect SAN specific errors (fabric events, aborted I/Os, reservation conflicts etc.)
- Identify configuration issues and conflicts in the SAN

- Interface Manager

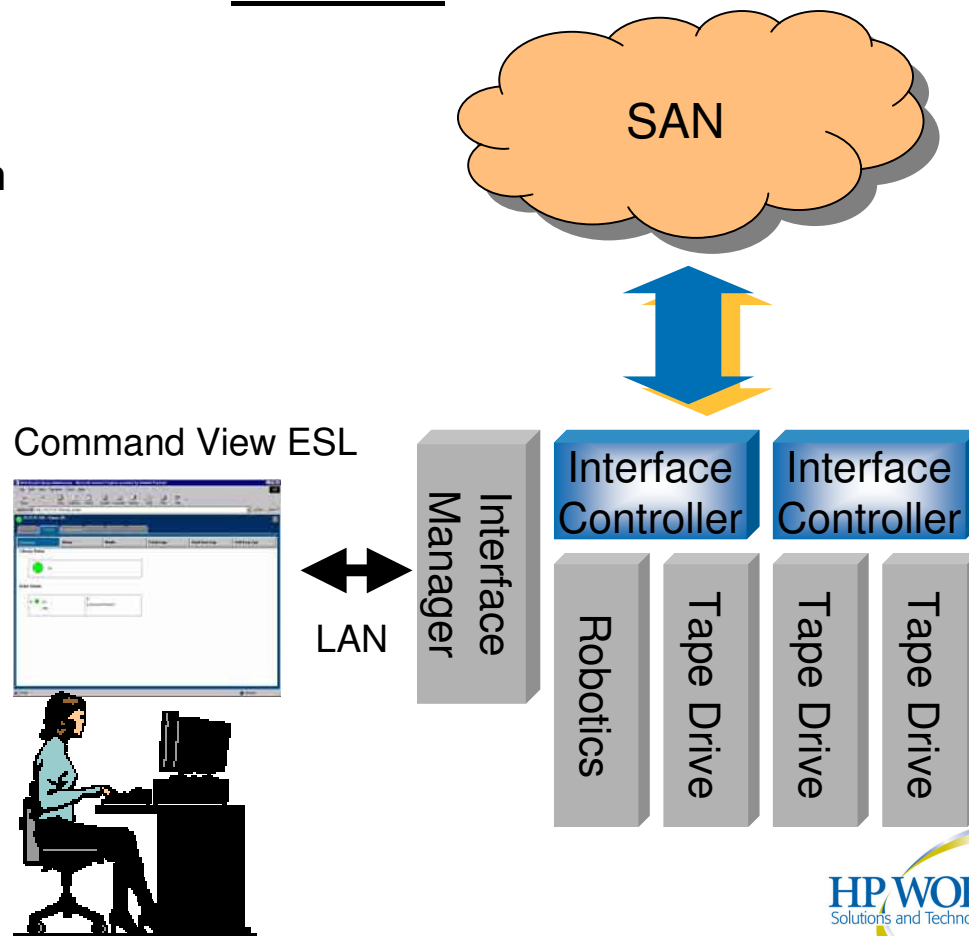
- Enables automated, simple and robust configuration
- Intelligent and consistent
- Based on knowledge of tape library and the SAN environment
- Adapts to changes
- Automatically corrects and maintains consistency
- Persistent extended history of tape library and SAN health
- In-depth analysis and data collection

HP Extended Tape Library Architecture

- Products and solutions that are part of HP's Extended Tape Library Architecture are created for SANs

Interface Controllers

- Layer of intelligence between tape drives and the SAN
- Manages shared access to the tape library, intelligently handling conflicts and storage network events
- Similar architecture to disk-arrays with controllers in front of disk drives

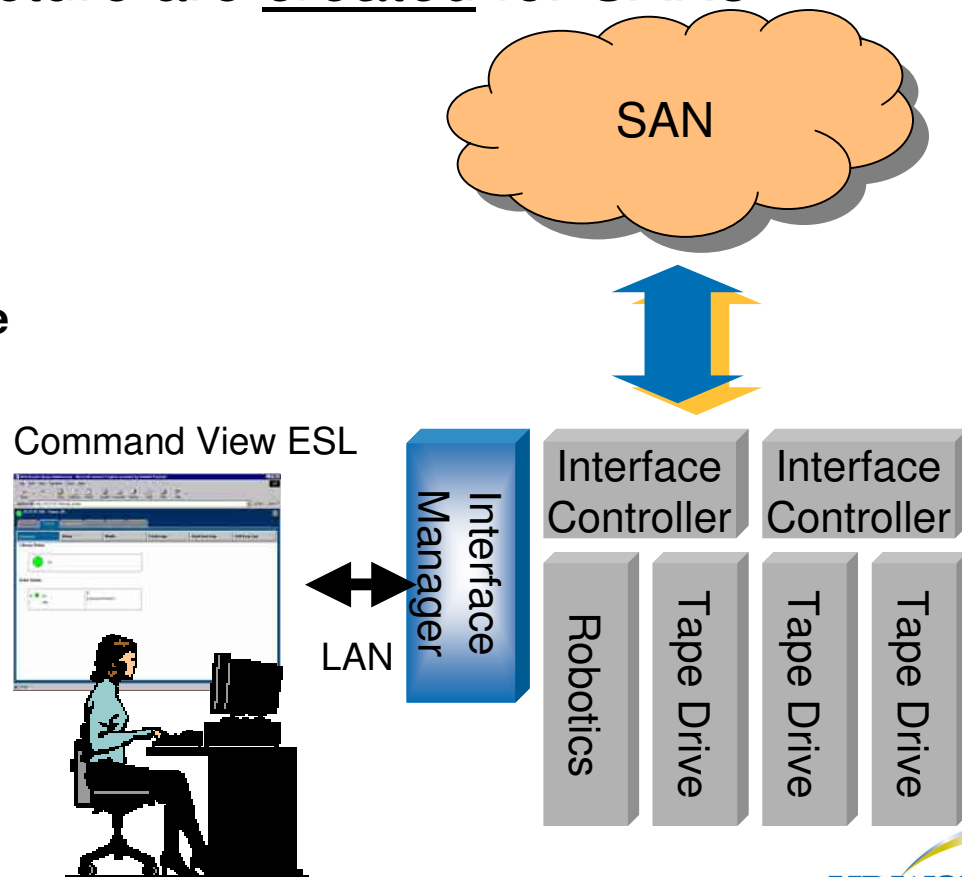


HP Extended Tape Library Architecture

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Interface Manager

- **Extends the intelligent management**
- **A central point of knowledge for the entire tape library subsystem**
- **Enables remote management**



