

Next Generation Platform Scalable Modular Server: DX2000

High Performance - Hyper Scalability

August, 2016

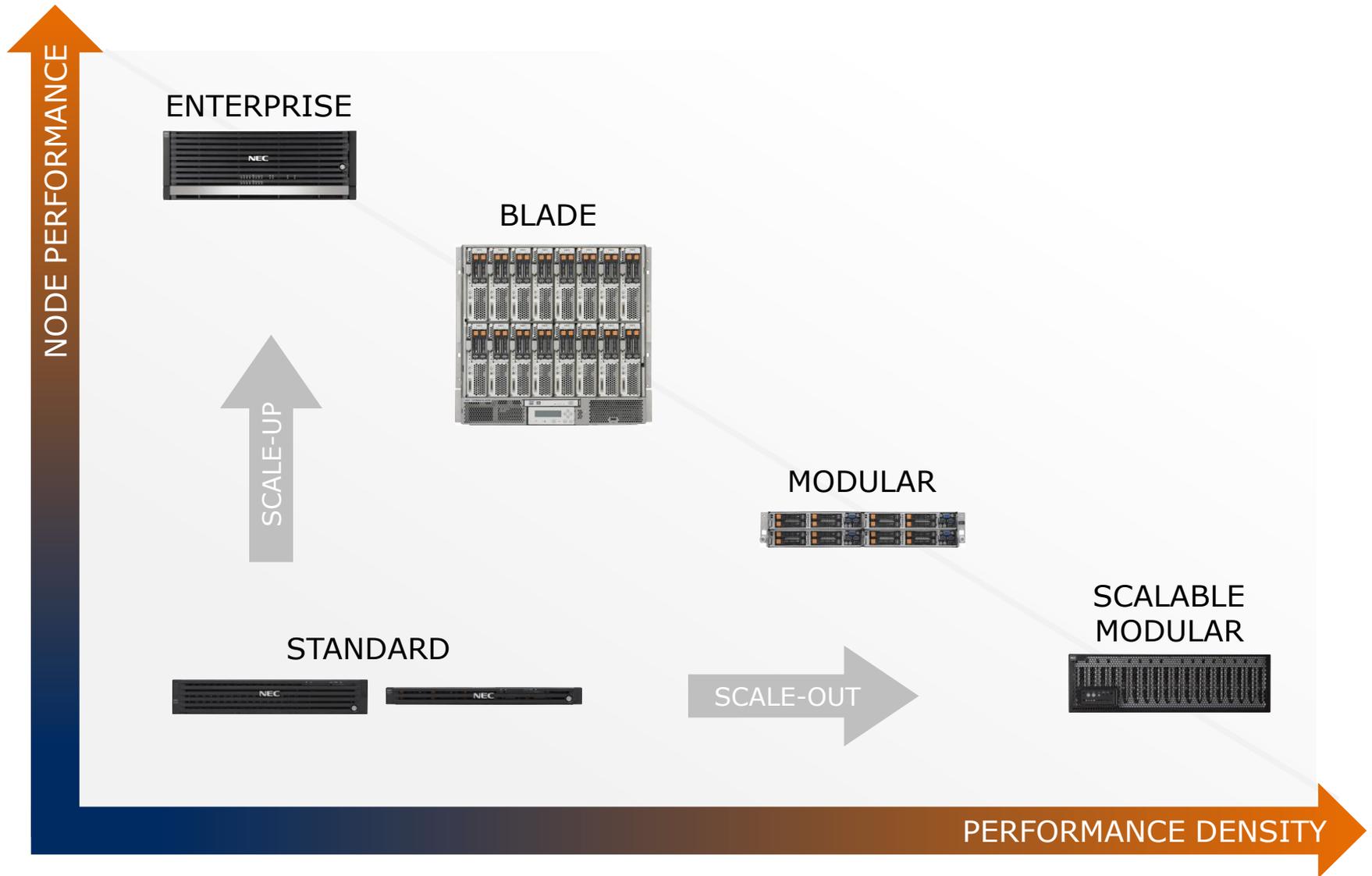




NEC DX2000

Hardware System Details

NEC Datacenterline Server Lineup



SCALABLE MODULAR SERVER

DX2000

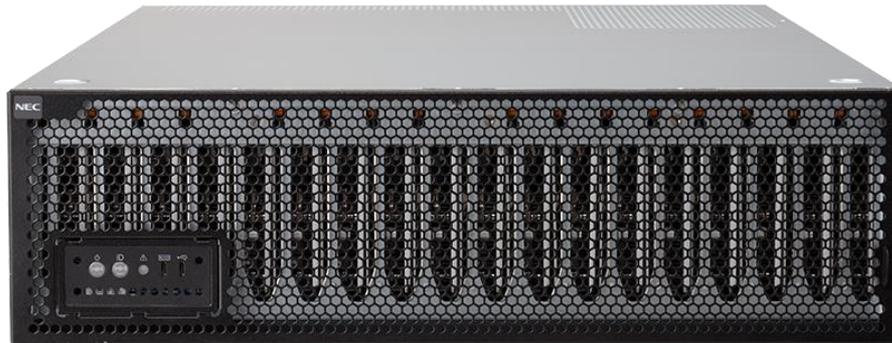
Extreme high density compute platform,
based on Intel® XeonD® SoC.
Ideal for lightweight scale out workloads.

Taking compute for Big Data and (Bare Metal) Cloud
to the next level.



DX2000 at a glance

- **3U** standard rack enclosure with up to **44*** **server nodes**
- Supports shared components including power, cooling, management and networking
- Support for the latest Intel® **XeonD® Processor** Family
- Up to **64GB** of DDR4 memory per server node
- Up to 512GB SSD per server node
- Two or four 10GbE links per server node
- **1502GB/s** of total memory bandwidth per enclosure
- Full manageability with integrated NEC EXPRESSSCOPE Engine 3



