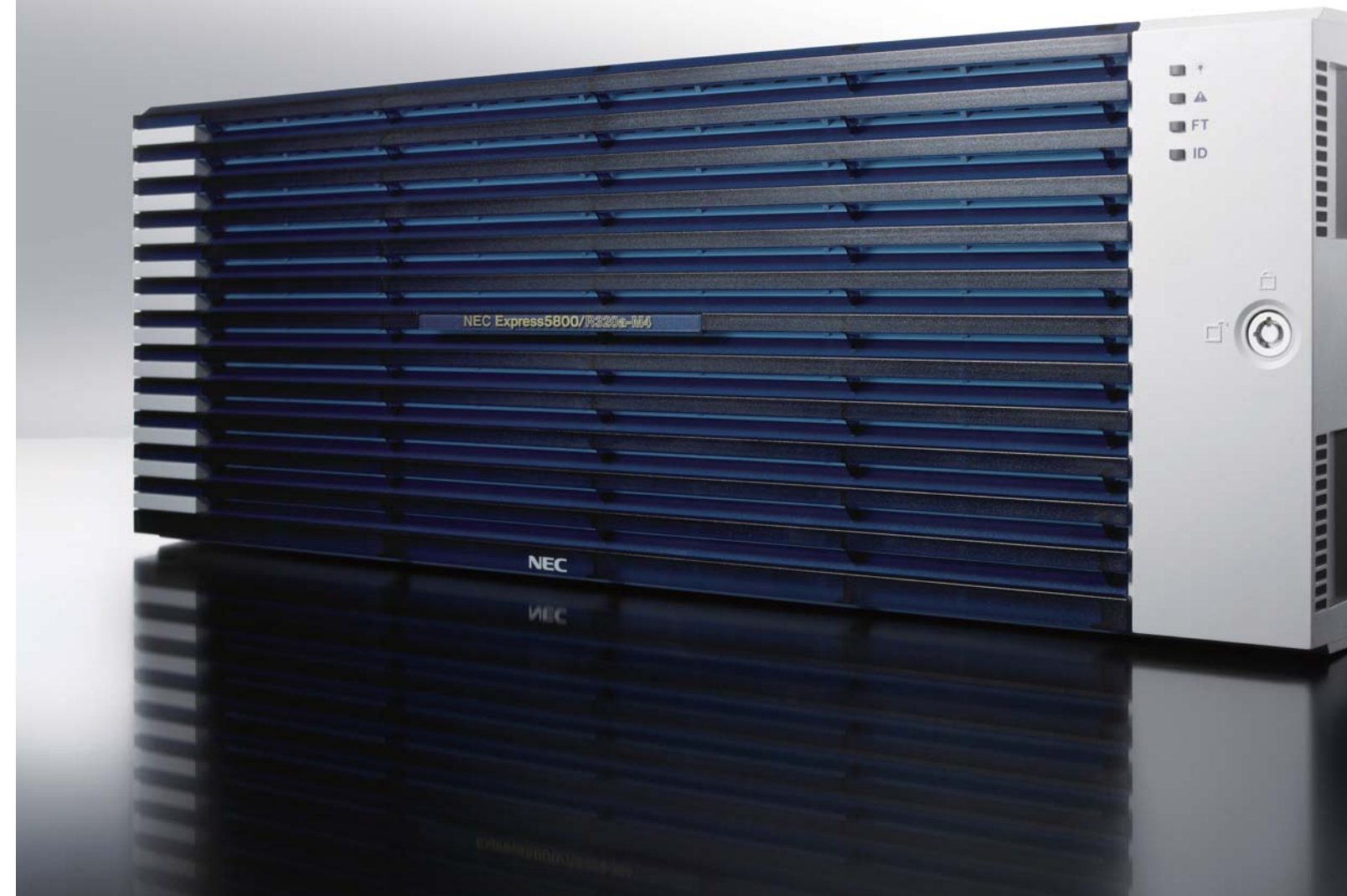Empowered by Innovation

NEC

Fault Tolerant Server

NEC Express5800/ft series

The ultimate choice for business continuity
NEC Express5800 fault tolerant servers

NEC Express5800/ft series

NEC Express5800
http://www.nec.com/express/

For further information, please contact:

Cat.No. E99-09110001E

http://www.nec.com/express/

Fully Redundant Components are Highly Resistant to Failures.
High-availability Servers for Nonstop Systems
NEC Express5800/ft Series

A single moment of downtime is not an option in today's business environment — a single server failure could affect a company's system as a whole, resulting in enormous loss of business opportunities. System administrators, therefore, focus their efforts on minimizing risk of downtime and keeping their systems up and running. Equipped with fully redundant components designed to run in lockstep, the Intel® architecture-based NEC Express5800/ft series fault tolerant servers address planned and unplanned downtime and deliver exceptional availability.

