

ETERNUS DX60 and DX80

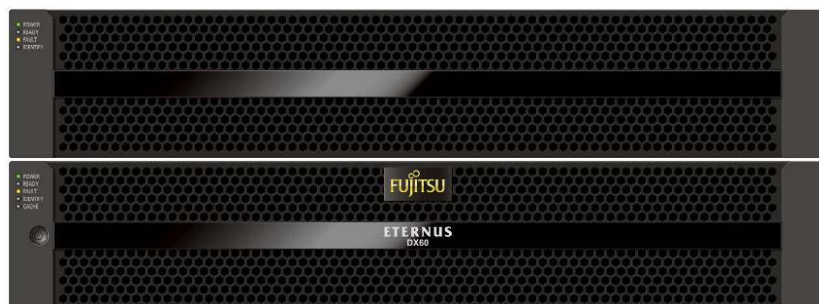
Product Introduction

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Highlights

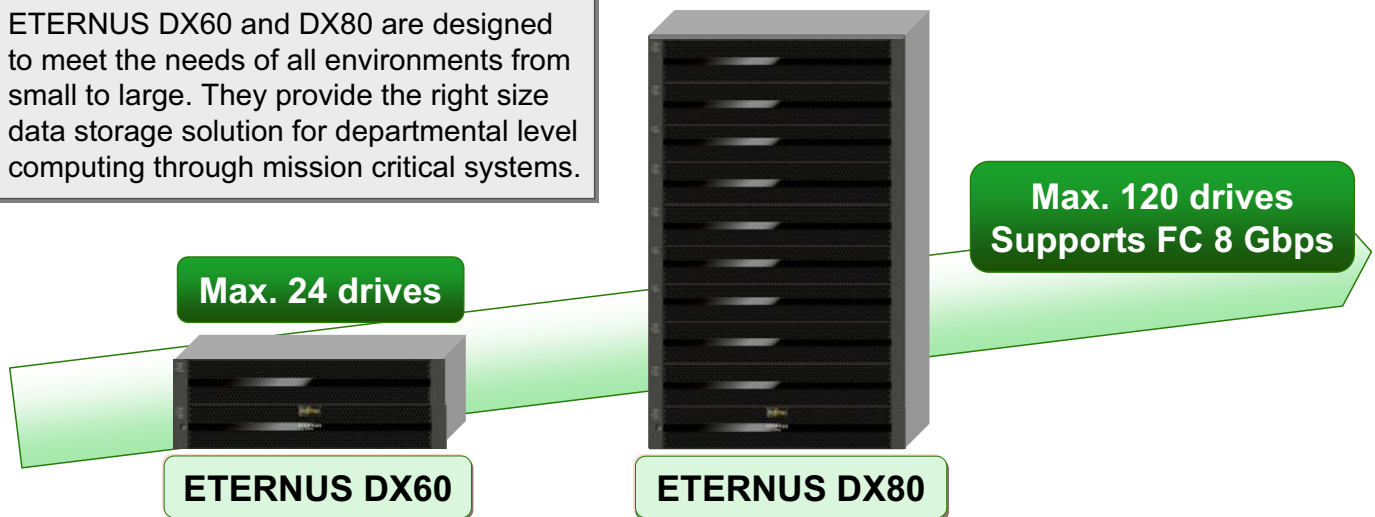


- Low environmental impact
- Highly scalable & versatile connectivity
- User friendly management systems
- Outstanding reliability



Overview (1)

ETERNUS DX60 and DX80 are designed to meet the needs of all environments from small to large. They provide the right size data storage solution for departmental level computing through mission critical systems.



		DX60	DX80	Note
Maximum number of drives		24	120	
Maximum storage capacity (Physical)	SAS	10.8 TB	54 TB	With 450 GB disks
	Nearline SAS	24 TB	120 TB	With 1 TB disks
Maximum cache capacity		2 GB	4 GB	
Host interfaces	FC	FC 4 Gbps	FC 8 Gbps / 4 Gbps	
	iSCSI	1 Gbps*	1 Gbps*	
	SAS	3 Gbps*	3 Gbps*	

* To be released in 3Q of CY2009

Overview (2)