**Chassis layouts depend on individual module configuration*

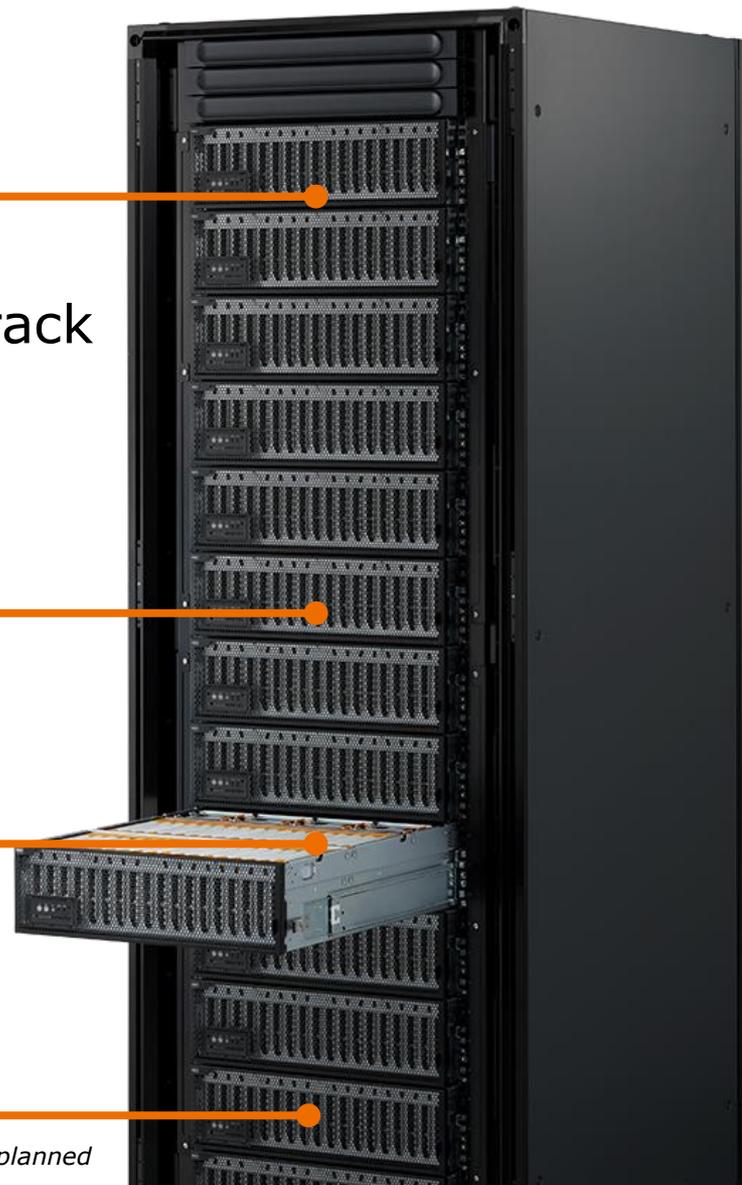
Scalability

Up to **572** server nodes in a standard rack

Currently* up to **3536** Intel® XeonD® Cores

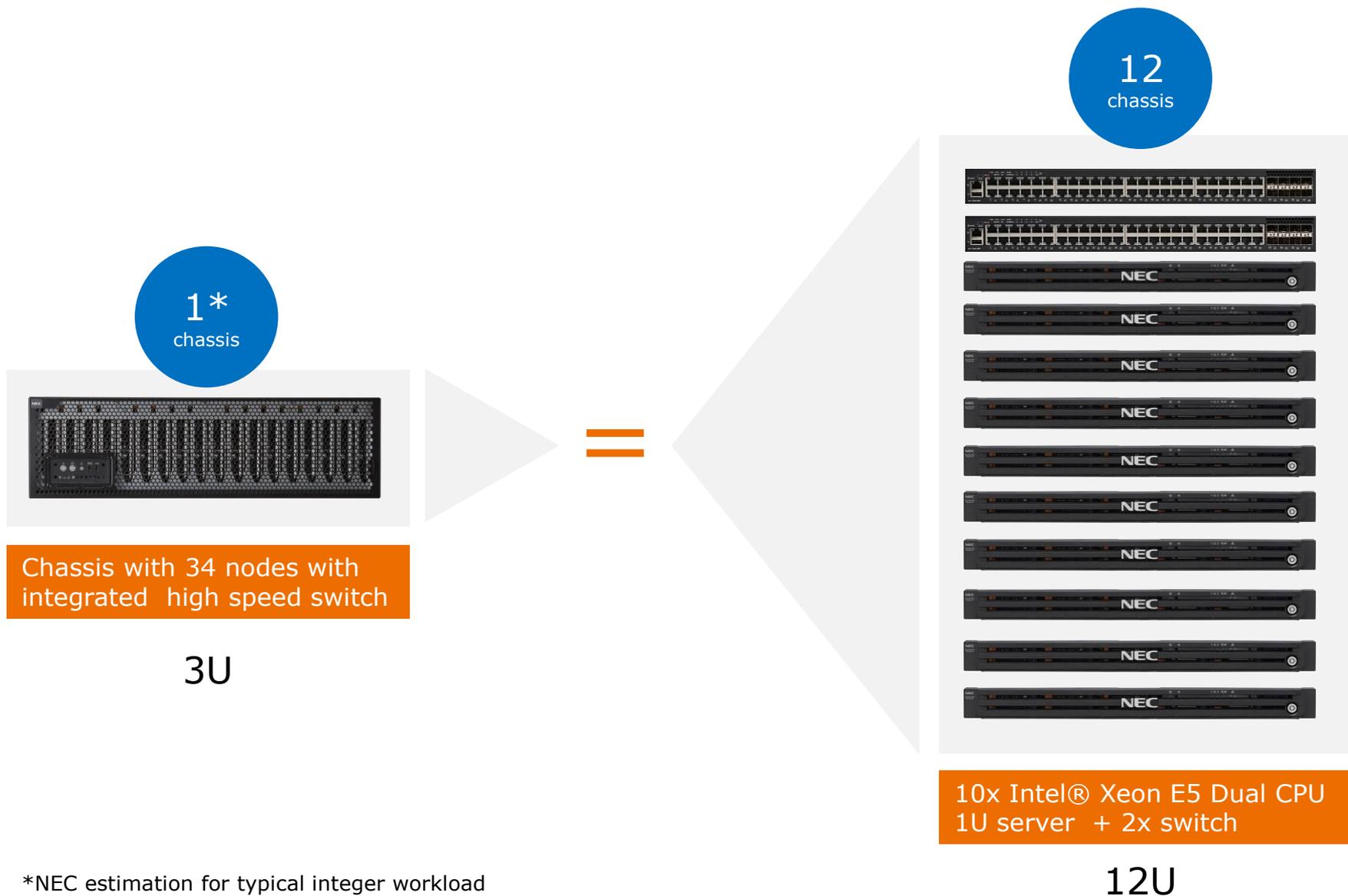
Up to **37TB** memory and

up to **293TB** SSD capacity per 42U



**16 Cores Intel® XeonD® Module planned*

DX2000 – high performance density



DX2000 – high memory bandwidth performance

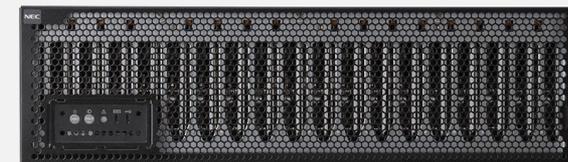
51.2
GB/s

Ideal for
“In-Memory Analysis”

34.1
GB/s



6x Intel Xeon E5-2600 v3



44x Intel Xeon D-1500



4.9x

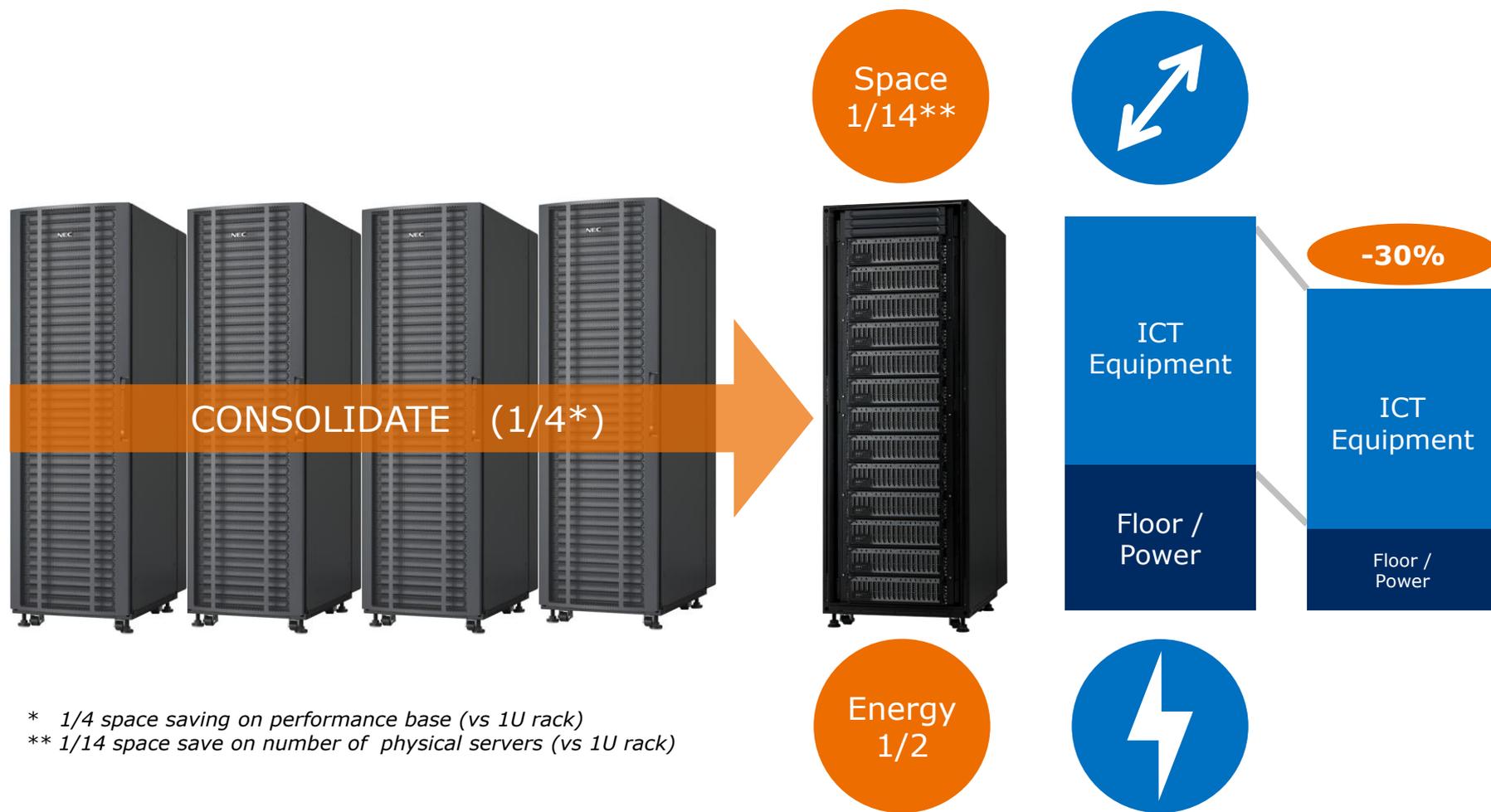
307
GB/s

Nearly 5x bandwidth per 3U

1502
GB/s

New levels of density and energy for the DC

Maximize compute in a certain space (more server per sq.m2)
Server density allows for floor space and energy savings



* 1/4 space saving on performance base (vs 1U rack)
** 1/14 space save on number of physical servers (vs 1U rack)

Tackling today's main datacenter issues for reduced TCO:

SPACE / SCALABILITY

"the reduction is actually an increase"

OPEX

Energy, maintenance, cabling, setup, ...

Up to

30%

TCO Reduction*

**comparing with 1U servers*

Massive scalability

Ideal scalable architecture for distributed parallel computing such as Spark/Hadoop

For intensive scale out compute requirements

Easy deployment (mount, connect, start)

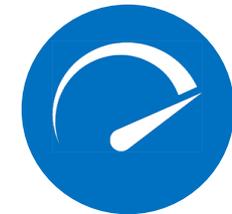
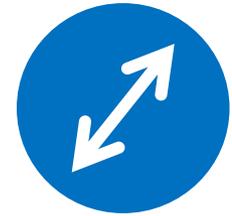
Mount chassis, go !