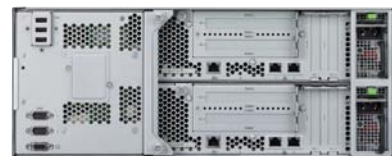## Hardware Redundancy in All Primary Components

R320a-M4 (Front)

Fully redundant by dual modular architecture

■Dual modular redundant design (R320a-M4)

Rear

CPU
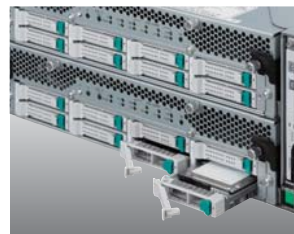Powered by Intel® Xeon® processor 5500 series with the new Intel QuickPath Architecture (R320a-M4)

intel Xeon inside™

Disk drives are built into each module. Rapid Disk Resync (RDR) ensures disk redundancy.

LAN/PCI
Each module provides two LAN ports and four PCI-Express slots.

CPU/IO module
CPU/IO modules, which include CPU, memory and PCI slots, are fully hot-swappable.

Memory
Up to 96GB of DDR3-1066

Continuous Processing

High-availability by redundancy chipset GeminiEngine™

GeminiEngine™ is a chipset specially engineered for transparent failover and system integrity. In NEC's FT servers, main hardware components are replicated and modularized for full hardware redundancy. The GeminiEngine™ controls these redundant modules to process the same instructions simultaneously, delivering so-called "lockstep" processing.
When a fault is detected, the faulty module is isolated and is allowed to be removed while the other remains online and continues operation. After replacement, the pair modules are automatically synchronized and resume normal operation. Through the whole process, the GeminiEngine™ ensures continuous processing without any interruption or loss of data.

■Module #1 | ■Module #2
Memory — CPU — CPU — Memory
Chipset
PCI
SAS — GeminiEngine™
LAN — I/O Controller Hub
Lockstep
Memory — CPU — CPU — Memory
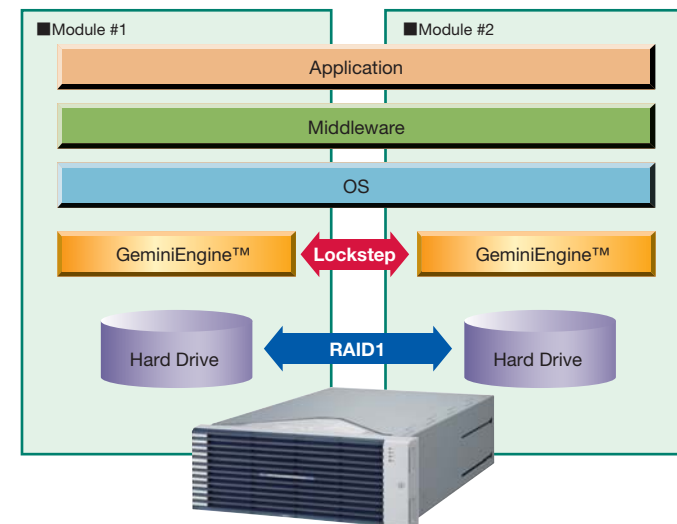Chipset
GeminiEngine™ — PCI
SAS
I/O Controller Hub — LAN
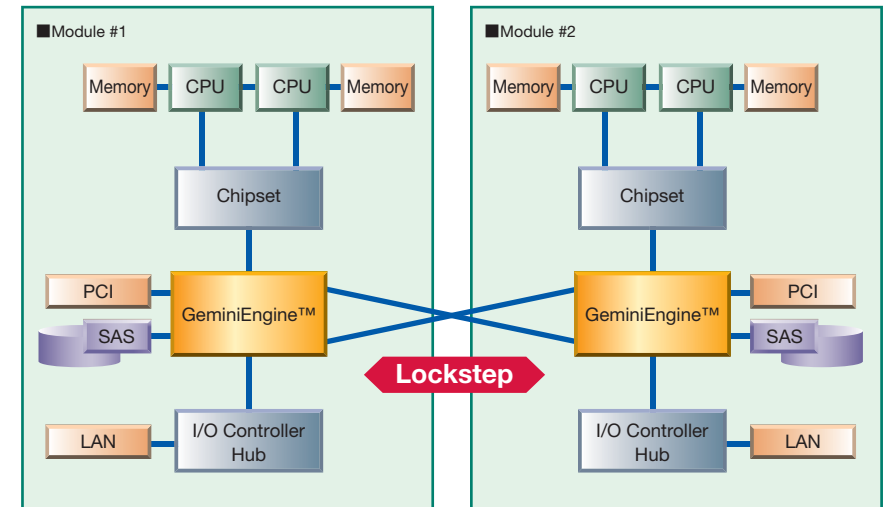
Easy to Deploy