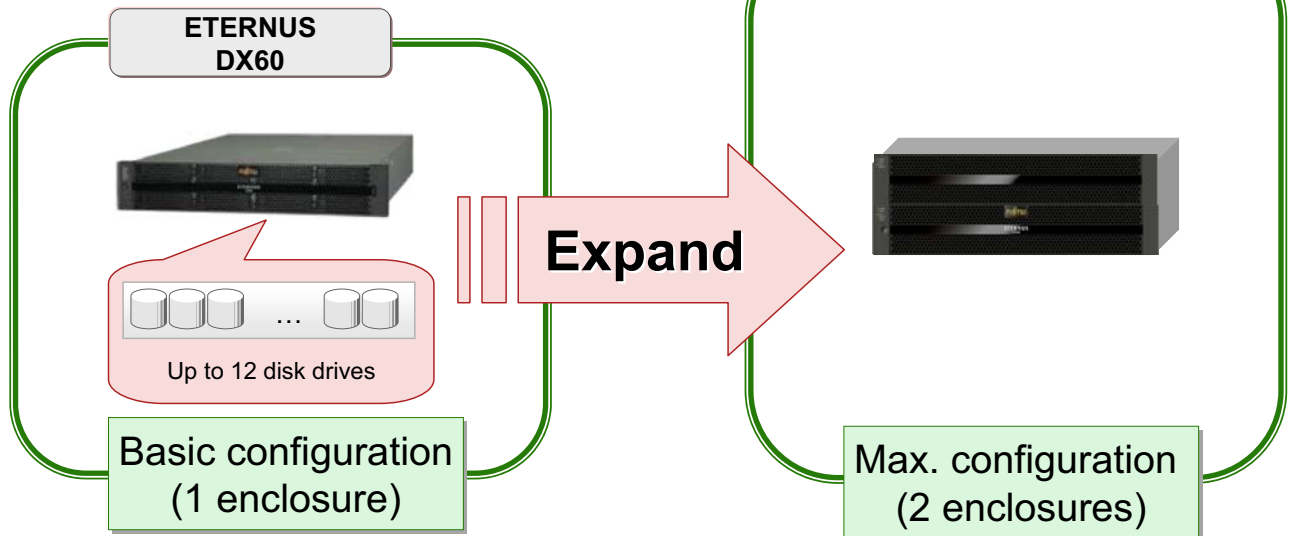
		ETERNUS DX60	ETERNUS DX80
Number of Controllers		1 or 2	1 or 2
Cache Capacity per system		2 GB	4 GB
Cache Data backup		Write back to NAND Flash Memory powered by SCU	Write back to NAND Flash Memory powered by SCU
Cache Hold Time		No Limitation	No Limitation
Host Interfaces	FC	4 Gbps	4 or 8 Gbps
	iSCSI	1 Gbps*	1 Gbps*
	SAS	3 Gbps*	3 Gbps*
Drive Types		SAS / NL-SAS (3 Gbps), SSD*	SAS / NL-SAS (3 Gbps), SSD*
RAID Levels		0,1,1+0,5,6,5+0	0,1,1+0,5,6,5+0
Maximum number of HDDs Number of HDD / Enclosure	3.5"	24 (12 in 2U)	120 (12 in 2U)
	2.5"	24 * (24 in 2U)	120 * (24 in 2U)
Maximum number of LUNs		512	1024
Maximum number of HBAs		64 (16/port)	128 (32/port)
RAID migration		x	x
Base Copy Functions		SnapOPC+ or QuickOPC	SnapOPC+ or QuickOPC
Optional Copy Functions		SnapOPC+, OPC, QuickOPC, EC,	SnapOPC+, OPC, QuickOPC, EC, REC**
Encryption		x	x
ECO mode		x	x
Supported OS		Windows, Linux, VMware, Unix	Windows, Linux, VMware, Unix

*2nd Release

**3rd Release

Optional Modules (1)

Flexible response to business expansion

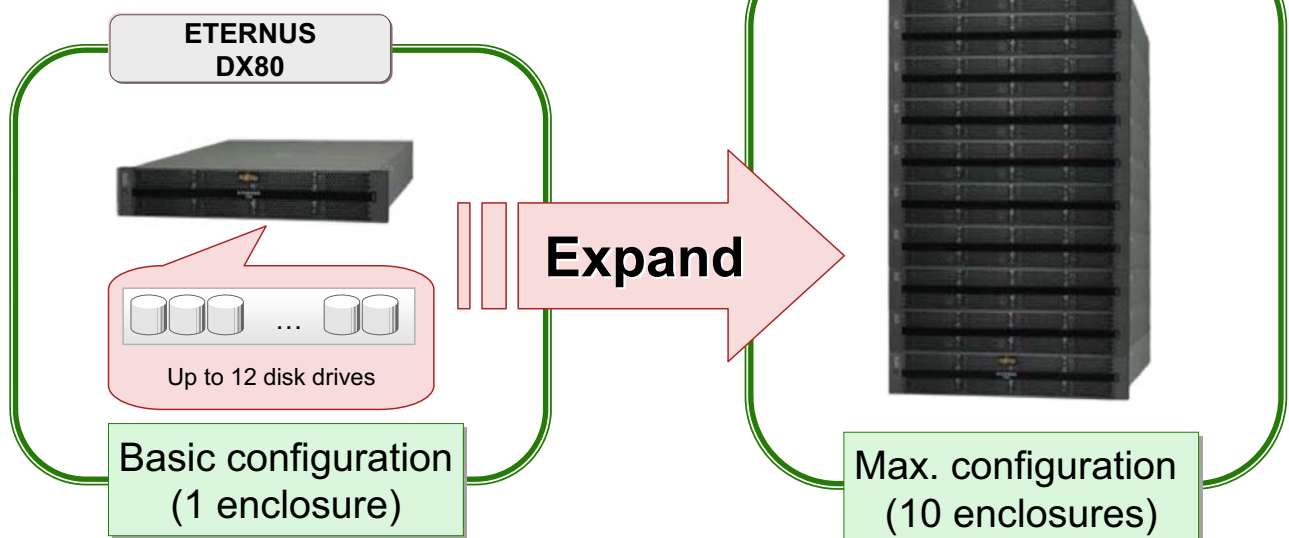


- Up to 12 disk drives
- Max. 5.4 TB (SAS)
- Max. 12 TB (NL-SAS)

- Up to 24 disk drives
- Max. 10.8 TB (SAS)
- Max. 24 TB (NL-SAS)

Optional Modules (2)

Flexible response to business expansion



- Up to 12 disk drives
- Max. 5.4 TB (SAS)
- Max. 12 TB (NL-SAS)

- Up to 120 disk drives
- Max. 54 TB (SAS)
- Max. 120 TB (NL-SAS)

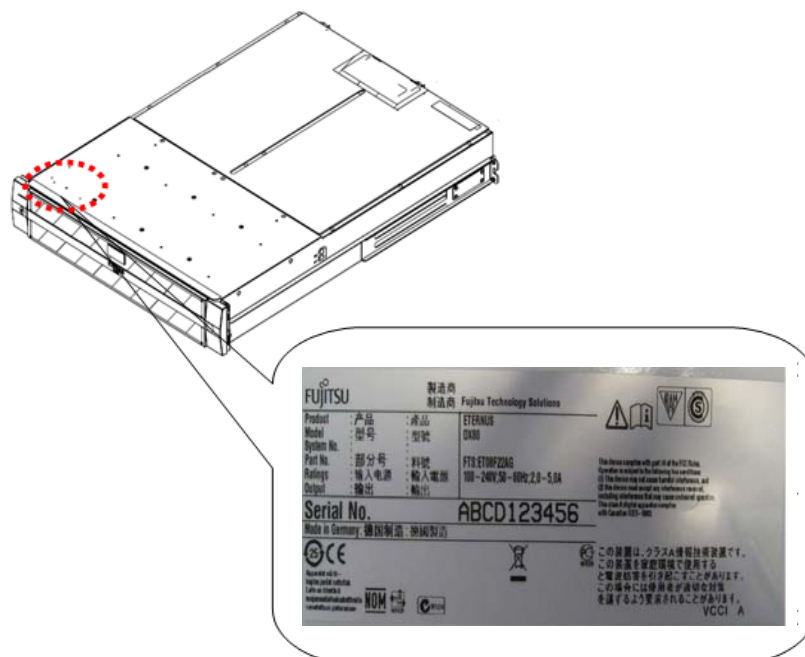
Optional Modules (3)