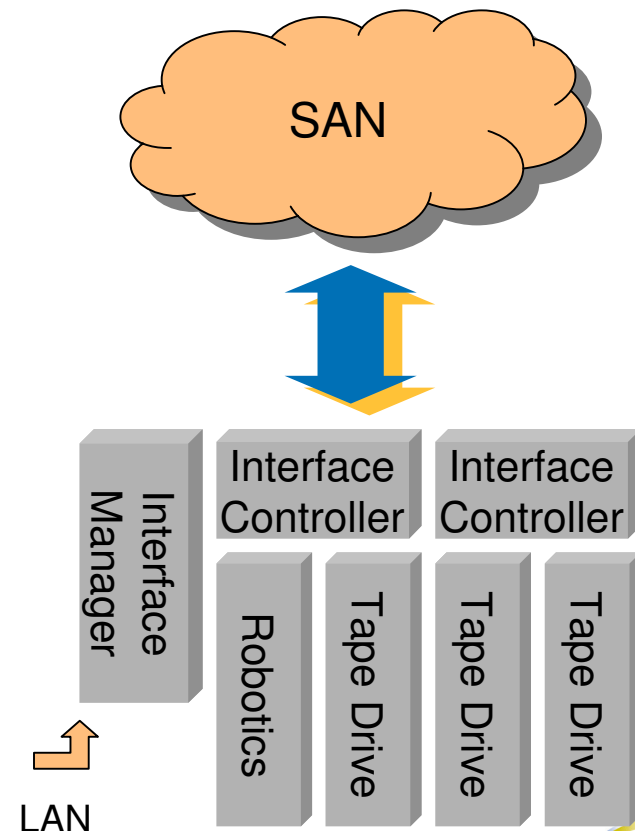
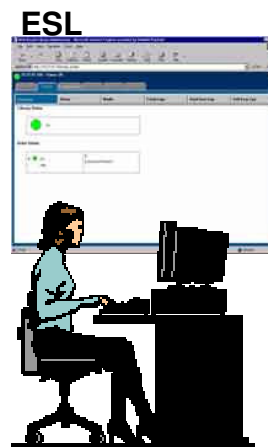
HP Extended Tape Library Architecture

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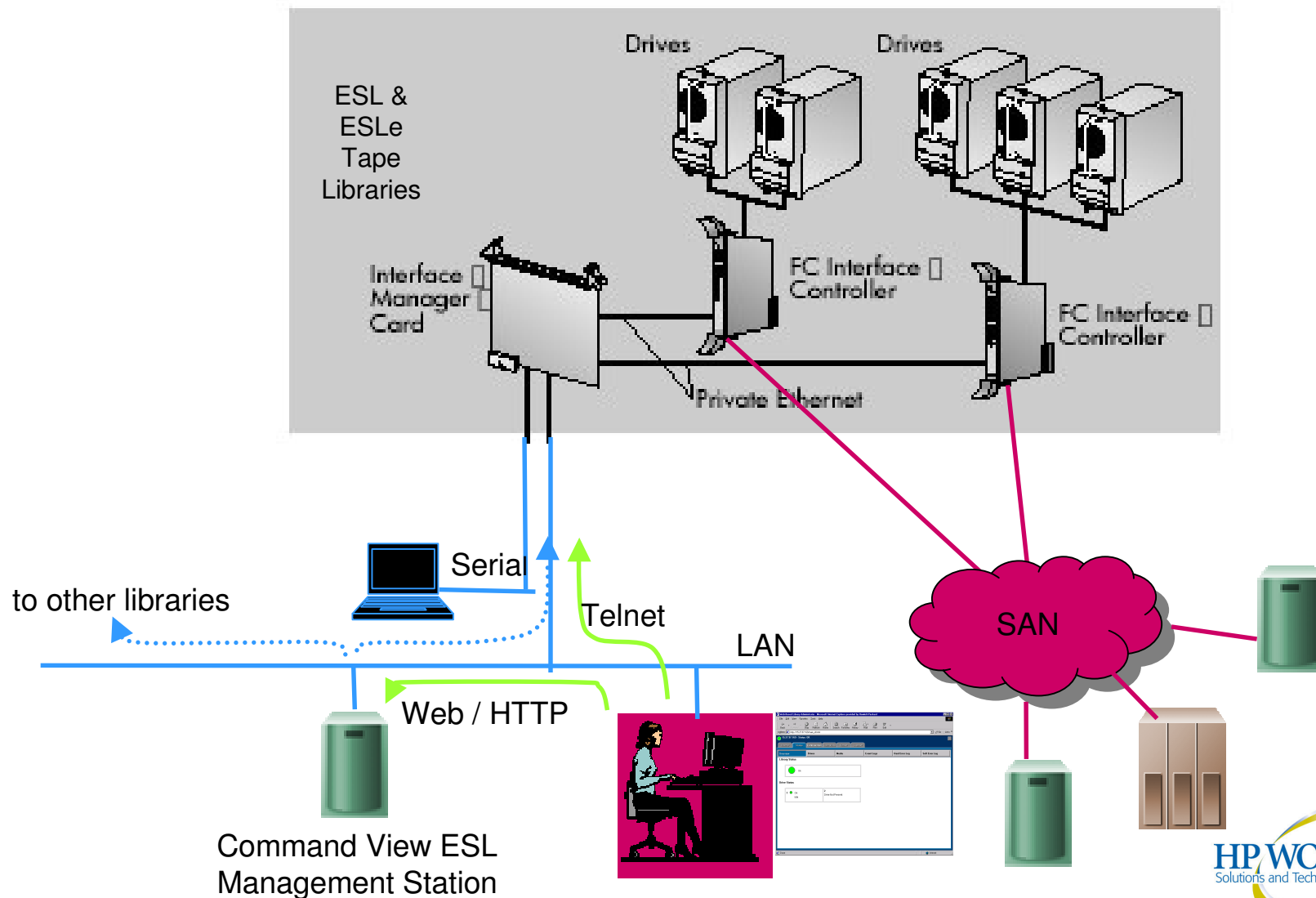
Command View ESL

- A single pane of glass view of the entire library
- Delivers easy-to-use remote management
- Simplifies and automates the most complex tasks
- Stays out of the SAN to allow critical traffic to flow