Seamless deployment and operation—no complexities

The NEC Express5800/ft series servers, though replicated in architecture, perform as single servers running a single operating system*, allowing configuration without any special considerations for the fault tolerant capabilities. Its user-transparent features eliminate the need to modify any middleware or applications. System availability is significantly improved just by replacing general servers with NEC FT servers.
*: VMware models can run multiple operating systems by virtualization.

■Module #1 | ■Module #2
Application
Middleware
OS
GeminiEngine™ — **Lockstep** — GeminiEngine™
Hard Drive — **RAID1** — Hard Drive

・Ft servers provide a single-server view, free of any special considerations for the redundant architecture.

・Most applications are compatible and do not need special modification.

・FT servers do not require special administrative resources and allow easy low-cost management.

Note:The NEC Express5800/ft series servers are intended to enhance hardware fault tolerance by replicating main hardware components and do not ensure fault tolerance for operating systems and software applications installed. To secure software fault tolerance, customers are required to take necessary preventive measures as exercised for general servers.

Simplified Management

The NEC Express5800/ft series servers feature LED status indicators allowing instant identification of failed components. This feature is controlled by EXPRESSSCOPE Engine2, an integrated baseboard management controller.* In tandem with the bundled NEC ESMPRO Agent monitoring software that alerts failures to the management PC, it allows centralized remote management of the hardware and power supply.

*: 320Fd-MR, 320Fd-LR configures EXPRESSSCOPE Engine

DIMM NUMBER
ID CPU MSB
PRIMARY I/O FAN PSU VLT
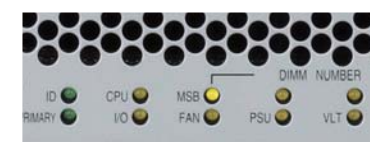
EXPRESSSCOPE
LED indicators allow users to visually identify failed components

Lower TCO

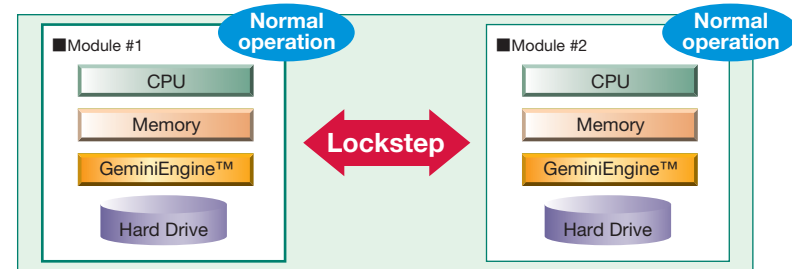The FT server can deliver a lower total cost of ownership over the life of a server as compared to alternative high availability solutions, such as software clusters. To run in redundant mode, the FT server only requires one copy of the operating system and application software license and no professional services to setup or configure the server. It's simple to setup, simple to use, and simple to manage.