- Single controller system can be expanded to a dual controller system
- ETERNUS DX Advanced Copy License
 - Allows up to 512/1024 Snapshots and Clones

HW License	Default	With Advanced Copy License
Number of sessions	8	512 (DX60) or 1024 (DX80)
Control by	GUI/CLI VSS	GUI/CLI/VSS
SnapOPC+	X (via GUI/CLI)	X (via GUI/CLI)
QuickOPC	X (via VSS)	X (via VSS)

Identification

- The Serial Number of the ETERNUS DX60 and ETERNUS DX80 is located on top left hand side of the shelf

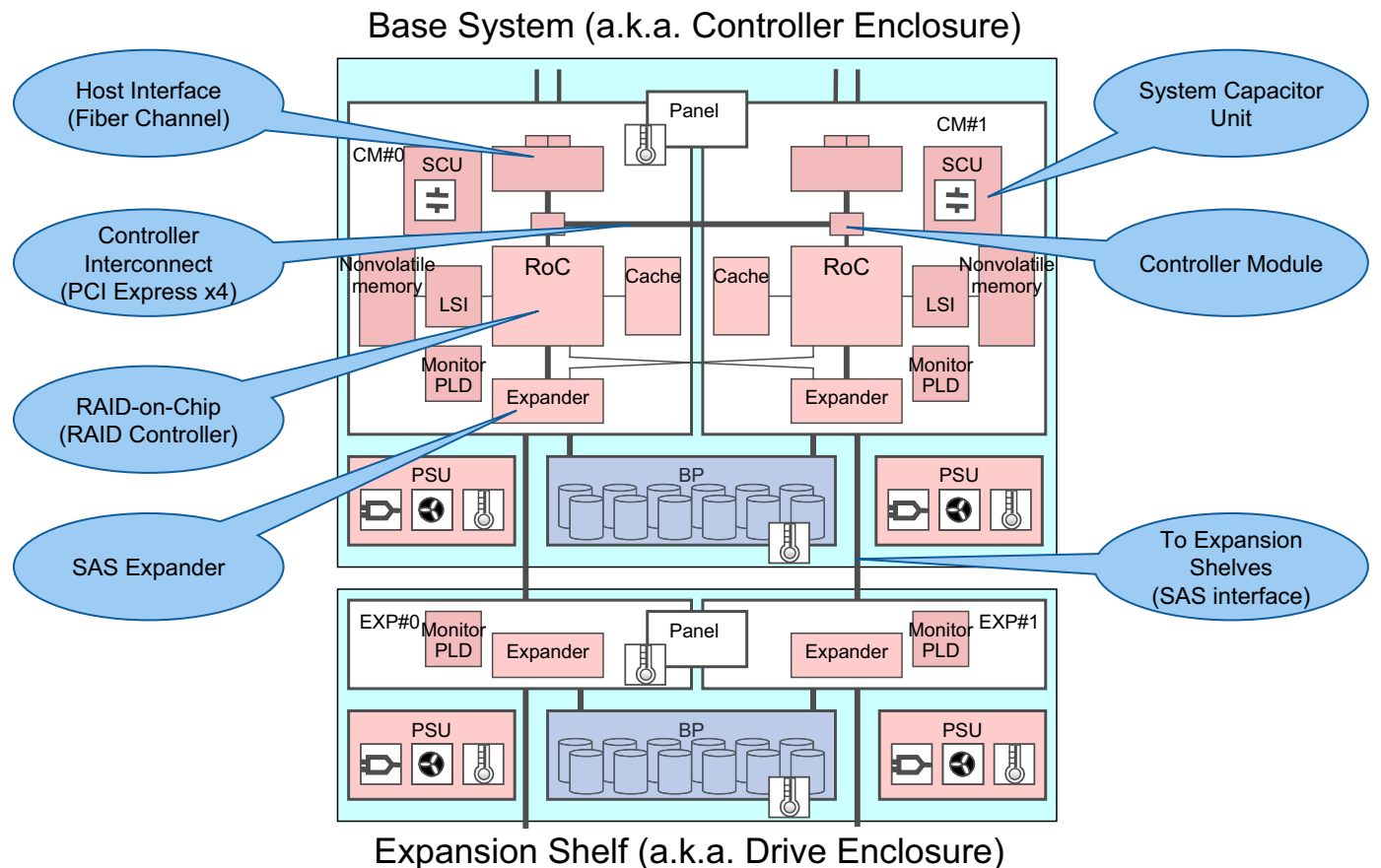


Technical Overview



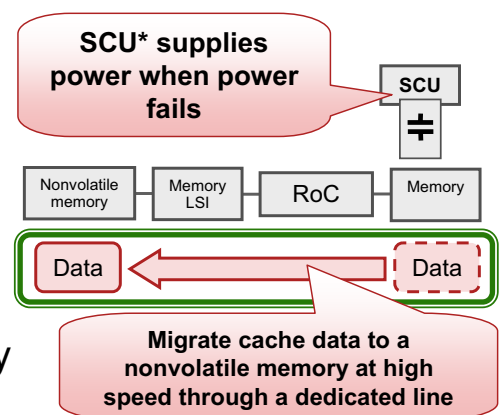
Technical Overview

- Battery free cache protection
- 8 Gbit Fiber Channel interface
- High Availability
- Advanced Data Protection
- Dynamic LUN Migration
- LUN Concatenation
- Logical Device Expansion
- Data Encryption
- EcoMode