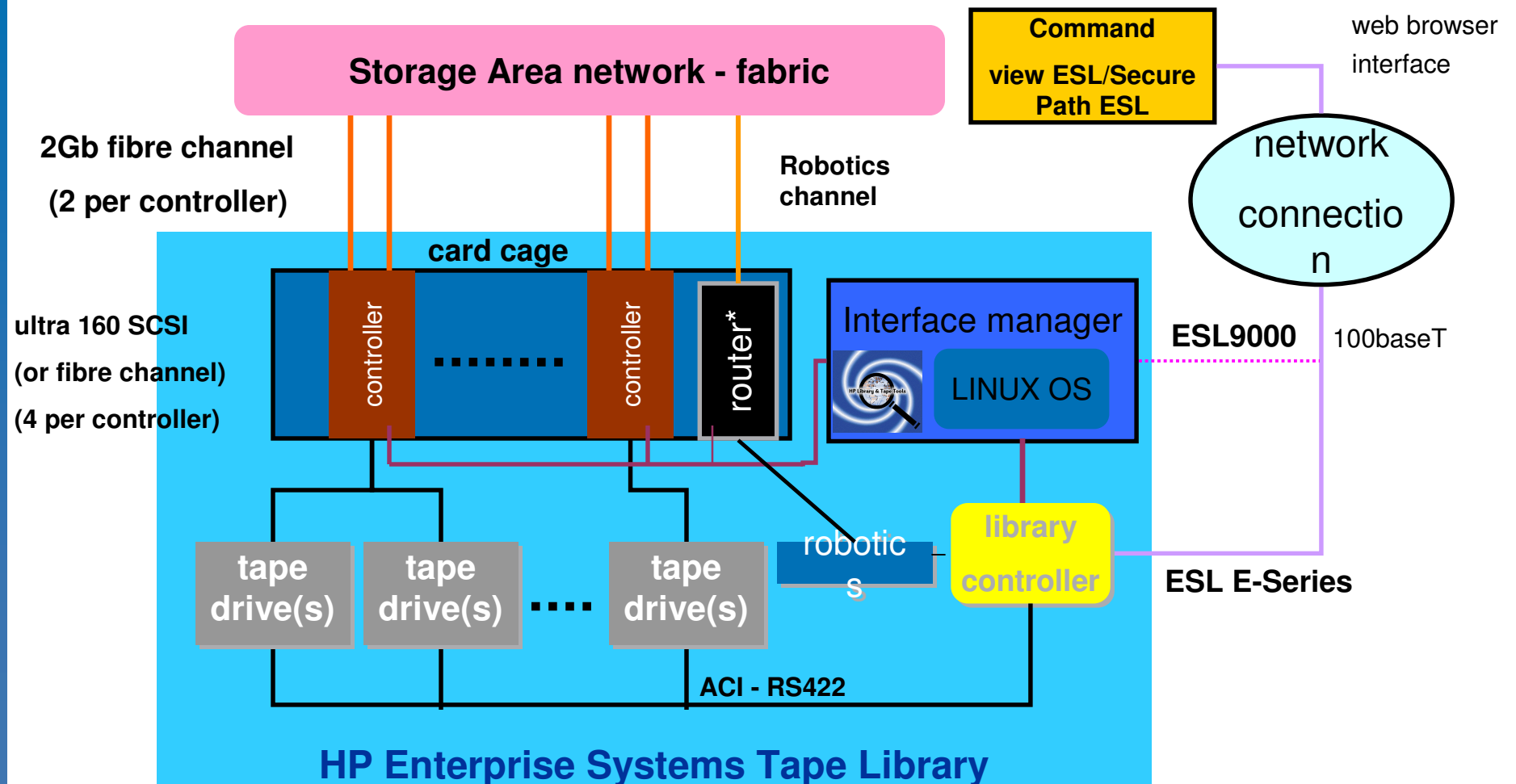
Command View



Extended Library Architecture - Topology and Interfaces



HP Extended Library Architecture concepts



* e1200-160 router E-Series only

Command View ESL “Identity” screen



HP Command View ESL - screenshots



The screenshot shows the HP Command View ESL interface. The title bar reads "hp Command View ESL". The menu bar includes "File", "Tools", "Actions", and "Help". Below the menu bar, the "Library" dropdown is set to "ESL 9322 (Address: 2/1.0.1)". The "Status" tab is selected, showing a tree view on the left with "Status Summary" highlighted. The main area displays a "Status Summary" table with columns for Component, Status, and Description. The table lists components under "Routers" and "Drives", with their respective status icons (green for Ready, yellow for Warning, red for Critical) and descriptions. A "Refresh Every 30 Seconds" button is visible above the table.

Component	Status	Description
Routers		
FC Interface Card 1	Ready	Good
FC Interface Card 2	Ready	Good
FC Interface Card 3	Warning	Wrong firmware revision
FC Interface Card 4	Critical	Can't communicate with card
FC Interface Card 5	Ready	Good
Drives		
Drive 1 (Ultrium 1-FC)	Ready	Good
Drive 2 (Ultrium 1-FC)	Ready	Good
Drive 3 (Ultrium 1-FC)	Warning	Wrong firmware revision
Drive 4 (Ultrium 1-FC)	Critical	Can't communicate with drive
Interface Manager	Ready	Good

Ready

HP Command view ESL – event logging



The screenshot displays the HP CommandView ESL application window. The title bar reads "HP CommandView ESL". The main menu includes "File", "Tools", and "Help". Below the menu is a tabbed interface with "Identity", "Status", "Configuration", "Operations", and "Support". The "Status" tab is active, showing a left-hand navigation pane with "Status Summary", "ESL Status", "Library", "Drives", "Interface Cards", and "Event Log". The "Event Log" is selected, displaying the "HP ESL Library" table.