Fully-Redundant and Hot-Swappable Modules Achieve Continuous Availability
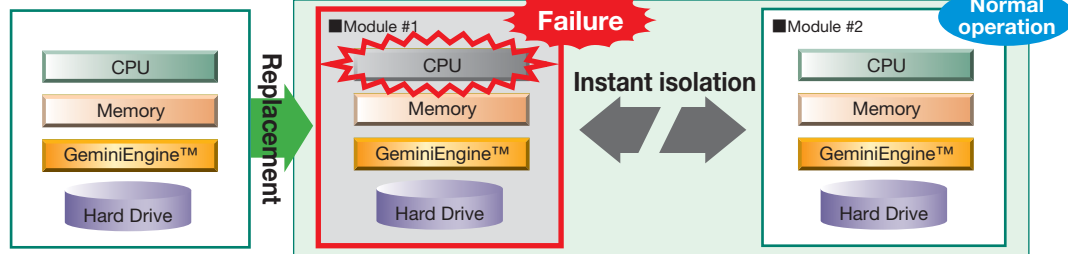
Minimum Downtime

Normal operation

Powered by GeminiEngine™, replicated modules run in lockstep as one logical server.

■Module #1 **Normal operation**
- CPU
- Memory
- GeminiEngine™
- Hard Drive

Lockstep

■Module #2 **Normal operation**
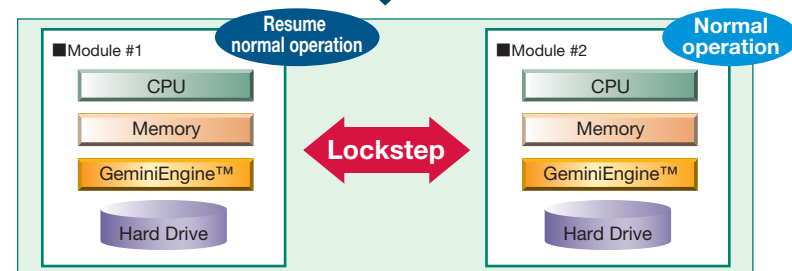- CPU
- Memory
- GeminiEngine™
- Hard Drive

Fault detection

In case of hardware malfunction, the faulty module is instantly isolated and the server continues operation on the other healthy module. The hot-swappable modules enable repair and replacement without interrupting processing.

Replacement

- CPU
- Memory
- GeminiEngine™
- Hard Drive

■Module #1 **Failure**
- CPU
- Memory
- GeminiEngine™
- Hard Drive

Instant isolation

■Module #2 **Normal operation**
- CPU
- Memory
- GeminiEngine™
- Hard Drive

Back to normal operation

Following the repair or replacement, both modules are automatically resynchronized and resume normal operation. There is no need to stop/re-boot the system, and both the OS and the applications are unaffected, achieving continuous processing throughout the whole process.

■Module #1 **Resume normal operation**
- CPU
- Memory
- GeminiEngine™
- Hard Drive

Lockstep

■Module #2 **Normal operation**
- CPU
- Memory
- GeminiEngine™
- Hard Drive

High-Availability Technology

Rapid Disk Resync (RDR)

The Rapid Disk Resync (RDR) redundancy software is used for hard disk drive synchronization, ensuring excellent reliability during normal operation. In addition, after a hard drive has stopped as a result of a failure, RDR copies only data changes to update it, thereby minimizing the time that the system runs with only one of the redundant disk drive modules.
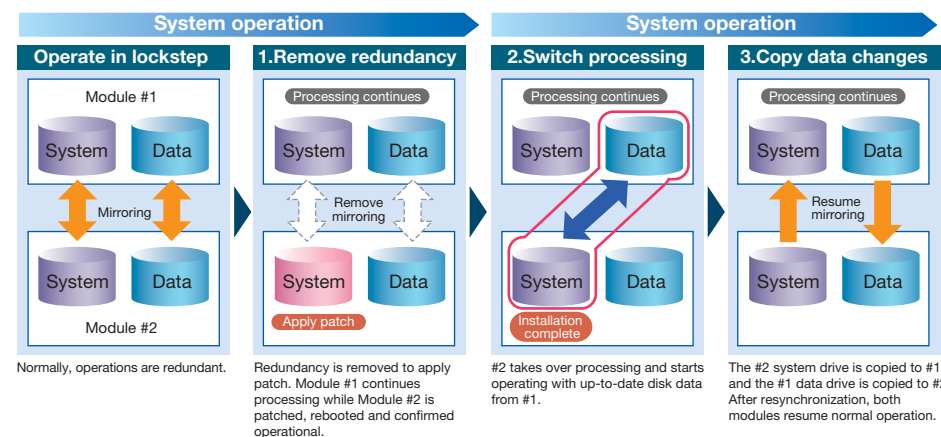
(RDR is available only with the Windows models)