Battery Free Cache Protection (1)

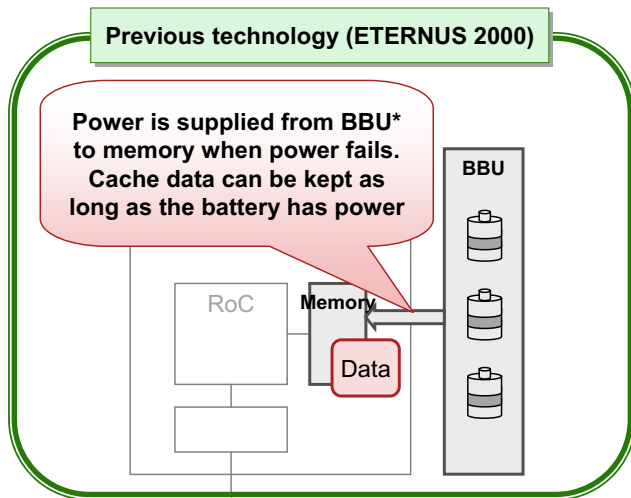
- **Reduced maintenance window**
 - SCU* is maintenance free for 5 years
 - Battery replacement was required every three years in the previous models
- **Avoid data loss during extended power outages**
 - Migrating cache data to a nonvolatile memory ensures unlimited data retention time
 - Previously battery back up supported cache data for approximately 96 hours
- **Cached write performance recovered almost immediately after power restoration**
 - SCU recharge time about 3 minutes
 - Exact battery recovery time depends on how long the power has been unavailable



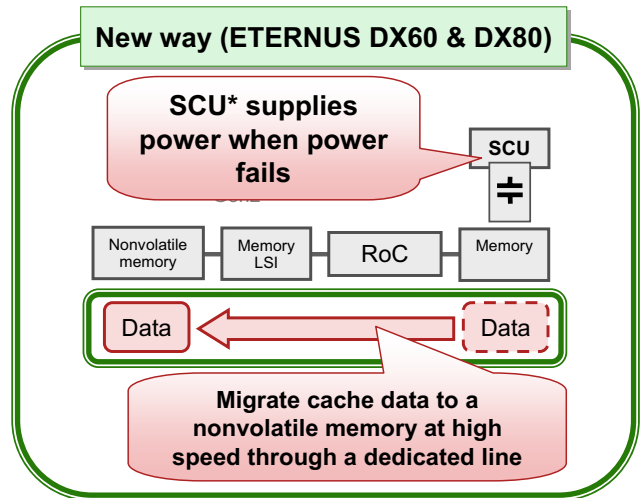
• SCU is a unit with electric double layer capacitor. Electric double layer capacitor has the advantages of being very resistant to degrading and by providing a short recharge time compared to traditional batteries.

In the event of a power failure, the data is migrated from cache to a nonvolatile RAM. For improved reliability, power for the migration process is supplied by a SCU* (System Capacitor Unit) rather than a battery

■ Technology comparison

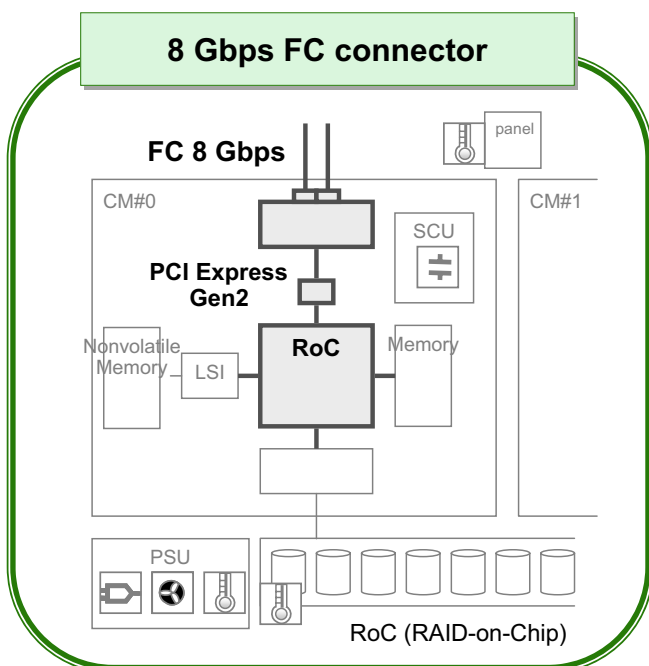


BBU = Battery Backup Unit

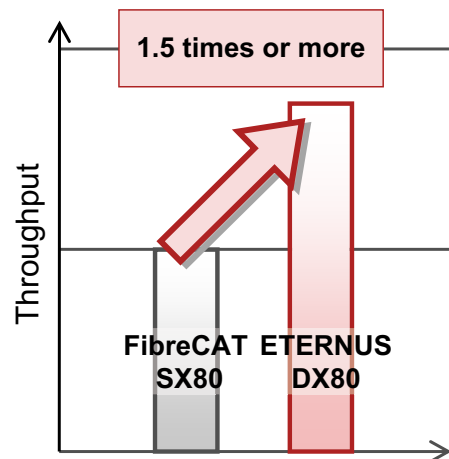


Support for 8 Gbps FC Interface (DX80)