Severity	Source	Timestamp	Event Description
Critical	Interface Card 1	Feb 4, 2003 15:03:01	Firmware upgrade complete – v2.0.0
Warning	Interface Card 1	Feb 4, 2003 15:03:04	Interface Card rebooted after FW upgrade
Info	Interface Card 2	Feb 4, 2003 15:30:01	Interface Card online
Critical	Interface Card 2	Feb 4, 2003 23:03:01	Firmware upgrade complete – v2.0.0
Warning	Interface Card 2	Feb 4, 2003 23:03:01	Interface Card rebooted after FW upgrade
Info	Interface Card 2	Feb 4, 2003 23:03:01	Interface Card online
Critical	Interface Manager	Feb 5, 2003 15:03:01	Loss of signal detected to IC 3
Warning	Interface Card 2	Feb 5, 2003 15:03:01	Ethernet settings submitted by Operator
Info	Interface Card 2	Feb 7, 2003 15:03:01	Assertion failed: 0, file tlintr.c, line 2508
Critical	Interface Card 1	Feb 7, 2003 15:03:01	Unit restart and initialization, Firmware Version 4.0
Warning	Interface Card 1	Feb 7, 2003 15:03:01	Unit restart and initialization, Firmware Version 4.0
Info	Interface Card 1	Feb 8, 2003 15:03:01	Assertion failed: 0, file tlintr.c, line 2508
Critical	Interface Card 2	Feb 8, 2003 15:03:01	Unit restart and initialization, Firmware Version 4.0
Warning	Interface Card 1	Feb 8, 2003 15:03:01	Unit restart and initialization, Firmware Version 4.0
Info	Interface Card 1	Feb 8, 2003 15:03:01	Assertion failed: 0, file tlintr.c, line 2508

The status bar at the bottom left indicates "Ready".

HP Command View ESL screenshots – drive status



The screenshot displays the HP Command View ESL interface. The main window shows a tree view on the left with 'Status' expanded, and a table of drives in the center. A 'Drive Properties' dialog box is open on the right, showing details for Drive 5.

Drives Table:

Drive	Health	Drive Type	Serial Number	Available	Target ID	Inter Con
Drive 1	Ready	LTO Gen 1	3415ja1456ijkas0	Yes	1	FC In
Drive 2	Ready	LTO Gen 1	3415ja1456ijkas1	Yes	2	FC In
Drive 3	Ready	LTO Gen 1	3415ja1456ijkas2	Yes	3	FC In
Drive 4	Ready	LTO Gen 1	3415ja1456ijkas3	Yes	4	FC In
Drive 5	Ready	LTO Gen 1	3415ja1456ijkas4	Yes	5	FC In
Drive 6	Ready	LTO Gen 1	3415ja1456ijkas5	Yes	6	FC In
Drive 7	Ready	LTO Gen 1	3415ja1456ijkas6	Yes	7	FC In
Drive 8	Ready	LTO Gen 1	3415ja1456ijkas7	Yes	8	FC In

Drive Properties Dialog (Drive 5):

- Health:** Ready
- Description:** OK
- Drive Type:** LTO Gen 1
- Serial Number:** 3415ja1456ijkas4
- Available:** Yes
- Target ID:** 5
- Interface Controller:** FC Interface Controller 2
- SCSI Port:** 0
- Inquiry String:** Inquiry String
- Direct Backup:** Enabled

Close

Searchable Library Inventory

hp Command View ESL

Ready

Command View ESL

File Tools Help

Library: Picker (15.27.102.21)

Identity Status Configuration Operations Support

Status

- Health Summary
- Component Status
 - Library
 - Robotics
 - Drives
 - Interface Controllers
 - Interface Manager
- Event Log
- Inventory

Inventory

Actions

Location	Status	Barcode	Media Type
ESL Robotics	Empty		
Drives			
Drive 1 (HP Ultrium 1-SCSI)	Full	Demo319 (from Slot 320)	LTO 1
Drive 2 (HP Ultrium 1-SCSI)	Full	Demo318 (from Slot 319)	LTO 1
Drive 3 (HP Ultrium 1-SCSI)	Full	Demo317 (from Slot 318)	LTO 1
Drive 4 (HP Ultrium 1-SCSI)	Full	Demo316 (from Slot 317)	LTO 1
Drive 5 (HP Ultrium 1-SCSI)	Full	Demo315 (from Slot 316)	LTO 1
Drive 6 (HP Ultrium 1-SCSI)	Empty		
Drive 7 (HP Ultrium 1-SCSI)	Empty		
Drive 8 (HP Ultrium 1-SCSI)	Empty		
Mailslots	0 full slot(s)		
Slots 1 through 40	15 full slot(s)		
Slots 41 through 80	0 full slot(s)		
Slots 81 through 120	0 full slot(s)		
Slots 121 through 160	0 full slot(s)		
Slots 161 through 200	0 full slot(s)		
Slots 201 through 240	0 full slot(s)		
Slots 241 through 280	0 full slot(s)		
Slots 281 through 320	0 full slot(s)		

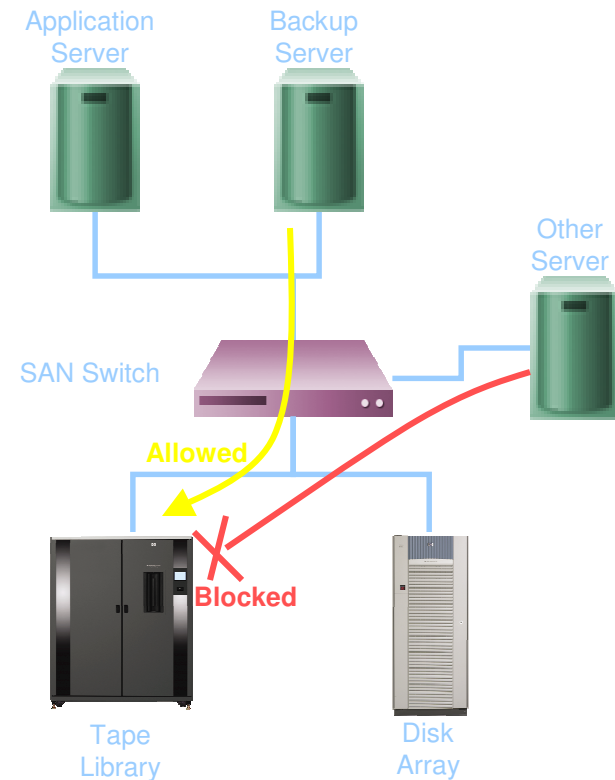
Ready.