Easy scale out performance

From 14 to thousands of nodes

Low latency and high speeds interconnect

Low latency and high speed node to node interconnect



Easy Maintenance

Module base component design

Easy parts maintenance via hot plug dynamic component replacement

Integrated NEC EXPRESSScope Engine

For NEC's BMC functionality for overall system management/monitoring

Integrated Switch

Cabling reduction





DX2000 Product Lineup

DX2000 Product Line up – planned appliances

CONFIG	CPU/MEM/SSD	Module type	Total # of Modules	Targeted Usage	Remark
1	4C/64G MEM/512G SSD	All CPU modules	x14, x44	For in-memory parallel processing	
2	16C/64G MEM/512G SSD	All CPU modules	x14, x34	For CPU intensive parallel processing	
3	4C/16G MEM/512G SSD	All CPU modules	x14, x44	For inexpensive hosting	
4	4C/32G MEM/256G SSD 16C/32G MEM/256G SSD	CPU+ SAS RAID	4Cx18+16Cx3+SASx3 4Cx28+16Cx6 +SASx6	For hosting + storage	
5	8C/64G MEM/512G SSD	CPU only	x14, x34	Bare metal Cloud, IaaS	
6	16C/64G MEM/512G SSD 10G LAN module	CPU+LAN	CPUx7 + LANx7 CPUx22 + LANx22	For NW rich bandwidth configuration and/or NW redundant configuration	
7	8C/64G MEM/512G SSD 10G LAN module	CPU+LAN	CPUx7 + LANx7 CPUx22 + LANx22	For NW rich bandwidth configuration and/or NW redundant configuration	

Subject to change without notice

DX2000 OS Support (planned)

SUPPORTED OS :

- Red Hat® Enterprise Linux® 7.2
- VMware ESXi 6.0
- Windows® Server2012 R2



OTHER

- CentOS 7.2
- Ubuntu 14.04 LTS

- RHEL 6.8 (TBD)

Note: not guaranteed and validation only

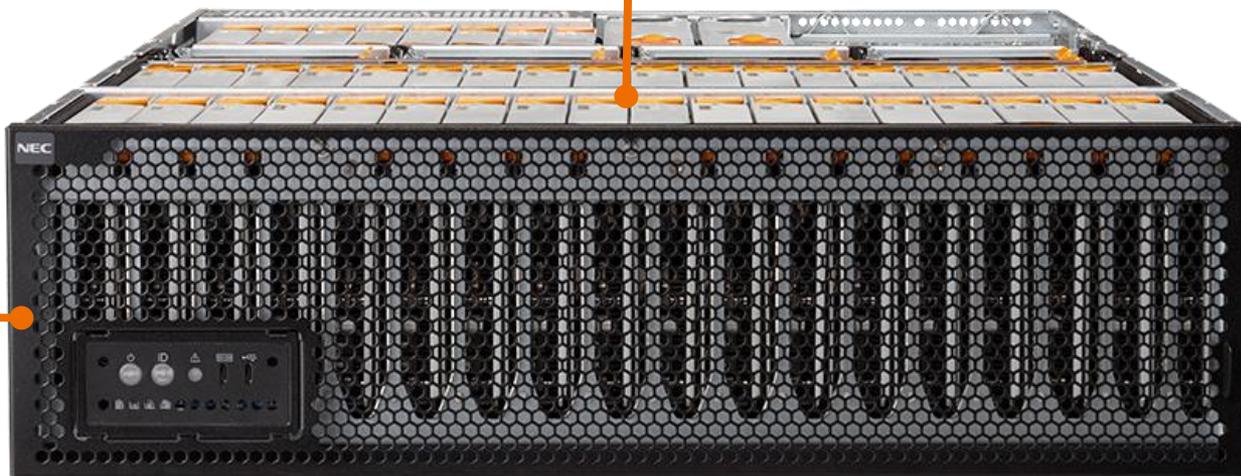
Subject to change without notice

DX2000 Product Detail – front view

Supports shared components (hot plug) including power, cooling, management and networking

3U standard chassis
form factor

Up to 44 hot plug
modules

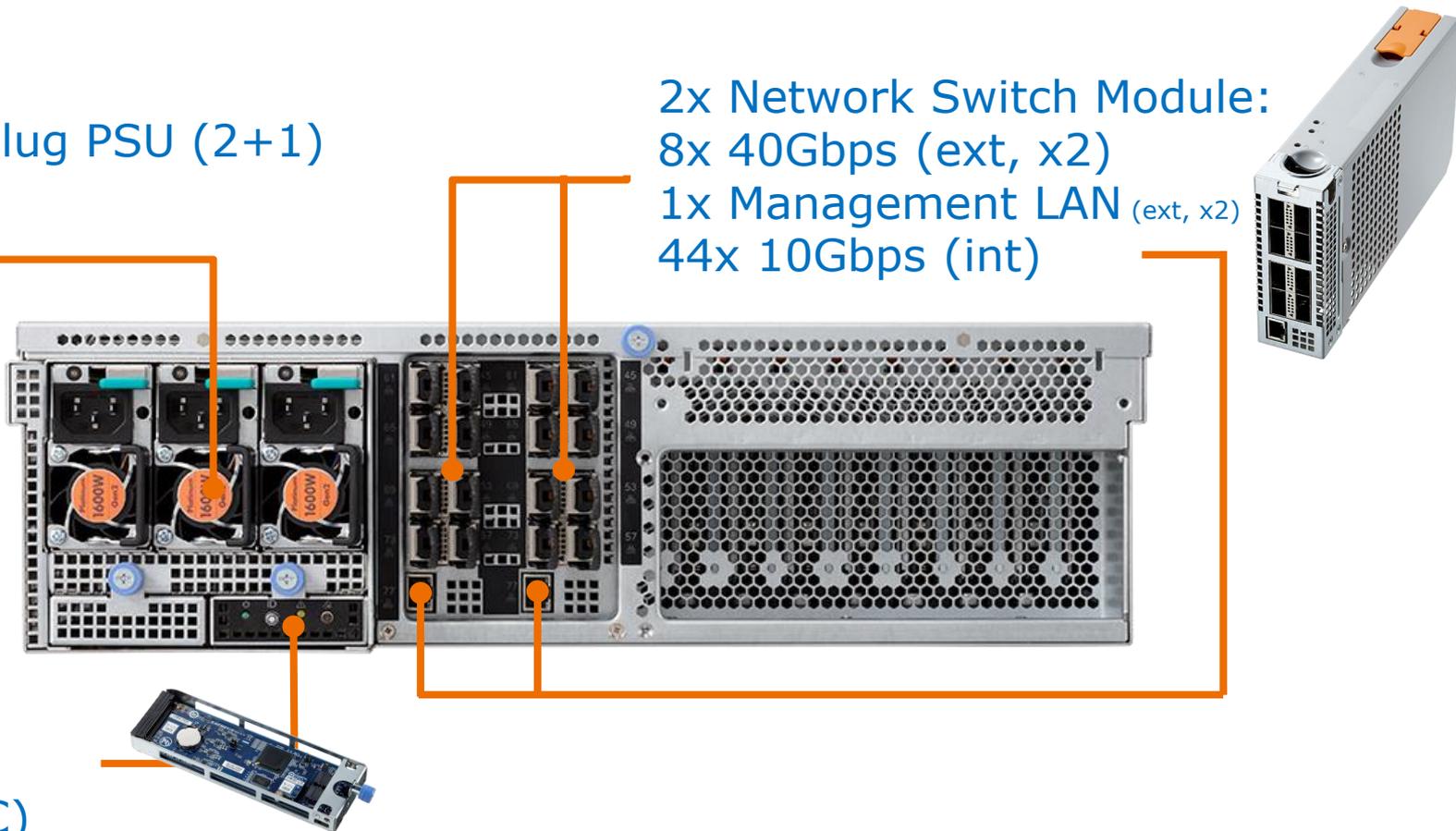


DX2000 Product Detail – rear view

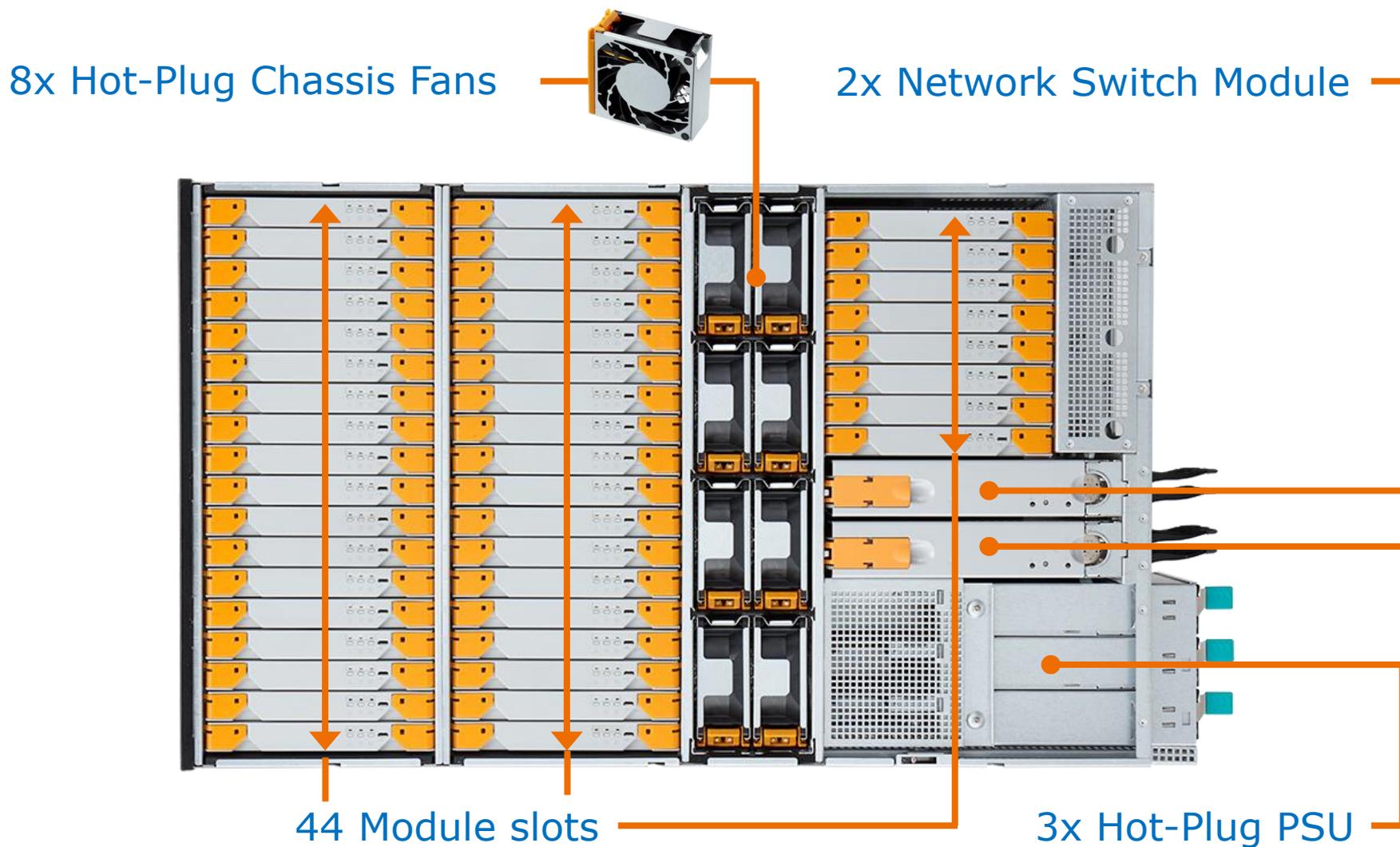
3x Hot-Plug PSU (2+1)