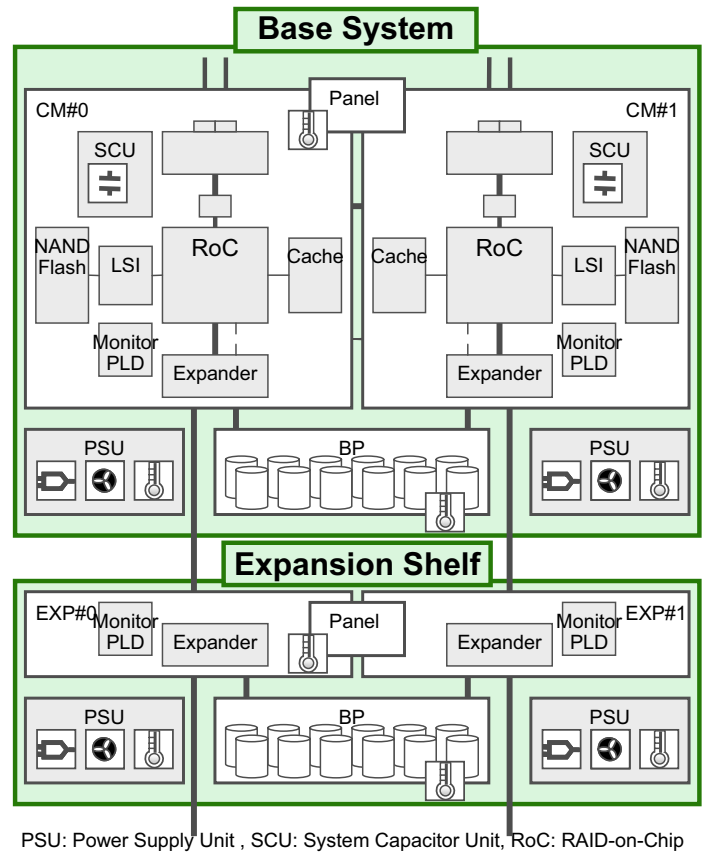
■ Improved throughput performance



Potential for 1.5 (or greater) throughput

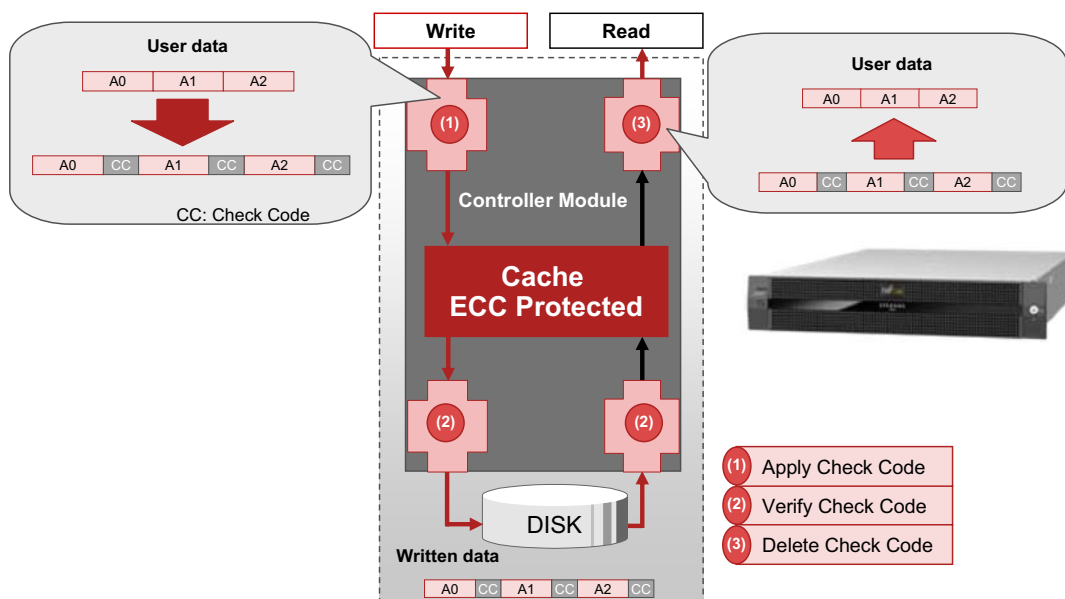


- Duplicated components
 - Basic configuration contains always two Power Supplies
 - The Controller Module can be optionally duplicated
- Components are hot swappable
- Hot expansion of disk drives
- Hot firmware upgrade supported

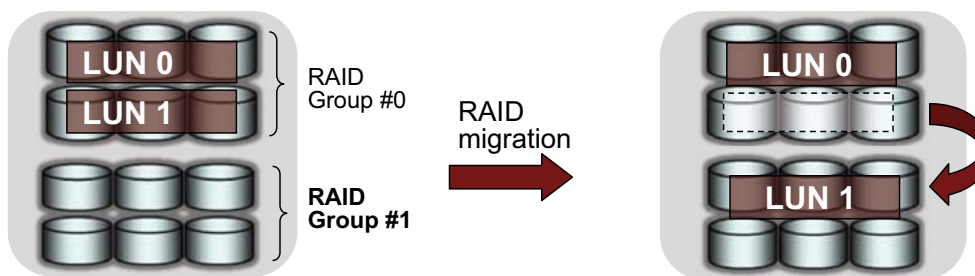


Advanced Data Protection

- Data Block Guard
 - Data Block Guard function saves additional 8-byte check code to every 512-byte of data to ensure data integrity both on the disk and in the cache

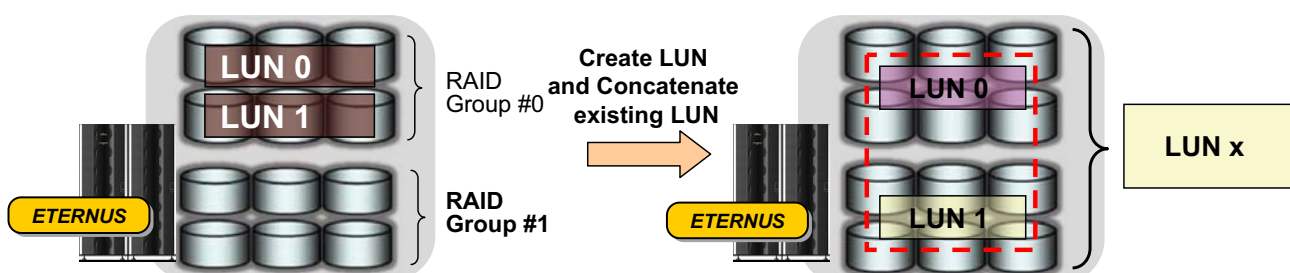


- LUNs can be migrated on the fly to
 - Other drives and different RAID groups
 - Other drives and different drive types (e.g. SAS to NL SAS, SAS to SSD)
- Benefits
 - Reduce hot spots
 - Move LUNs to more suitable disk type or RAID type if requirements change