Mode: Automatic

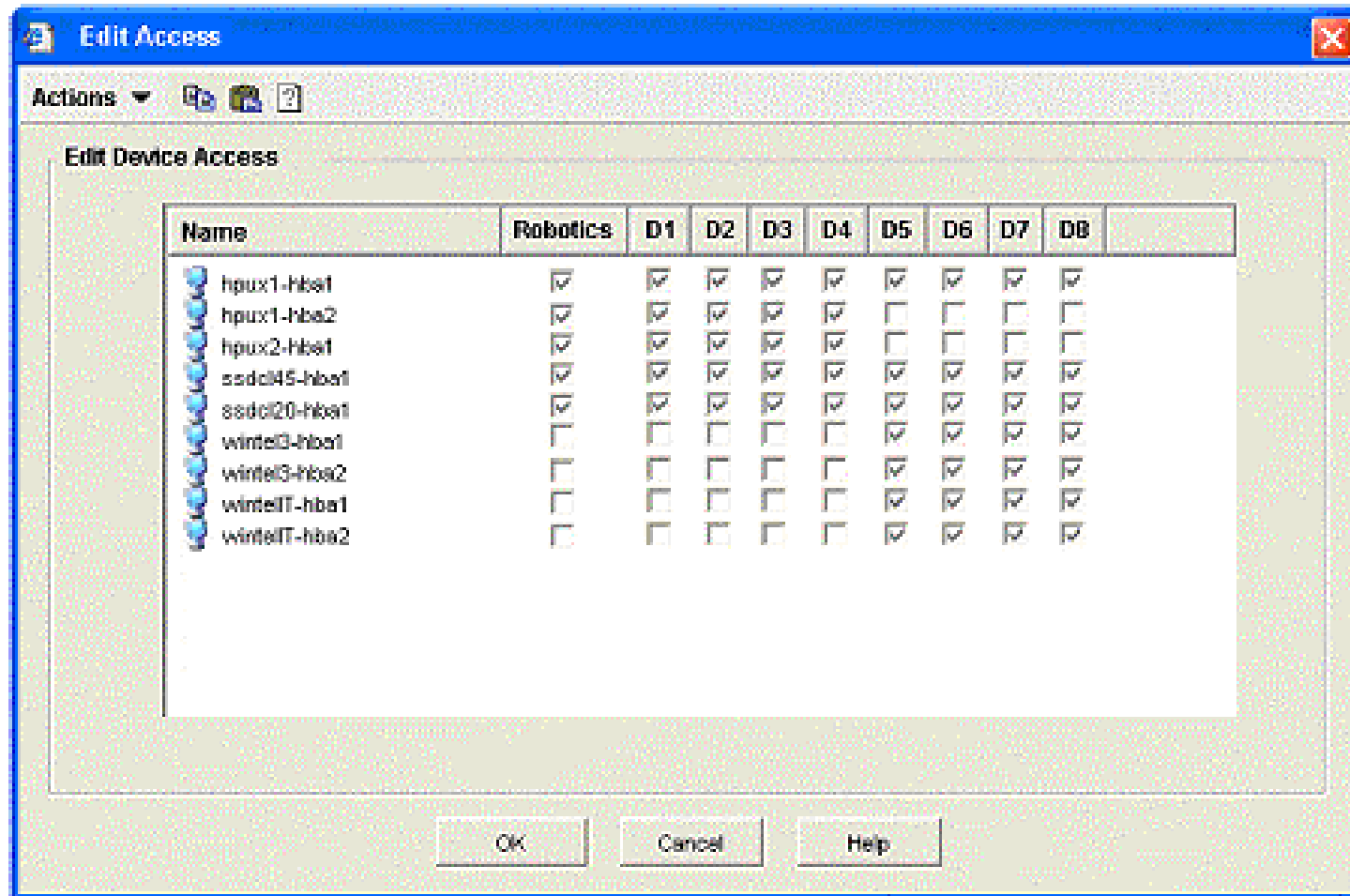
Advanced Access Control with Secure Manager



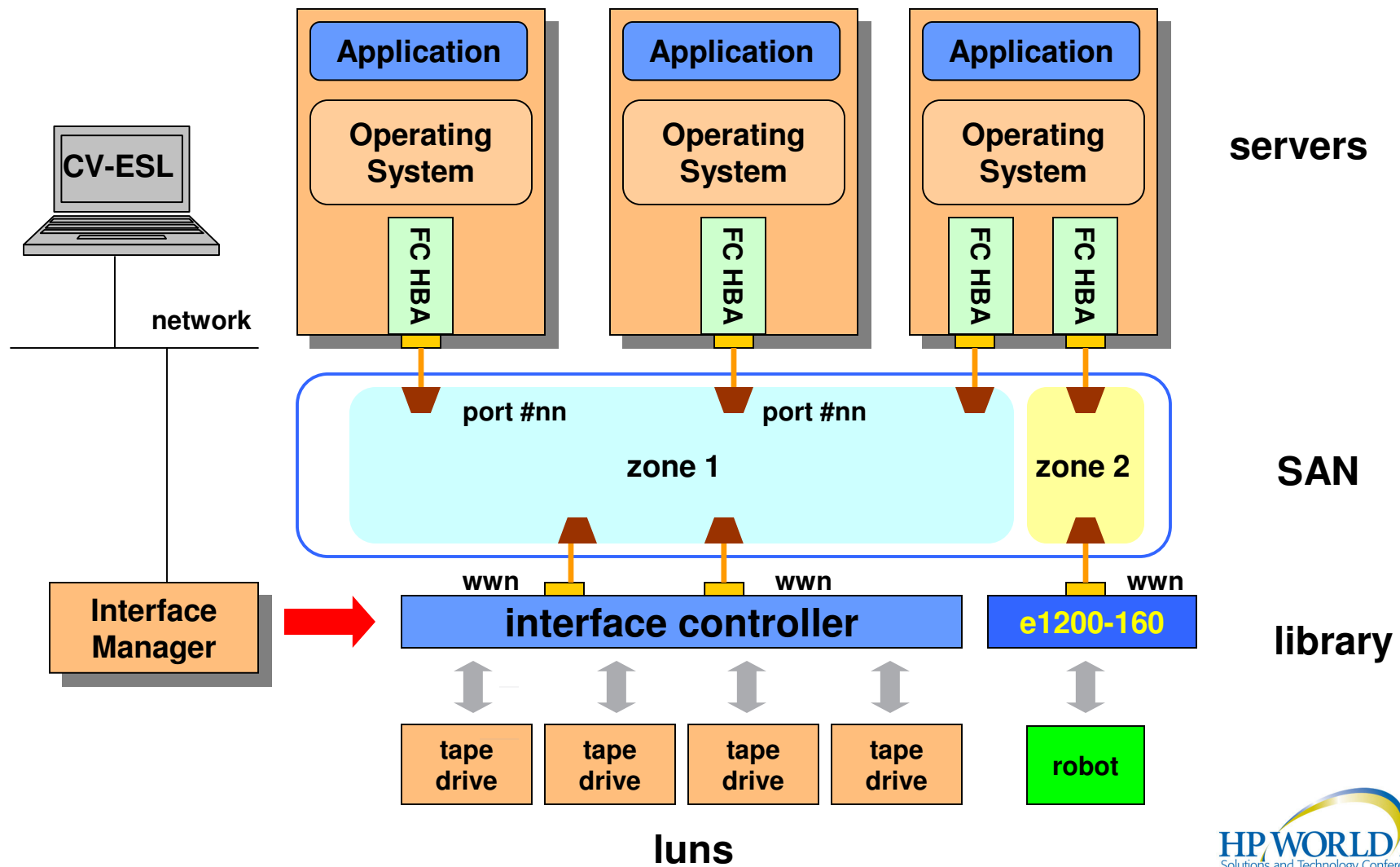
- Secure Manager for ESL:
 - Manages access from HBAs to individual tape drives
 - Increases reliability of backup operations by blocking disruptive traffic from selected hosts:
 - Unexpected device resets
 - Fibre Channel loop initializations
 - Repetitive OS and driver polling
 - Unwanted application queries which can disrupt streaming and lower backup/restore performance
 - Improves robustness and simplifies configuration of tape libraries in large SANs
 - Presents multi-HBA servers with a single view of library and drives
 - Configurable through Command View's easy-to-use graphical interface