CPU | MEM | GeminiEngine™ | HDD

RDR

CPU | MEM | GeminiEngine™ | HDD
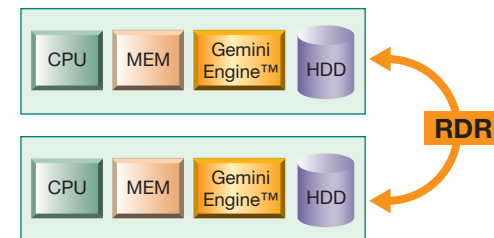
Active Upgrade™

The Active Upgrade™ feature minimizes the planned downtime required to install security patches and software upgrades. The synchronized modules are separated and patches are applied to one module while the other remains online and continues operations. The operating module is then switched, keeping downtime to a minimum (approximately 10 seconds).

(Active Upgrade™ is available only with the Windows models)

System operation

Operate in lockstep	1.Remove redundancy
Module #1	Processing continues
System / Data	System / Data
Mirroring	Remove mirroring
System / Data	System / Data
Module #2	Apply patch
Normally, operations are redundant.	Redundancy is removed to apply patch. Module #1 continues processing while Module #2 is patched, rebooted and confirmed operational.

System operation

| 2.Switch processing	3.Copy data changes
Processing continues	Processing continues
System / Data	System / Data
	Resume mirroring
System / Data	System / Data
Installation complete	
#2 takes over processing and starts operating with up-to-date disk data from #1.	The #2 system drive is copied to #1, and the #1 data drive is copied to #2. After resynchronization, both modules resume normal operation.

For More Availability and Reliability

A Reliable Platform for Virtualization

FT Servers + VMware

Server consolidation enhanced by virtualization can significantly lower the TCO by reducing distributed servers and much of the maintenance related workloads and costs. NEC's VMware-compatible FT servers support VMware Infrastructure3, enabling users to smoothly build such favorable virtualized environments with utmost reliability.
In a virtualized environment, multiple virtual servers are built on a physical server and its downtime can cause unprecedented damage. NEC FT servers reduce these costly risks by its fully redundant hardware and offer continuous operation of your virtualized setting.

- Consolidate multiple existing systems on one FT server
- Minimize downtime of multiple virtual servers in the event of hardware failure.

Virtual Server A | Virtual Server B | Virtual Server C

VMware Infrastructure 3

HW Failure | HW | HW

NEC Storage D Series
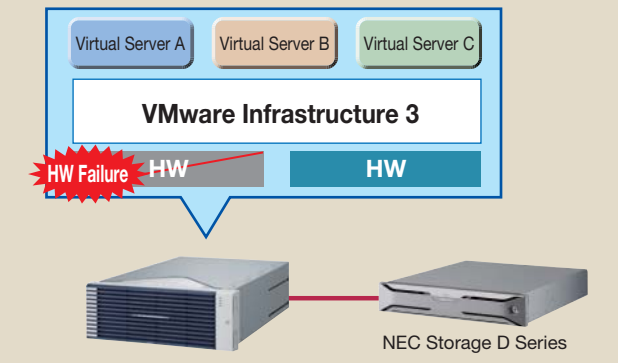
A High-Availability Database System

FT Servers + Large Storage Capacity

The NEC Express5800/ft series support NEC's SAN-compatible disk array devices NEC Storage D series for catering to specific capacity needs. The redundant data path between the FT server and storage ensures instant operation switching and continuous availability in the event of a failure, regardless of where the malfunction occurs. This solution is ideal for customer-facing, production and sales management systems, electronic patient record and knowledge management systems, and other environments requiring large volume, high availability and high-speed response.

- Hardware redundancy extends to the connection path
- Redundancy control software provides immediate switching in the event of a path or FC controller failure

NEC Storage D Series
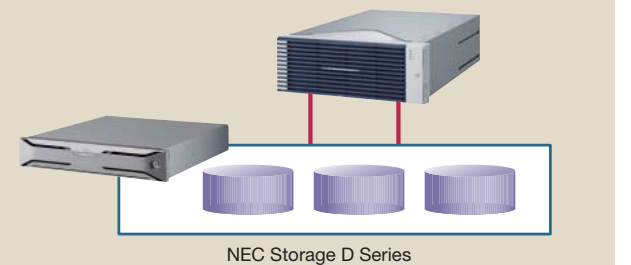
Ensuring Software Fault Tolerance for Higher Availability