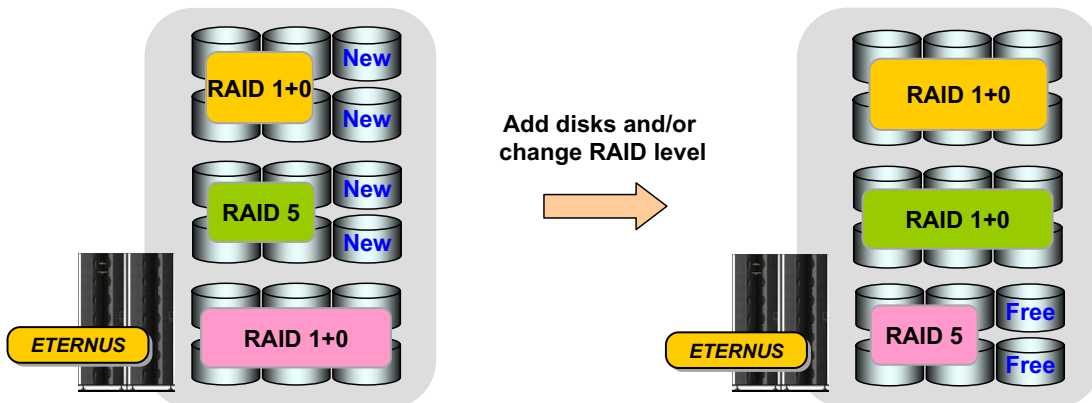
LUN Concatenation

- Can expand the capacity of existing LUN by creating new LUN and concatenating it to an existing LUN
 - Data on existing LUN will be kept
 - Independent of RAID level in use
 - Minimum required capacity of a LUN is greater than 1 GB
 - Maximum number of LUNs that can be concatenated is 16
 - Maximum capacity of a concatenated LUN is 32 TB



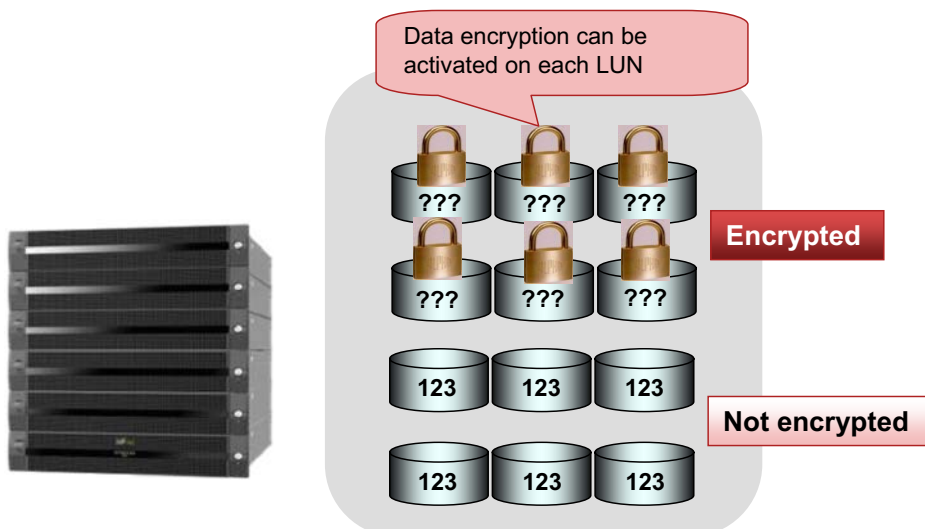
Logical Device Expansion

- Expand free space of RAID Group by adding disks or by changing the RAID Level
- No need to prepare a complete new RAID Group to expand



Data Encryption

- Key is generated automatically by the system
- Encryption can be configured per volume



Protects your data even on defective or decommissioned disk drives

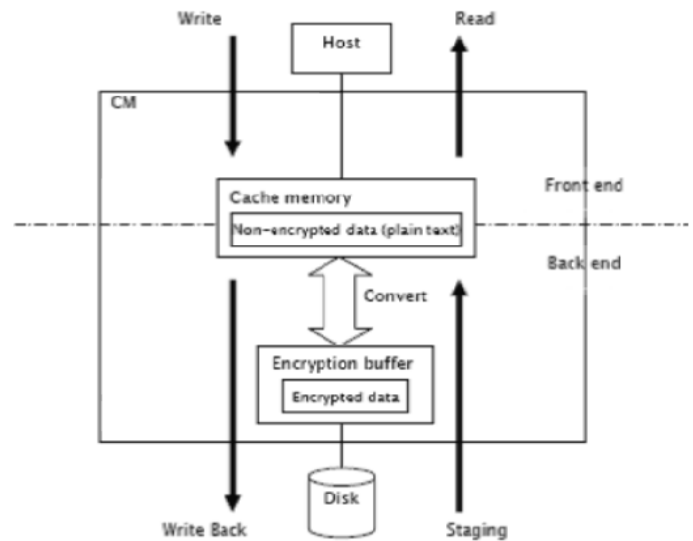
■ Encryption can be turned on per volume

- At creation time
- Or converted during operations
- It can not be turned off later
- Requires also encrypted copy destination volumes for snapshots or clones

■ Encryption is done by the storage controller

- Will have an impact on controller performance

■ For redundancy, the Data Encryption configuration is saved on the controller(s) and on the disks



EcoMode (1)

■ Use EcoMode to save power for idling disks

■ Disk drive motors will power off when:

- the RAID group is unused for a configurable time period (for example 30 minutes)
 - Powered back on by host I/O within the host time out value
- or on scheduled times

Set ECO Mode Schedule
Present Set ECO Mode Schedule is displayed. Various setting change and details can be confirmed from the tree at the left of the screen.

ECO Mode Commonness Setting

ECO Mode	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
Host I/O Monitoring Time (min.)	30
Disk Motor Control Limit Count (Cycle/Day)	3

Set ECO Mode Schedule
Present Set ECO Mode Schedule is displayed. Various setting change and details can be confirmed from the tree at the left of the screen.