HP Command View ESL – Secure manager



SAN & Network connections to an HP tape library with ETLA



Enterprise Platform - ESL E-Series Product Overview



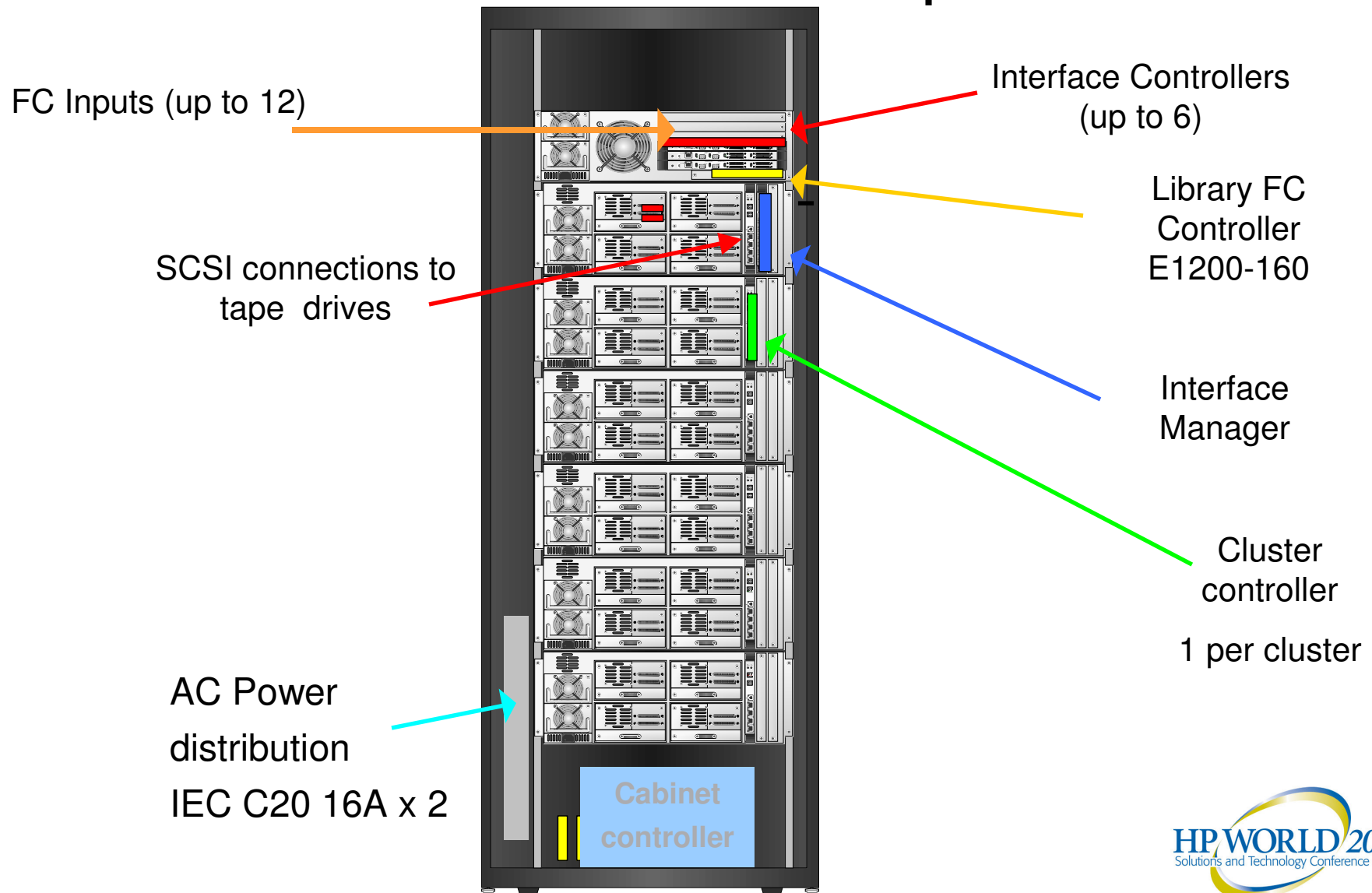
- 1-24 drives in single cabinet
- 712 LTO Cartridges (max config)
- 630 SDLT Cartridges (max config)
- Footprint/density – 28.5 TB per sq.foot
- Smaller form factor: 1/2 width of 9595
- Scalable to ~3000 cartridges (5 units)
- LTO/SDLT/NFC* Tape Drives
- Embedded Manageability
- HP enhanced interface controllers
- Bulk Loading: 42 SDLT or 48 Ultrium cartridges in removable magazines
- Intelligent robotics