2x Network Switch Module:
8x 40Gbps (ext, x2)
1x Management LAN (ext, x2)
44x 10Gbps (int)

Chassis
Sensor
Card (CSC)



DX2000 Product Detail – top view



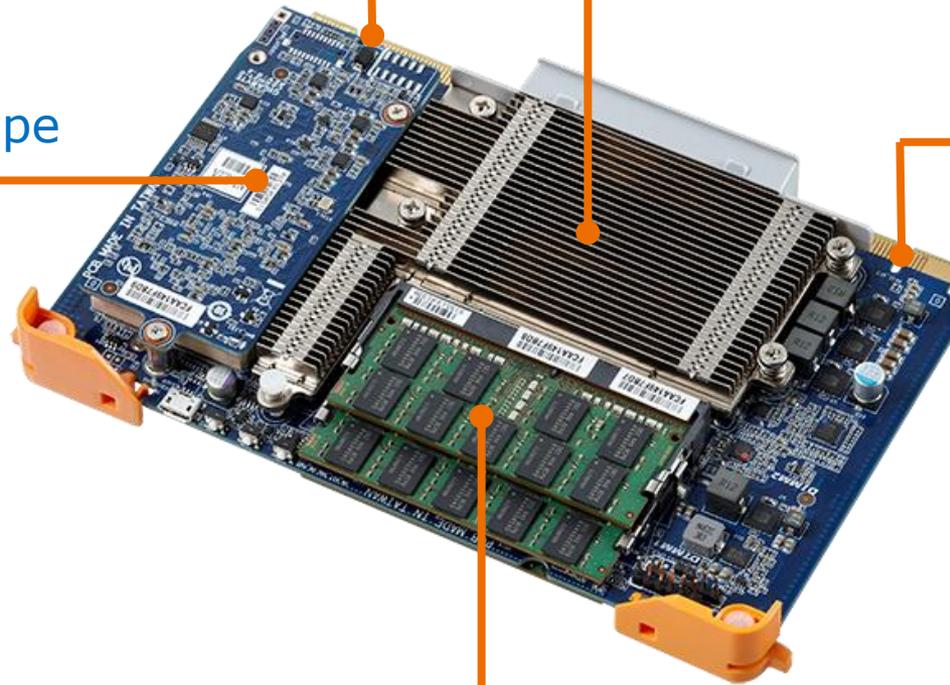
DX2000 Product Detail – compute module

PCIe 3.0 x8

Intel® XeonD® Processor
(4 / 8 / 16 cores)

NEC EXPRESSScope
Engine™ (BMC)

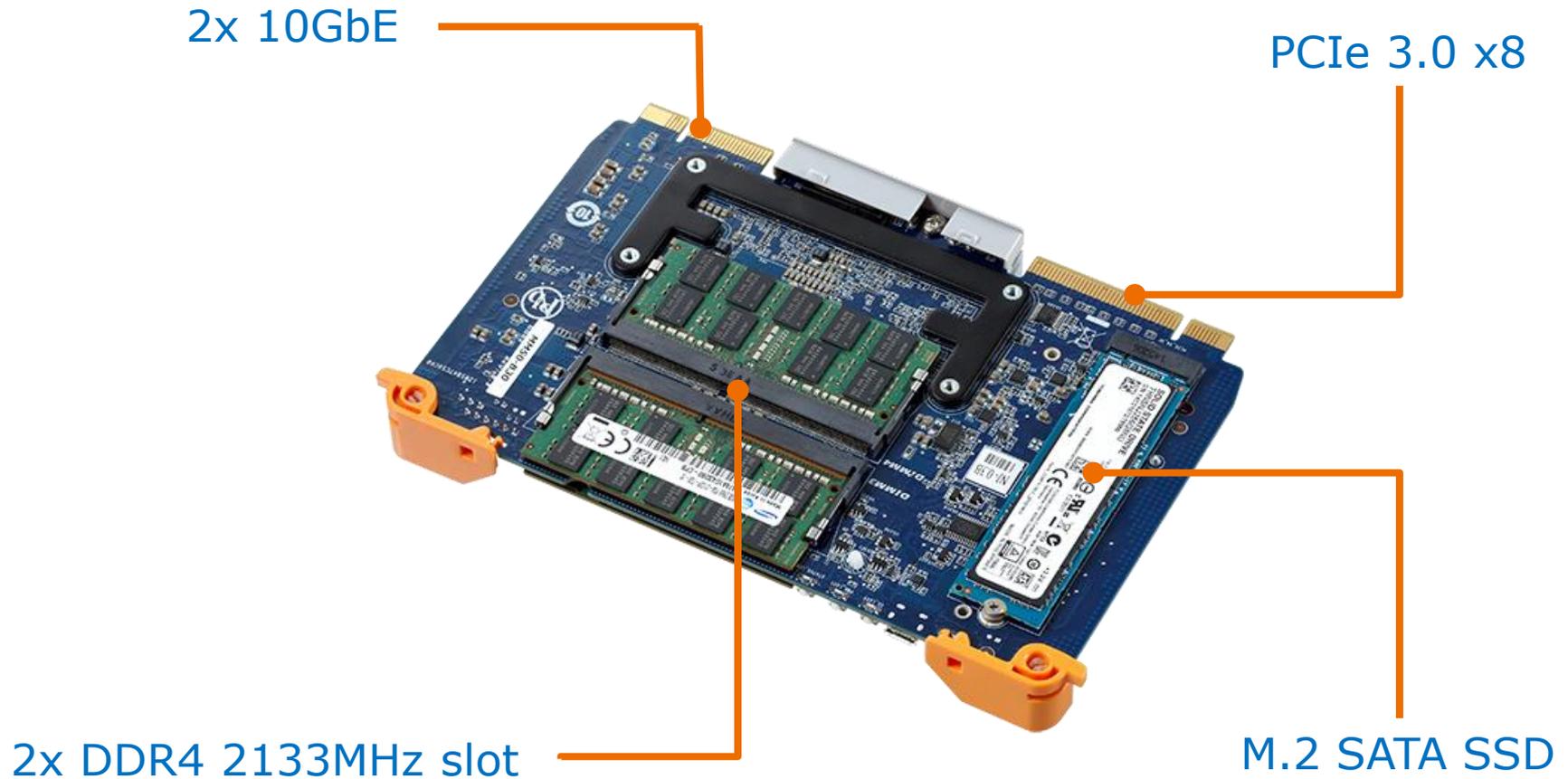
2x 10GbE



2x DDR4 2133MHz slot



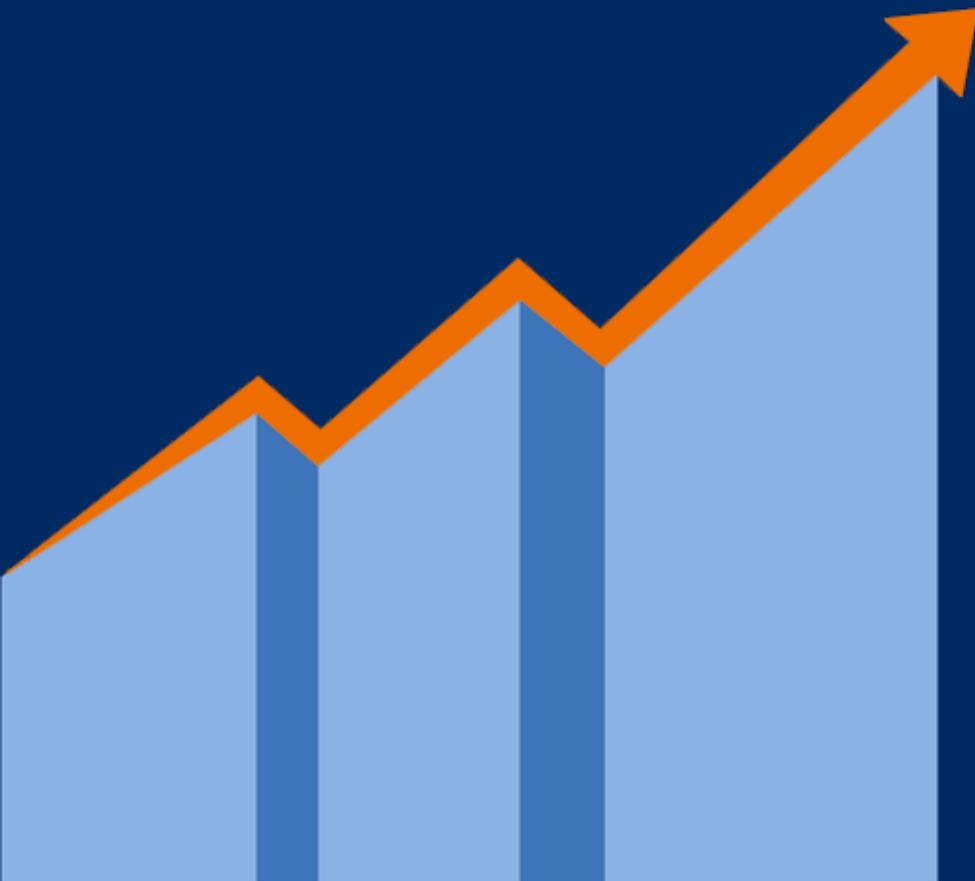
DX2000 Product Detail – compute module



DX2000 Product Detail – 10GbE expansion card



How does this compare?