Schedule

No.	0
Schedule Name	Test (1 - 16 characters(alphanumeric character blanc sign))

Event List

Event	From Time	To Time	
Add	Edit	Delete	Delete All

Set Event

Event Type: Everyday Every week Specific days Specific week

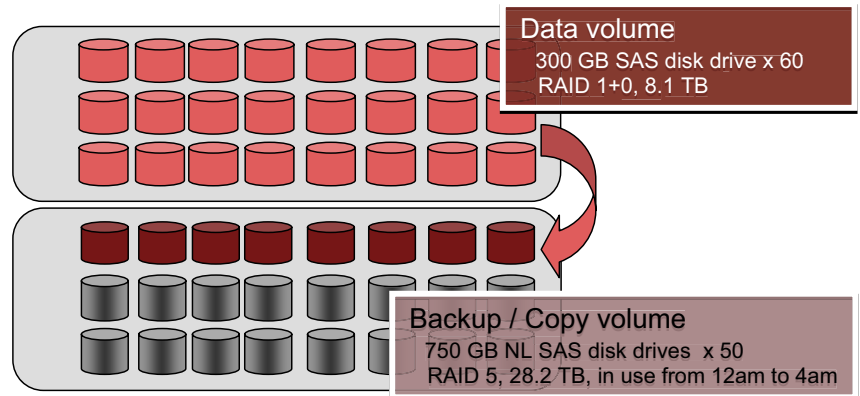
From Time: 20 : 00

To Time: 07 : 00

Apply Cancel

- When disks (RAID groups) are used only a few hours per day (e.g. for backup), EcoMode provides a safe way of saving power

- Schedules can be defined with ETERNUS Manager GUI or CLI



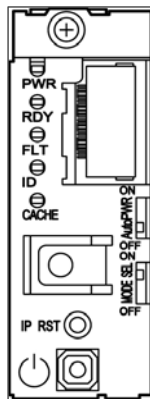
System Modules, Components and Features



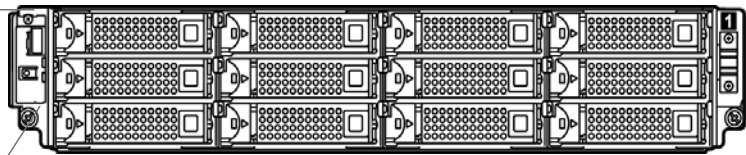
Base and Expansion Unit Exterior View Front



- Power LED
- Ready LED
- Fault LED
- Identify LED
- Cache LED

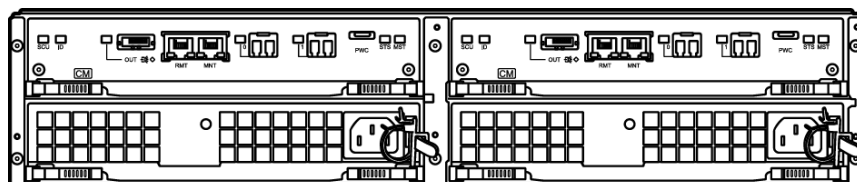
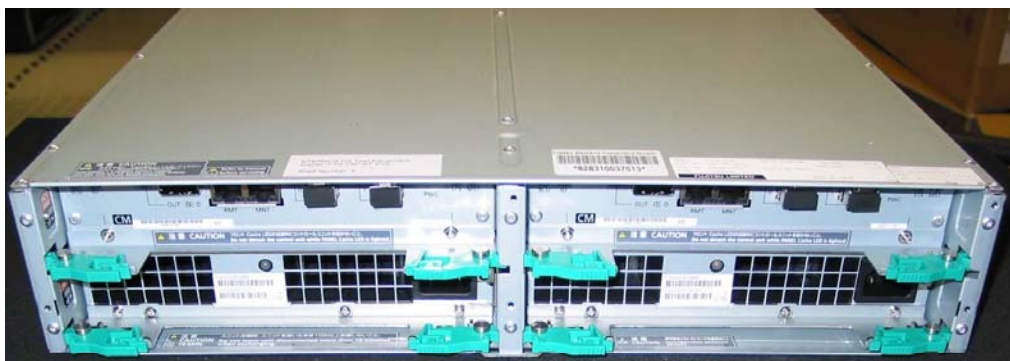


- IP Reset Switch
- Power Switch

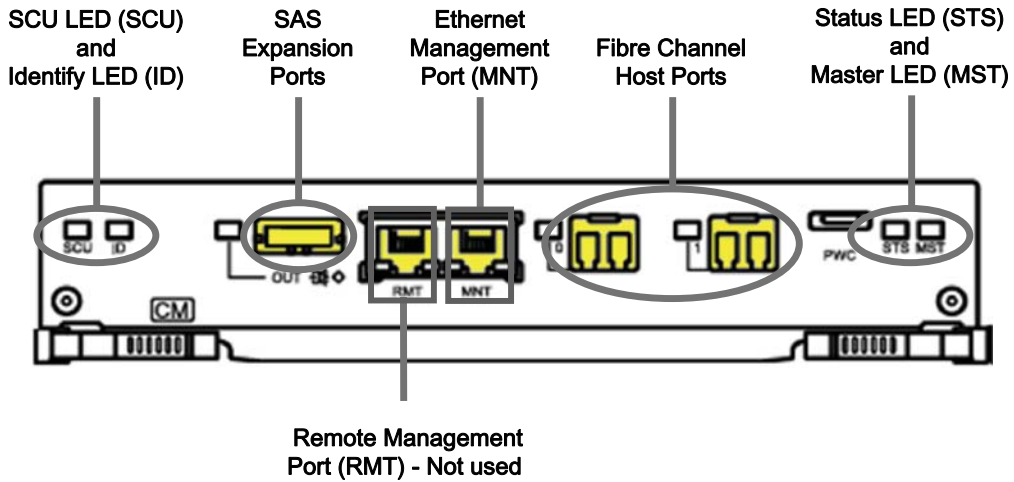


Disk #8	Disk #9	Disk #10	Disk #11
Disk #4	Disk #5	Disk #6	Disk #7
Disk #0	Disk #1	Disk #2	Disk #3