FT Server Clustering

Cluster systems utilizing NEC FT servers provide continuous availability in the event of both software and hardware failures. NEC's FT servers and EXPRESSCLUSTER X clustering software allow customers to build cluster systems.* When a hardware component fails, the NEC FT server isolates the faulty module and continues to operate. If a software failure interrupts server operation, the faulty server fails over to one in another node and continues processing. Compared to the general IA server clusters, the FT server cluster delivers superior robustness and availability by eliminating system downtime caused by switching between nodes in the event of a hardware failure. The FT server cluster is ideal for mission-critical systems that require higher availability and reliability.

*: only compatible with NEC Storage

- Each node runs different applications
- A node failover ensures system continuity in the event of software failure

Data base | Groupware | Application 1 | Application 2

NEC Express5800/ft series

EXPRESSCLUSTER X
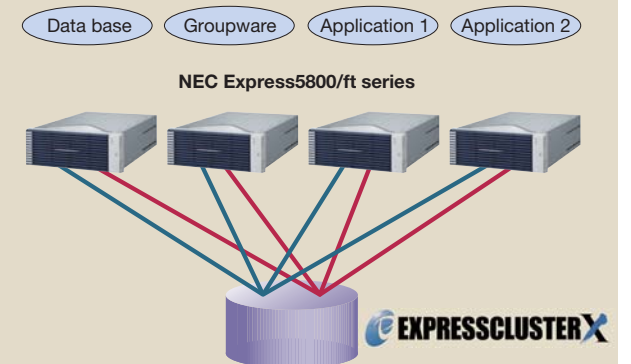
Windows Models

Intel® Xeon® processor 5500 series delivers high performance processing that stands up to heavily-loaded operations

`New` **NEC Express5800/R320a-M4**

- Intel® Xeon® processor X5570 (two sockets)
- Up to 96GB, DDR3-1066 Registered DIMM with ECC
- Up to 2.4TB SAS internal hard disk drives
- 4 x PCI Express
- Microsoft® Windows Server® 2008 Enterprise x64 supported*
  *Hyper-V is not supported.
- Active Upgrade™, Rapid Disk Resync

`New` **NEC Express5800/R320a-E4**

- Intel® Xeon® processor E5504 (two sockets)
- Up to 96GB, DDR3-1066 Registered DIMM with ECC
- Up to 2.4TB SAS internal hard disk drives
- 2 x PCI Express
- Microsoft® Windows Server® 2008 Enterprise x64 supported*
  *Hyper-V is not supported.
- Active Upgrade™, Rapid Disk Resync

Red Hat Enterprise Linux Models

Compatibility with Red Hat® Enterprise Linux® AP 5.2 (EM64T) makes it possible to build flexible systems utilizing OSS.

NEC Express5800/320Fd-MR

- Intel® Xeon® processor E5450 (two sockets)
- Up to 32GB, DDR2-667 FB-DIMM with ECC
- Up to 900GB SAS internal hard disk drives
- 1 x PCI Express, 2 x PCI-X
- Red Hat Enterprise Linux Advanced Platform 5.2 (EM64T)

NEC Express5800/320Fd-LR

- Intel® Xeon® processor E5405 (two sockets)
- Up to 32GB, DDR2-667 FB-DIMM with ECC
- Up to 900GB SAS internal hard disk drives
- 1 x PCI Express, 2 x PCI-X
- Red Hat Enterprise Linux Advanced Platform 5.2 (EM64T)

VMware Models

Compatibility with VMware ESX 3.0 virtualization software provides high reliability. Ideal for consolidating mission-critical systems.

NEC Express5800/320Fd-MR

- Intel® Xeon® processor E5450 (two sockets)
- Up to 24GB, DDR2-667 FB-DIMM with ECC
- 1 x PCI Express, 1 x PCI-X
- SAN boot is required.
- VMware® ESX™ 3.0.2ft

NEC Express5800/320Fd-LR

- Intel® Xeon® processor E5405 (two sockets)
- Up to 24GB, DDR2-667 FB-DIMM with ECC
- Up to 900GB SAS internal hard disk drives
- 1 x PCI Express, 1 x PCI-X
- VMware® ESX™ 3.0.2ft

Install rack models in a tower enclosure
Tower Conversion Kit

The tower configuration is ideal for customers considering a single server installed in an office environment.
Use the Tower Conversion Kit to install ft series as tower models.