DX2000 Strong Points

Standard Rack Enclosure (fits standard 19" 1meter depth rack)

48KG weight (same level as 3x 1U rack server)

High speed networking

- 10GbE x44 x2 down
 - 40GbE x8 x2 up
-

Up to 512GB SSD and 64GB Memory per Module

Dynamic Module replacement

Certain configurations up to 104 degree operating temperature support

DX2000 Comparison Analysis

	DX1000 	DX2000 	HP Moonshot 
CPU Lineup	Atom(x86 Intel) Fair	Xeon D (x86 Intel) Fair	Atom(x86 Intel), AMD(x86 AMD), APM(ARM), Xeon E3(x86 Intel+GPU) Excellent
CPU Performance (CPU Mark)	3859 (ATOM C2750) Fair	11880 (Xeon D-1541, 2.1GHz 8core) Excellent	10400 (est.) (E3-1284L v4, 2.9GHz 4core) Fair
Memory Capacity	32GB(4x8GB) Fair	64GB(4x16GB) Excellent	32-64GB Fair
NW Module	2 x2.5G Fair	2 x10G Excellent	2 x10G, 2x1G, 2 x2.5G x4 etc. Excellent
Maximum NW Module	2 x2.5G Fair	4 x10G Excellent	2 x10G Fair
Module in Chassis	<u>46</u> Excellent	<u>44</u> Excellent	<u>45</u> Excellent
Module in 42U Rack	16 Excellent	13 Excellent	8 Fair
Weight per 1U	17kg Excellent	16kg Excellent	19.1kg Fair
Standardized 1m Rack	<u>Possible</u> 2U, Depth:780mm Excellent	<u>Possible</u> 3U, Depth:769mm Excellent	Impossible 4.3U, Depth:900mm Poor
Internal Switch Uplink / Downlink	46 x2.5G x2 / 2 x40G x2 Fair	44 x10G x2 / 8 x40G x2 Excellent	45 x10G x2 / 4 x40G x2 45 x1G x2 / 6 x10G x2 180 x1G x2 / 16 x10G x2 Excellent
Maximum Core in 42U Rack	5,888 Fair	3,536 Fair	11,520(Atom, AMD) Excellent
Maximum Memory Capacity in 42U Rack	23,552GB Fair	36,608GB Excellent	11,520GB(Xeon E3) Fair
Maximum Memory Bandwidth in 42U Rack	18,842GB/s Excellent	19,521GB/s Excellent	18,432GB/s(Atom, APM) Excellent



DX2000 Model Use Cases

DX2000 Target Markets



High Density & Energy Saving

In-Memory Analysis

rubicon
PROJECT

packet

phoenixNAP
GLOBAL IT SERVICES



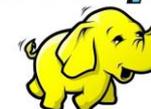
Bare Metal Cloud



Big Data Analytics

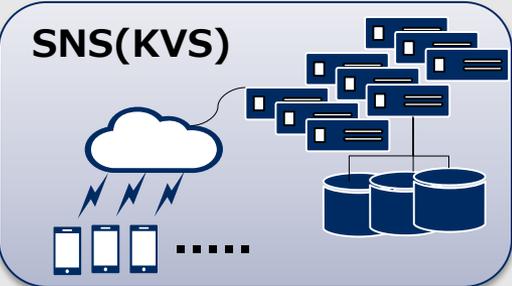
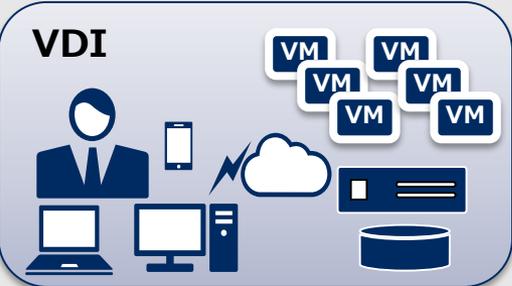
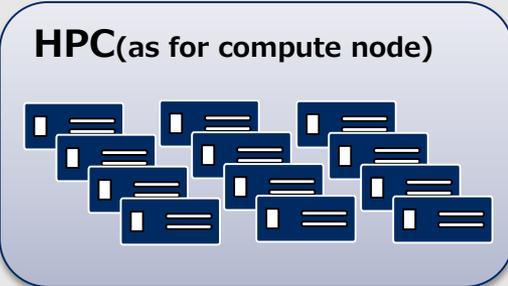
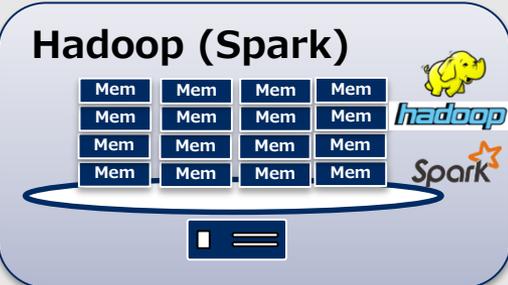


hadoop



Target usage

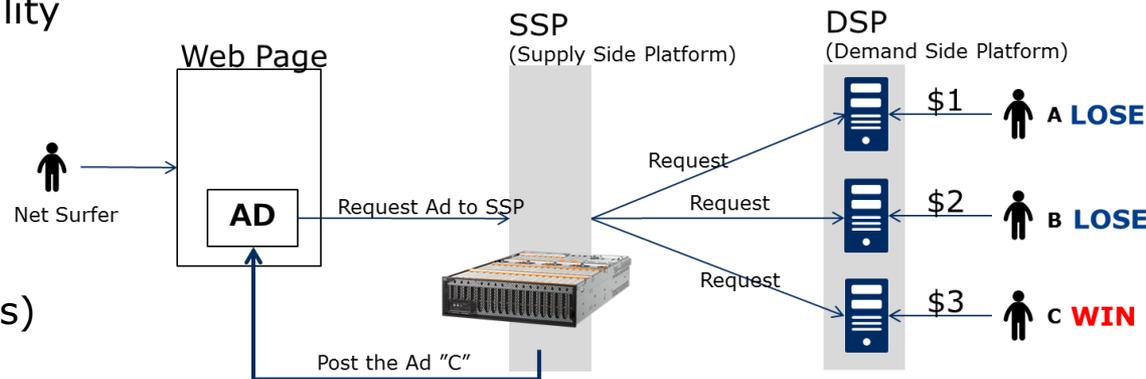
Example of the usage with massive access and processing.

Category	B2C	B2B	Parallel Computing
Usage	<ul style="list-style-type: none"> Service of many members Web server 	<ul style="list-style-type: none"> Large scale system Enterprise (Global / Regional) 	<ul style="list-style-type: none"> Data Platform for Hadoop Parallel Processing In-Memory Processing
Example	<p>SNS(KVS)</p>  <p>e-Commerce SSL</p> 	<p>VDI</p>  <p>IaaS</p> 	<p>HPC(as for compute node)</p>  <p>Hadoop (Spark)</p> 

Case Study: Rubicon

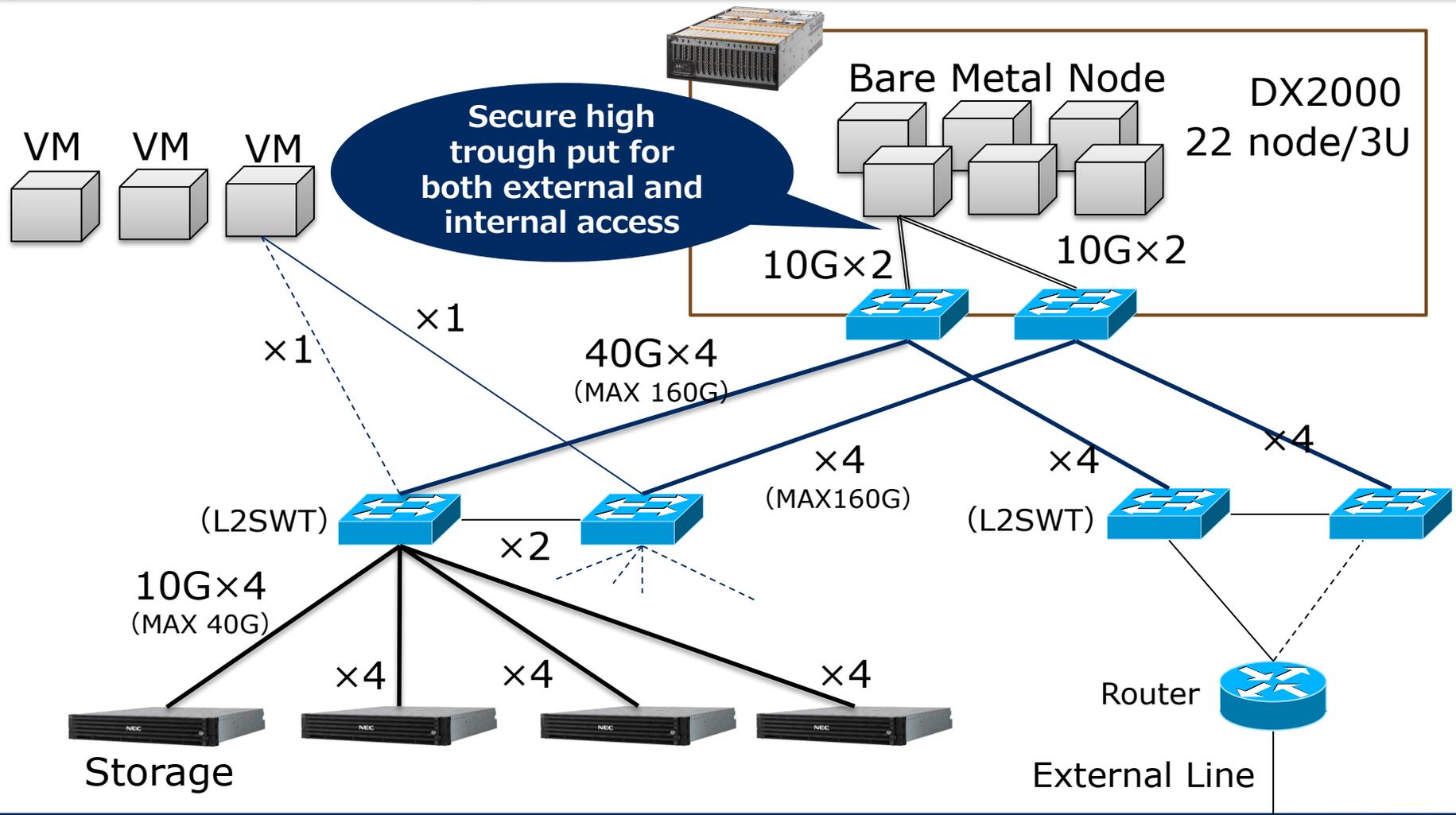
Rubicon Project (LA)