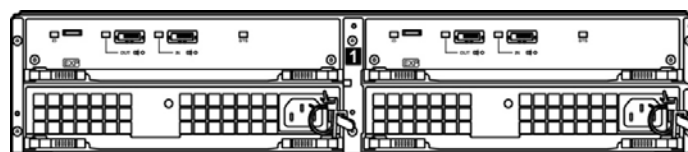
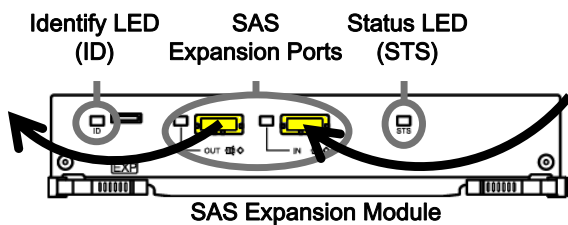
Base Unit Exterior View Rear



CM #0	CM #1
PSU #0	PSU #1



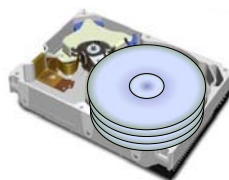
Expansion Unit Exterior View Rear



EXP #0	EXP #1
PSU #0	PSU #1

Support for high performance disk drives (15,000 rpm) and large capacity disk drives suitable for backup

**SAS disk drives
(15,000 rpm)**
SAS interface: 3 Gbps

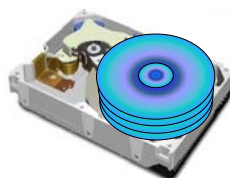


450 GB



300 GB

**Nearline SAS disk drives
(7,200 rpm)**
SAS interface: 3 Gbps



1.0 TB



750 GB

Disk Drives

■ Available Disk Types

- SAS 300 GB / 15k rpm
- SAS 450 GB / 15k rpm
- Nearline SAS 750 GB / 7.2k rpm
- Nearline SAS 1000 GB / 7.2k rpm

■ Available information on Front Label

- Interface Type (SAS)
- Part Number
- Size / Rotation Speed
- Revision Level



- RAID 1+0 is recommended for business databases that are updated frequently
- Select RAID 1+0 for systems that require high reliability and high performance
- RAID 5 (RAID 5+0 if enough disks are available) or RAID 6 is recommended for data that requires less random performance or for systems where there is a high level of reading
- Global and dedicated hot spares are available, all disks can be used except the system disks

RAID level	Number of disks
0	2-16
1	2
1 + 0	4-32 (even number)
5	3-16
6	5-16
5 + 0	6-32 (even number)

Firmware

- Firmware Version xx and patch Level yy (VxxLyy)
- One firmware file for the whole system
- Up to 3 versions can be hold as history on the system
- Firmware can be updated online via ETERNUS Manager (WebGUI)
 - Dual Controller configuration and MultiPath required

The screenshot shows the ETERNUS DX80 WebGUI interface. At the top, it displays 'ETERNUS DX80' and user information 'User: admin | Logout'. Below this, there are navigation tabs: Status, Easy Setup, Volume Settings, Global Settings, Maintenance (selected), Log/Dump, and Utilities. Under the Maintenance tab, there are sub-tabs: Start/End Maintenance, Hardware Maintenance, Firmware Maintenance (selected), and Clear Sense Data. The main content area is titled 'Apply Controller Firmware' and includes a sub-section 'Controller Firmware Information' with the following data:

Registration status of the Active Firmware	Registered
Current Firmware Version	V10L10-5290
Firmware Version to be active at next Power Cycle.	V10L10-5290

Below this is the 'Select Controller Firmware Update Mode' section, which includes radio buttons for 'Update Mode' (Registration and Update is selected), 'Only Update', and 'Only Registration'. There is also a 'Controller Firmware Archive' section with a search button 'Durchsuchen...'. A table lists the firmware archive history:

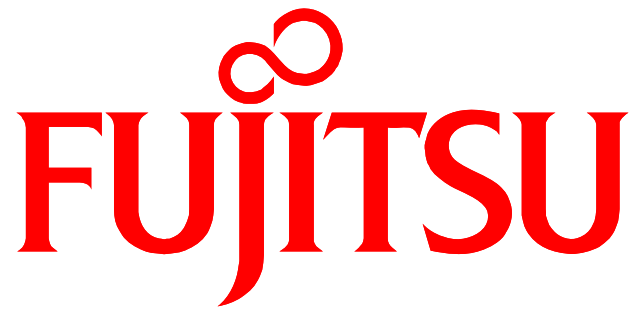
Generation	Firmware Version	Created	Active	Status
<input type="radio"/> 1	V10L10-5210	2009-05-21	EC#1	Valid
<input checked="" type="radio"/> 2	V10L10-5290	2009-05-29	EC#2(Active/Next)	Valid
<input type="radio"/> 3	-	-	-	Not Registered

At the bottom right of the interface, there is a 'Next >' button.

- Field Replaceable Units and Customer Replaceable Units differ only for the Base Unit and Expansion Shelf which are not available as a CRU
- FRU = CRU
 - Base System
 - Controller Modules
 - Disks
 - Power Supplies
 - Expansion Shelf
 - SAS Expander
 - Disks
 - Power Supplies
- End customers can order the CRUs through Helpdesk

Manuals and Support Information

- A document CD-ROM is shipped with the system
 - Installation Guide
 - Server Connection Guides
 - ETERNUS Manager User Guide
- Generic ETERNUS DX related information in the Partnet https://partners.ts.fujitsu.com/ETERNUS_DX
- Service and support related ETERNUS DX information in the Partnet <https://partners.ts.fujitsu.com/com/service/storage/Pages/default.aspx>
- For Partnet access a login is required
 - Can be applied for over the above links



THE POSSIBILITIES ARE INFINITE