ESL9000 series - product overview

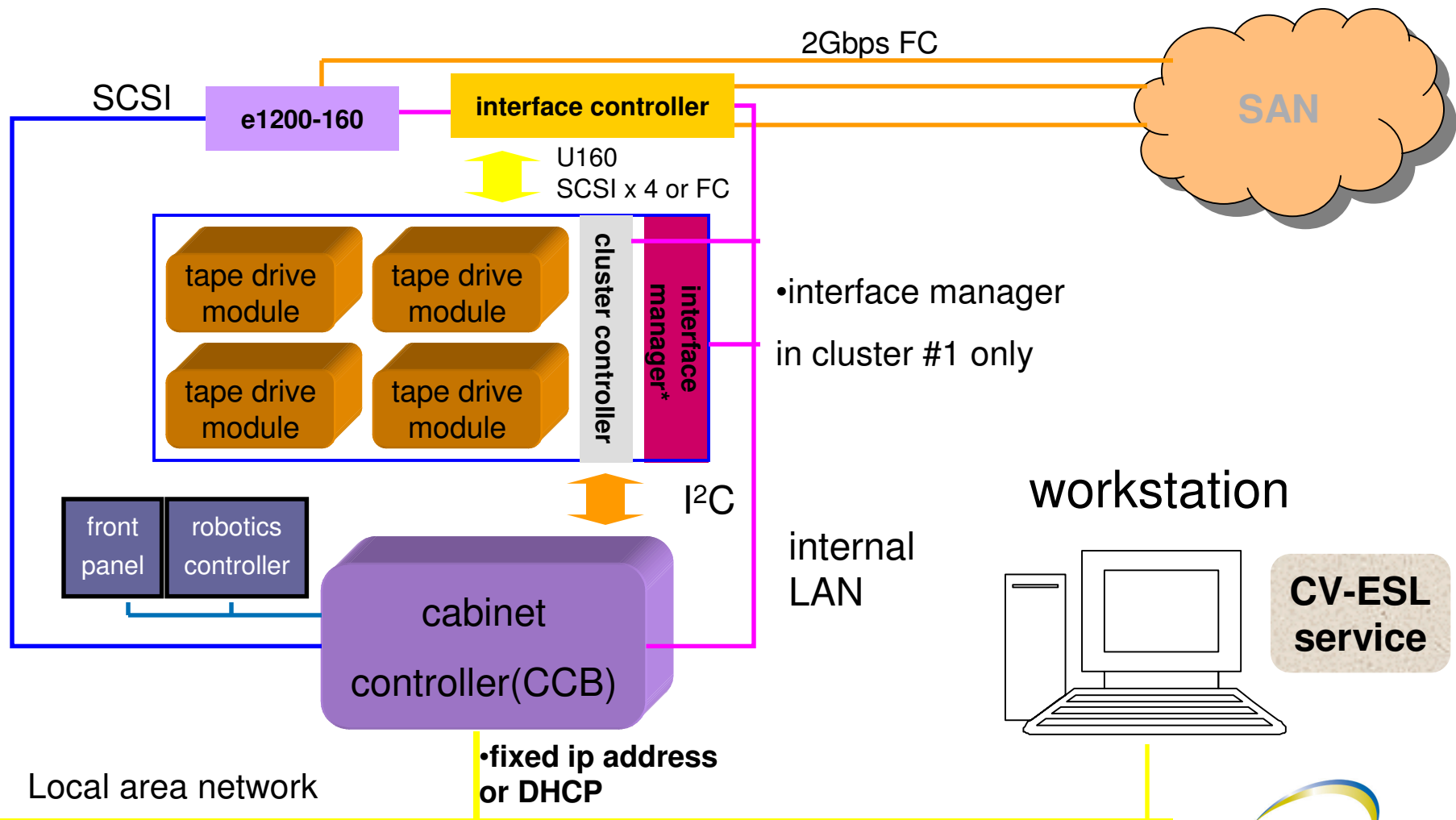


- single cabinet
- 8 drives (ESL9322) 16 drives (ESL9595)
- Ultrium 1,2 or SDLT320
- 222(SDLT),322(ultrium) slots for the ESL9322
- 595 slots ESL9595
- SCSI or FC
- HP ETLA
- redundant PSU and fans