- Internet based marketing matching service company automating the buying and selling of advertising.
- Customer's challenge
 - High density & low power consumption
 - In-memory transaction
 - Network low latency (less than 150ms)
 - Easy maintenance and serviceability
 - Global support
- Competitor: HP Moonshot
- Active POC
 - New Datacenter in Amsterdam
 - 20 enclosure of DX2000 (16 cores)
 - \$2M sales



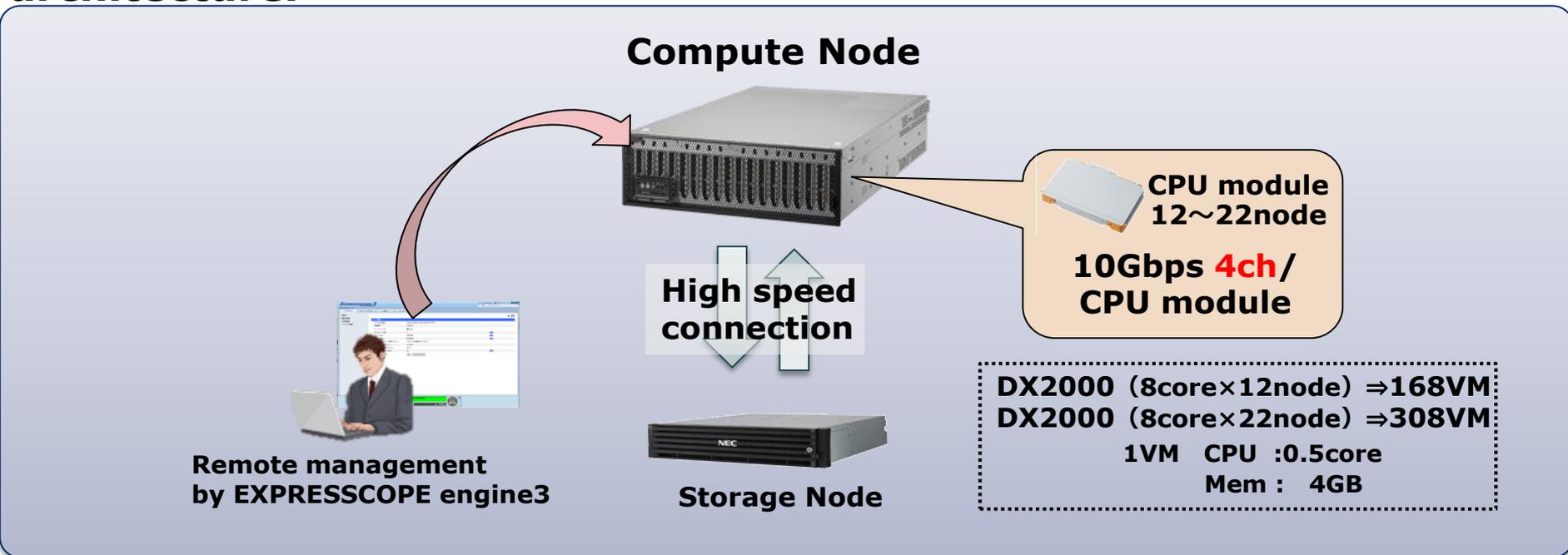
Use Case: Bare Metal Cloud Compute Node

DX2000 can configure 2 x 10G network for each node. This configuration marks high performance for bare metal computing process and also saves space that reduces the Opex cost.



Use case: IaaS -private cloud-

Adopting DX2000 as the cloud platform which requires scale-out architecture.



Possible to deploy 300VM in the single chassis for large enterprise or group company use.

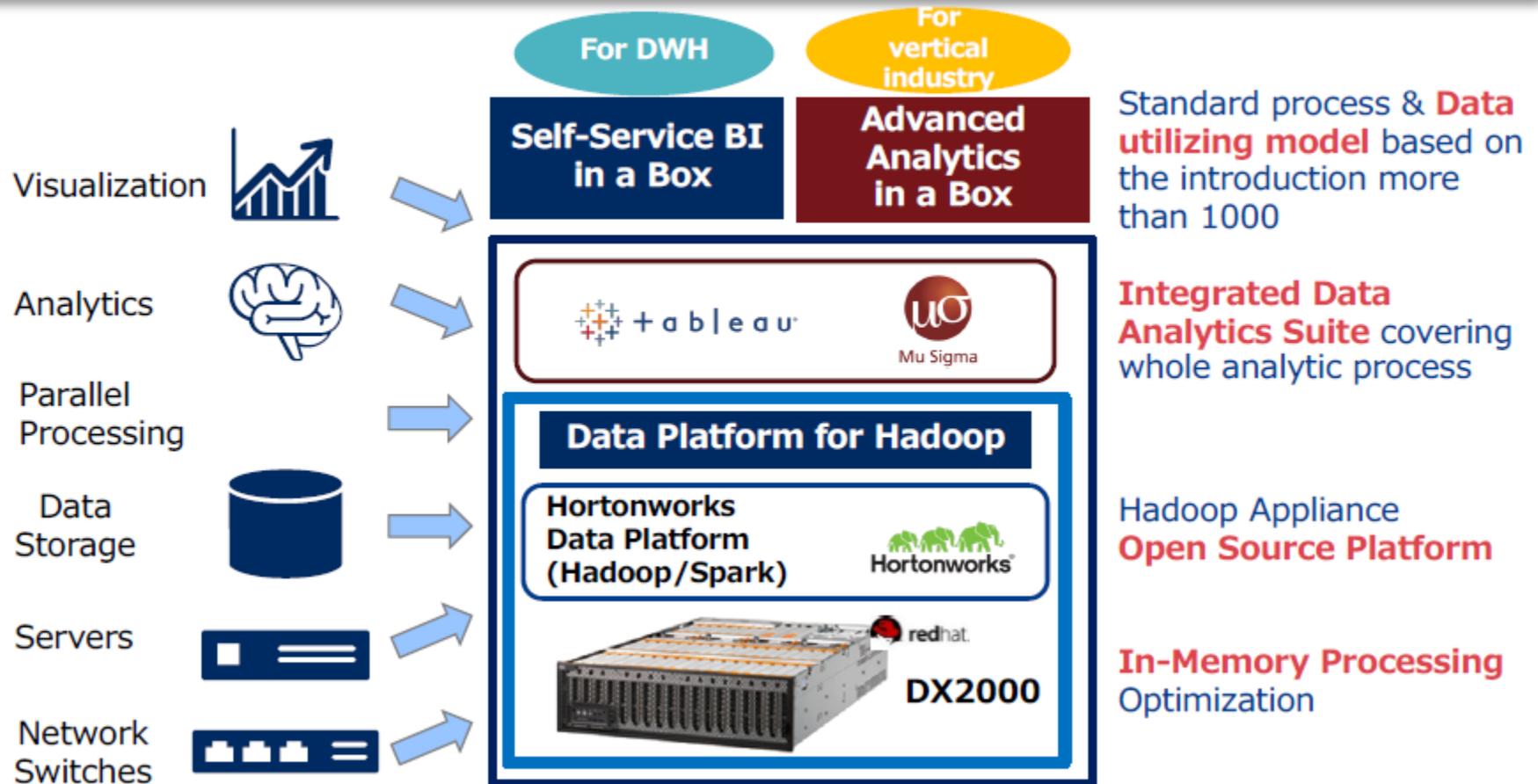
it is possible to make 300VM in a chassis

10GB x 4 network/server allows high speed connection between external storage.

Applicable for VDI platform.

NEC DPH concept

- All in one solution which includes HW, Analytics and Visualization tool in a Box- Pre validated, pre installed and easy deployment



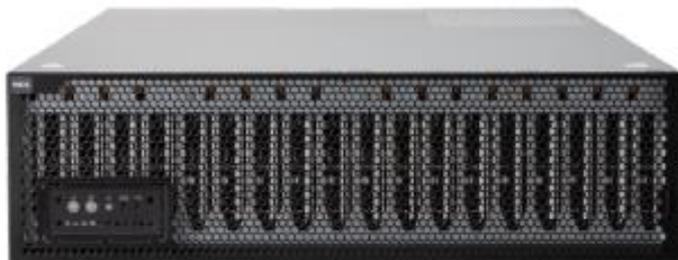
DHP: Data Platform for Hadoop

- * Integrated insulation tool will be provided.
- * Tableau license needs to be purchased separately.