For R320a-M4, R320a-E4   For 320Fd-MR, 320Fd-LR   Internal view (front bezel opened)

Model	Windows model		Linux model		VMware model	
	NEC Express5800/R320a-E4	NEC Express5800/R320a-M4	NEC Express5800/320Fd-LR	NEC Express5800/320Fd-MR	NEC Express5800/320Fd-LR	NEC Express5800/320Fd-MR
Form Factor	4U rack-mountable		4U rack-mountable		4U rack-mountable	
Processor	Intel® Xeon® processor E5504	Intel® Xeon® processor X5570	Intel® Xeon® processor E5405	Intel® Xeon® processor E5450	Intel® Xeon® processor E5405	Intel® Xeon® processor E5450
Clock Speed	2GHz	2.93GHz	2GHz	3GHz	2GHz	3GHz
Cache	4MB (L3 cache)	8MB (L3 cache)	2 x 6MB (L2 cache)			
Logical Processors	1 (std.) - 2 (max.)					
QPI speed	4.8GT/s	6.4GT/s	–			
Chipset	Intel® 5500 with GeminiEngine™		Intel® 5000V (1333MHz) with GeminiEngine™			
Memory Type	DDR3-1066 Registered DIMM with ECC		DDR2-667 FB DIMM with ECC			
Logical Max. Memory	96GB (8GB x 3 x 4)		32GB *1		24GB (4GB x 6)	
Memory Clock	800MHz	1066MHz	333MHz (differential)			
Storage Logical Max.Capacity	2.4TB (300GB x 8)*2		900GB (300GB x 3, RAID1)		–	
I/O	Serial Attached SCSI				SAN	
FDD	Optional *3					
ODD (Logical)	DVD-RAM drive *4		CD-RW/DVD combo drive *4			
Device Bay	–					
PCI Slots (Logical)	Low profile: PCI Express (x8) x 2 *5	Low profile: PCI Express (x8) x 2 *5 Full height: PCI Express (x8) x 2 *5	Low profile: 64bit/133MHz PCI-X x 1 Full height: 64bit/133MHz PCI-X x 1 PCI Express (x8) x 1 *5		Low profile: 64bit/133MHz PCI-X x 1 Full height: 64bit/133MHz PCI-X x 1 (occupied by a 4Gb Fibre Channel Controller) PCI Express (x8) x 1*5	
Video RAM	32MB					
Network (Logical)	1000BASE-T x 2, Management LAN x 1		1000BASE-T x 2			
External Interface Video	15-pin mini-D sub x 1					
USB *6	Type A (USB) x 3					
Dimensions (WDH)	483 x 736 x 178 mm		483 x 762 x 178 mm			
Weight (max.)	51.5Kg		53.5kg			
Max. Power Consumption	1,400VA / 1,390W		1,202VA / 1,200W			
Temperature and humidity condition	10 to 35℃ / 20 to 80% (non-condensing)					
Heat Dissipation	5004KJ/h		4320KJ/h			
Software for Availability	Active Upgrade™, Rapid Disk Resync (RDR)		–			
Support OS	Microsoft® Windows Server® 2008 Enterprise x64 Edition SP2 *7 Microsoft® Windows Server® 2003 R2, Enterprise Edition SP2		RedHat® Enterprise Linux® Advanced Platform 5.2 (EM64T)		VMware ESX 3.0.2ft	

*1 Please contact your sales representative for 32GB memory configuration.
*2 Larger capacity will be available in the future. Please contact your sales representative for the latest information.
*3 Required for maintenance.
*4 DVD: max. X8, CD: max. X24
  Writing software is not provided for this drive.
*5 Operates at X4 bandwidth
*6 Supports only NEC-authorized keyboard, mouse, floppy disk drive, and KVM switch
*7 Hyper-V is not supported.

Tower Conversion Kit	For 320Fd-MR, 320Fd-LR	327mm(W) x 840mm(D) x 592mm(H), 26.5Kg (including stabilizer)
	For R320a-M4, R320a-E4	327mm(W) x 804mm(D) x 592mm(H), 27.1Kg (including stabilizer)

Note: Specifications are subject to change without notice.