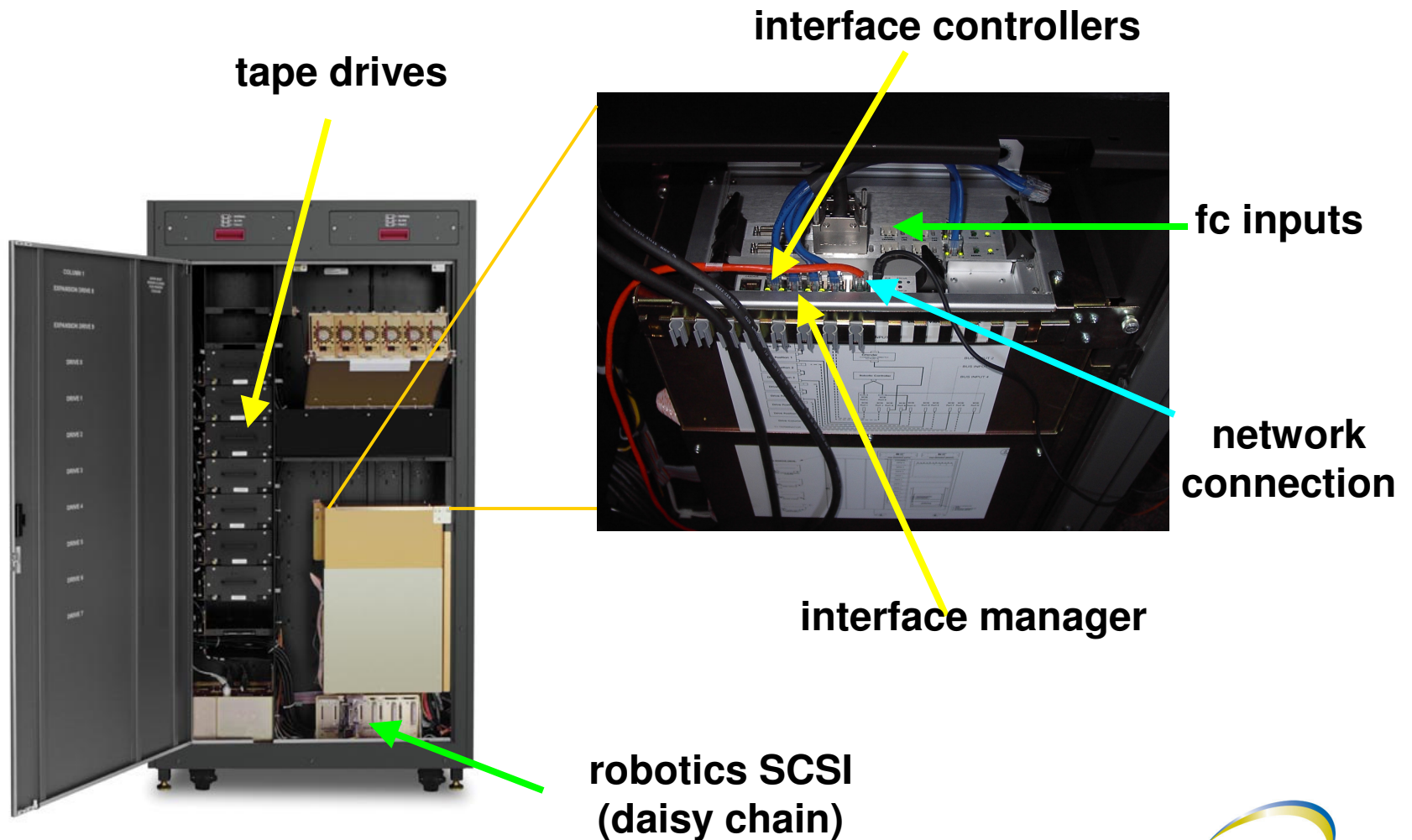
ESL E-Series Internal components



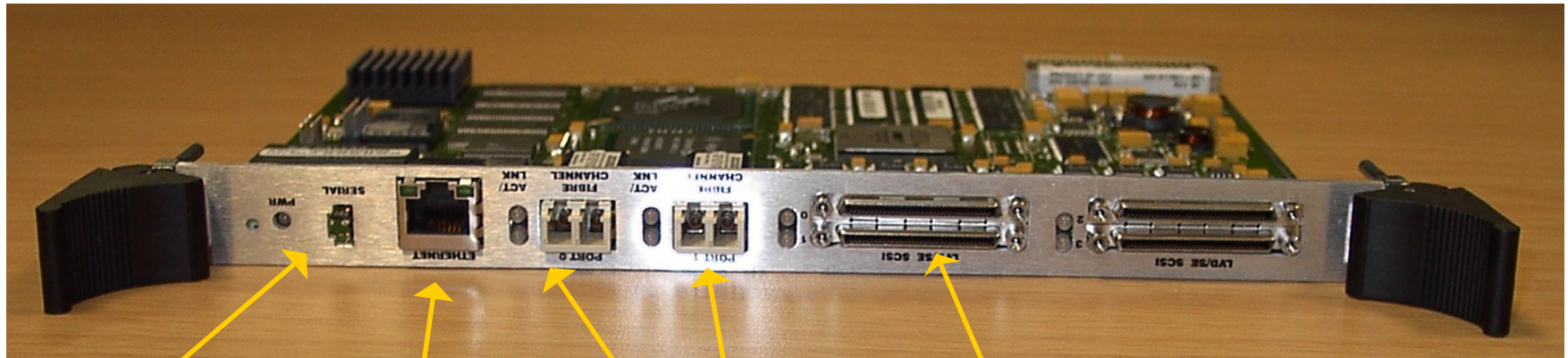
HP ESL E-Series - internal data paths



ESL9000 series - internal components



Interface Controller PCA



RS232
(service)

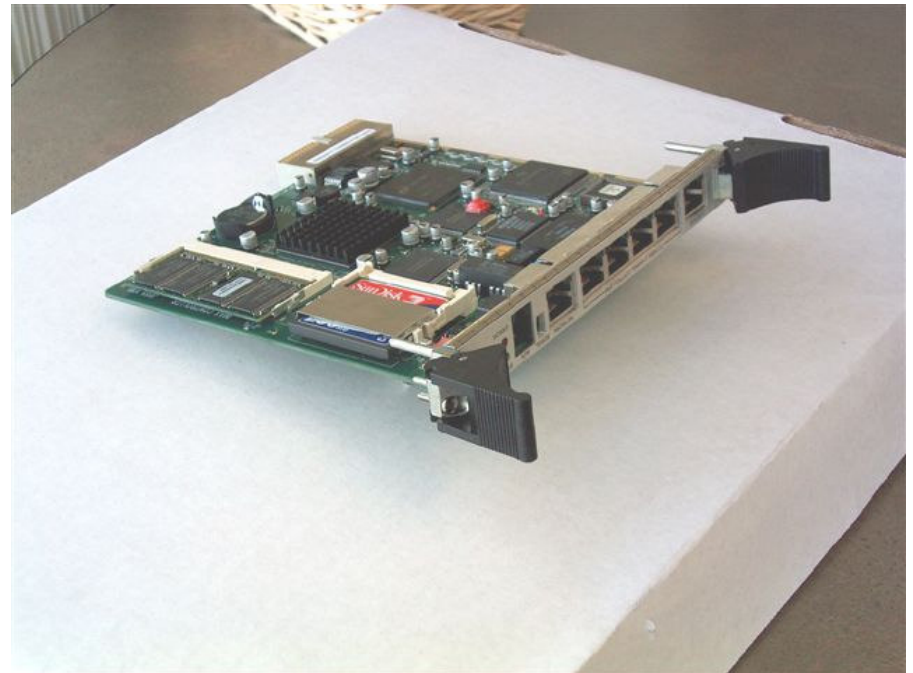
network
(to interface
manager PCS)

2Gbps FC

Ultra-160 SCSI (4)

Interface Manager

- network connected to the internal library network
- contains embedded LINUX
- OS on flash memory
- embedded diagnostics
- same PCA as ESL9000 series



HP Extended Tape Library Architecture delivers:



- Easy & efficient SAN configuration
- Secure SAN access to tape drives and robotics
- Advanced diagnostics and monitoring of tape library and SAN
- Event logging and alerts
- SNMP alerts via standardised API (SMI-S)
- A platform for upgrades and advanced features such as Direct Backup, Native Fibre Channel, Hardware partitions



Reference material

- www.hp.com/go/ebs
[full compatibility matrix]
- www.hp.com/go/automated
[product information]

HP StorageWorks Extended Tape Library Architecture



- The HP StorageWorks Extended Tape Library Architecture provides enterprise storage network users superior reliability, interoperability and advanced functionality by incorporating intelligent controllers in front of drives in the tape library.

*Self-aware storage
designed for your SAN*



The image features a close-up, low-angle shot of a server rack. The perspective is looking down the length of the rack, with the server bays receding into the distance. The bays are filled with server components, and the lighting creates a strong sense of depth and perspective. The HP logo is overlaid on the left side of the image.

hp

Any questions?



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