Converged Solution as Data Platform for Hadoop

- Optimized in-memory processing design
- Super high density solution in a box to save space & energy
- Easy scale out

DX2000



Server module X1

Processor

Intel Processor
D-1541 (8C/16T)



Memory

DDR4SO-DIMM 64GB

DX2000 for Data Platform for Hadoop

- Compute** 14 Node – 34 Node
112 Cores – 272 Cores
896 GB RAM – 2,176 GB RAM
7 TB – 17 TB Internal Disk (SSD)
- Storage** 4 JBOD - 6 JBOD
RAW Storage 96TB – 432TB
- Network** 2 X Network Switch Modules
Internal 10GB X 2 per server
External 40 GB X 8 per switch

Wide	depth	Height	Weight
448mm	732mm	130mm	48kg

Sales Tools/Marketing Collaterals



DX Server Sales Tools (1/3)

Data Sheet for DX2000

Data Sheet
April 2016

Scalable Modular Server
DX2000

Orchestrating a brighter world **NEC**



Key Features

- 3U rack enclosure with up to 44 server nodes
- Up to 572 server nodes in a 42U server rack
- Support for the latest Intel® Xeon® Processor D Family
- Up to 64GB of high-speed DDR4 memory per server node
- Up to 2.8TB memory per enclosure
- Two or four 10GbE links per server node
- 150GB/s of total memory bandwidth per enclosure
- Full manageability with integrated EXPRESSSCOPE Engine 3

Ideal Platform to support IoT

Big data continues to flood the world in real time, generating valuable information that needs to be collected and analyzed using advanced analytics technology. The hardware generated through big data analysis creates a flow of information about people, things and services and is sent as the Internet of Things (IoT). The constant flow of information will bring a big impact to business, including changes in the process of knowledge creation, a new social value creation, reformation of industrial structure and industry reorganization. Today's businesses must quickly convert enormous amounts of data into valuable information that provides business insight as well as solutions that can use this new

power of IoT. To solve business challenges through IoT requires the ability to utilize big data, create high-speed big data analytics platform, and use an advanced analytics engine to analyze various forms of data such as text, images, audio and video. The Scalable Modular Server DX2000 from NEC is at the core of a high-speed big data analytics platform that delivers both high-speed processing and extreme density, while providing total solutions for big data utilization. NEC's solutions support building an IoT platform that will help lead your business to the next stage.

Features

- **Perfect For Big Data Solutions, Cloud and IoT**
The DX2000 is designed to deliver high-speed parallel processing with extreme density for big data solutions. It is suitable for organizations that want to analyze/realize accumulated data without high levels of knowledge. Also, solutions integrated with this server is ideal for companies that want to utilize an extremely large amount of complex data in order to achieve sales expansion and cost reduction, for example, through demand prediction and effective recommendations. In addition, the DX2000 is suitable for other scale-out computing platforms such as team neural cloud, virtual cloud and infrastructure as a Service (IaaS).
- **High Performance with Hyper Scalability**
The DX2000 incorporates up to 44 single-processor server modules with the energy-efficient, high-performance Intel® Xeon Processor D Family in a 3U enclosure, 1600 up to 2.8 TB total memory per enclosure (in 44 server nodes), the DX2000 provides extremely wide memory access bandwidth, which is approximately 5 times more than the total amount of memory access bandwidth that is provided by three conventional 1U rack, dual-processor general purpose servers. In addition, the total memory bandwidth among server nodes in a chassis is 880GB/s, while the up-link is 640GB/s. These features provide in-memory distributed processing for real-time big data analytics for up to thousands of servers, along with a reduced total cost of ownership because of advanced power efficiency and smaller footprint in the data center.
- **Simplified Manageability**
The integrated EXPRESSSCOPE Engine 3 technology of the DX2000 provides extensive remote management capabilities for chassis and module including out-of-band management of each server. All modules and shared components, including fans, power supply units, and switch modules are hot-swappable and easy to replace.

Module Enclosure

- 2.80GB/s (max/64MB)
- 0.16GB/s (min/64MB)
- 1.30GB/s (10-core/64MB)
- 1.30GB/s (10-core/64MB)

• 10 LAN modules with an optional 10G LAN module (Occupies one server node)

• 1000BASE-T for management

• 10 LAN modules and 8 slots can be used for PCI cards (except switches for configuration)

• 100W

• 1.3 Hz

• 67° F / 20 to 80° F (19° C / 20 to 80° C)

• Ambient temperature up to 50°C/122° F

• 30.3 x 5.1 Ft., 48 kg / 105.82 lbs.

For further information please contact your local NEC representative at:

Depot Management (Japan) NEC Corporation www.nec.com	North America (USA, Canada) NEC Corporation of America www.nec.com	APAC (South Asia, South East Asia, Oceania) NEC Asia Pacific Pte. Ltd. apac.nec.com	EMEA (Europe, Middle East, Africa) NEC Europe Solutions www.nec-europe.com
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Data Sheet 10-10000000

Data Sheet for DX1000

Micro Modular Server
DX1000

Powered by Innovation **NEC**

CONCENTRATED VERSATILE PLATFORM FOR DATA CENTER SOLUTIONS




EXTREME DENSITY

EXCEPTIONAL ENERGY EFFICIENCY

OUTSTANDING MANAGEABILITY

Extremely Dense and Flexible

The DX1000, an innovative micro modular server system, incorporates outstanding performance, performance per watt, flexibility and enterprise-class reliability in an extremely dense design. With over 700 nodes per rack and shared power, cooling, and networking resources, the DX1000 system provides maximum efficiency and availability. The DX1000 system operates in a 40 degree Celsius (104 degree Fahrenheit) environment, and accommodates flexible network and storage solutions in accordance with your system requirements.

Perfect for Datacenter Solutions

The DX1000, a 2U enclosure system with 46 Intel® processor-based micro modular servers, is designed for lightweight scale-out computing such as web hosting and big data analytics, as well as cloud services providers. The DX1000 is perfect as a concentrated versatile platform for data center solutions.

Efficiency

- Technology 40 degree (out-of-band)
- Intense cooling
- Supply design certified power efficiency.

Outstanding Manageability

- Extensive remote management capabilities for chassis and modules including out-of-band management of each server.
- All modules and shared components including fans, power supply units, Chassis Management Modules and switch modules are hot-swappable and easy to replace.

Module Enclosure

- 40 100W/100W/100W
- 10 100W/100W/100W

Power

- 100W
- 100W
- 100W

Network

- 10 10GbE
- 10 10GbE
- 10 10GbE

Other

- 10 10GbE
- 10 10GbE
- 10 10GbE

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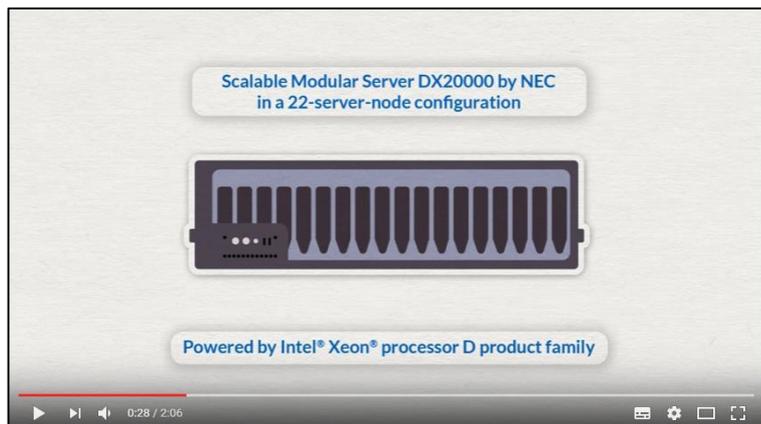
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Available at https://www.necam.com/Servers/Scalable_Modular/

DX Server Sales Tools (2/3)



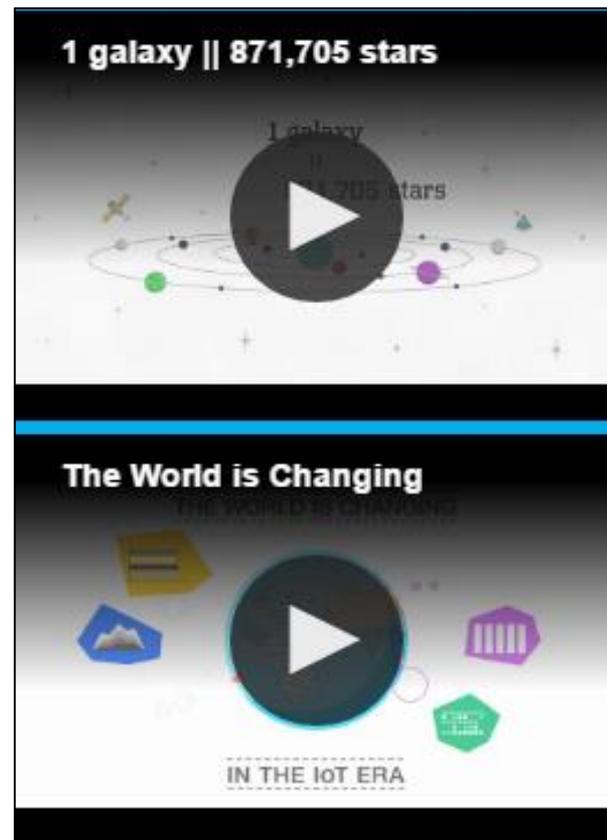
Introduction Video for DX2000

<https://youtu.be/UyORyFM27m0>



Introduction Video For DX1000

<https://youtu.be/85AIYtvaZuk>



DX Series Introduction at Intel® Cloud Builders

<https://cloudbuilders.intel.com/membership/nec>

Available at **You** 

DX Server Sales Tools (3/3)

Space-efficient, and scalable solution, powered by Red Hat® Enterprise Linux® OpenStack® Platform 7 & Apache Spark™



Powered by the Intel Xeon® processor D product family

44 customizable slots in just **3U** means resource flexibility

The modular NEC enclosure delivered **BIG DATA PERFORMANCE and COMPUTE DENSITY**

This compact design provided **IN-MEMORY CAPABILITIES** to speed up critical data analysis

Cut analysis time in half by adding server nodes

Nodes	Analysis Time (seconds)
8 nodes	247.4
12 nodes	179.1
16 nodes	139.6
19 nodes	122.0

Process **100 GB*** in **~2 minutes**



A Principled Technologies report: Hands on testing. Real-world results.

DX2000 from NEC lets you put big data to work with quick analysis in a robust, space-efficient, and scalable solution, powered by Intel®

Modern businesses generate and collect data at an incredible rate. The data sets are sometimes too large for the traditional processing, and the emergence of big data fuels the need to process and analyze data differently than we have in the past. Analyzing and understanding big data is vital to the success of most businesses as it can lead to improvements in:

- Customer experience
- New products or services
- Revenue generation
- Customer base growth
- Market reach
- Customization of existing products or services

Just collecting data is not enough; to get these improvements you have to identify data patterns in a speedy, scalable, and flexible hardware and software solution.

We set up a new Scalable Modular Server DX2000 from NEC, powered by the Intel Xeon® processor D product family. We then configured a Red Hat Enterprise Linux® OpenStack® cloud environment with Apache Spark™, an industry-leading big-data analytics engine, to put the DX2000 through its paces. The solution analyzed a big data sample set – not only quickly and efficiently, but most importantly – in a predictable, scalable fashion. When we added more server nodes, it processed the big data more quickly.

Find patterns in **100GB** of data in **~2 minutes**

Cut analysis time in half by adding server nodes

Nodes	Analysis Time (seconds)
8 nodes	247.4
12 nodes	179.1
16 nodes	139.6
19 nodes	122.0

Get all the facts at <http://facts.pt/p7bReD>

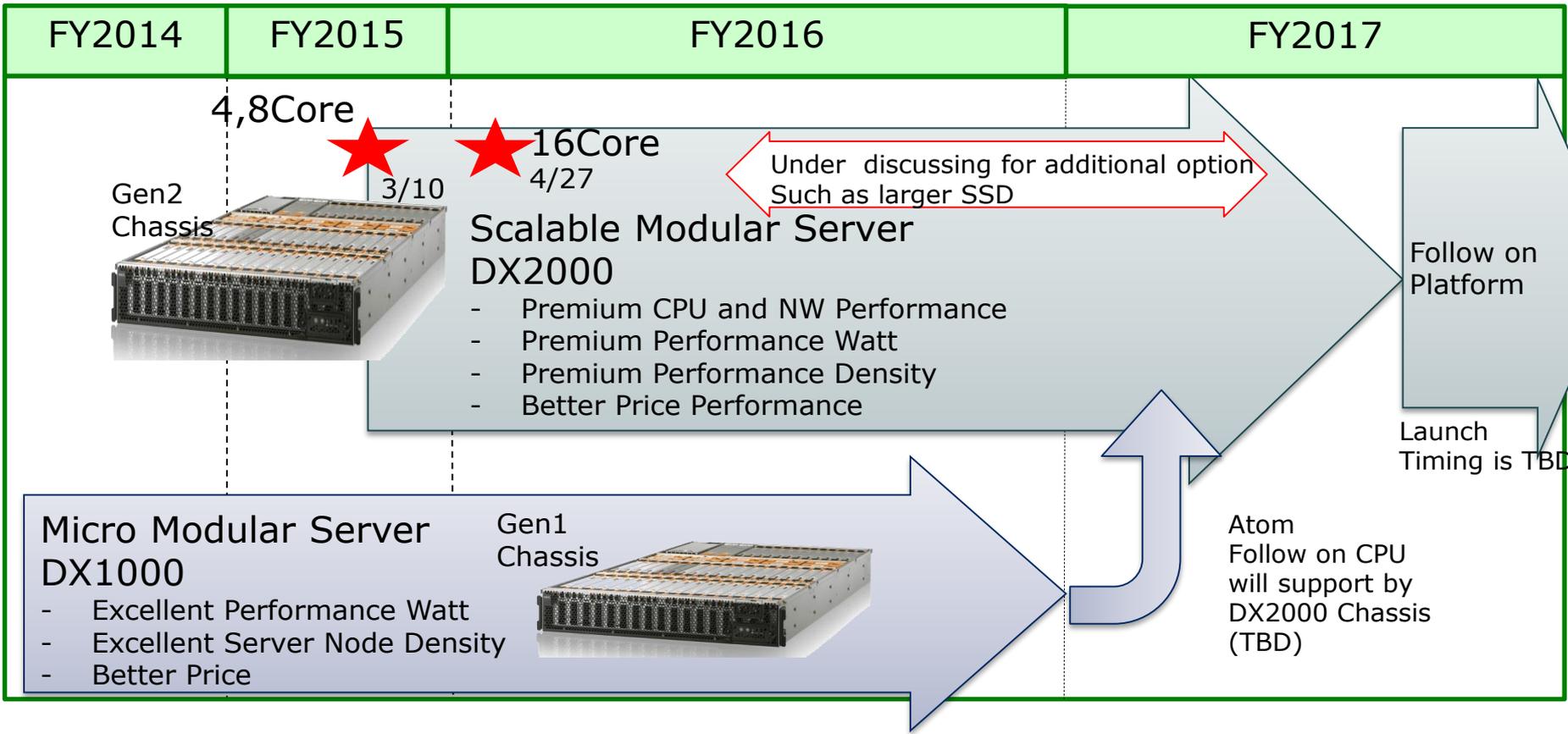


1. Basic demographic data refers to age, sex, income, ethnicity, language, religion, housing status, and location. Read a more detailed explanation and review at <http://dl.acm.org/citation.cfm?id=1536632>. Copyright 2016 Principled Technologies, Inc. Based on "DX2000 from NEC lets you put big data to work," a Principled Technologies report, April 2016. Principled Technologies is a registered trademark of Principled Technologies, Inc. All other product names are the trademarks of their respective owners.

Product Roadmap

DX2000: Roadmap

Subject to change without notice



 **Orchestrating** a brighter world

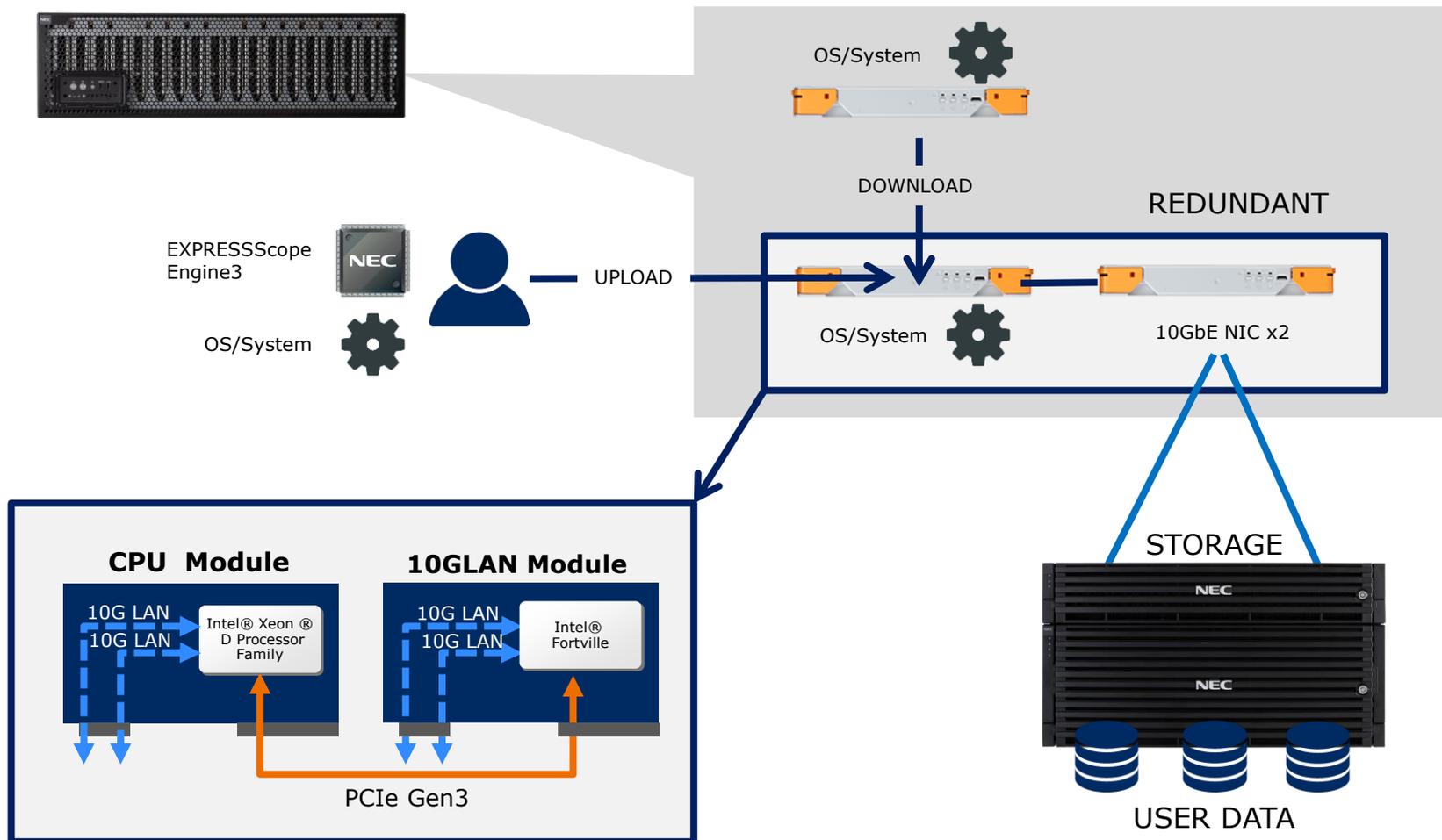
NEC



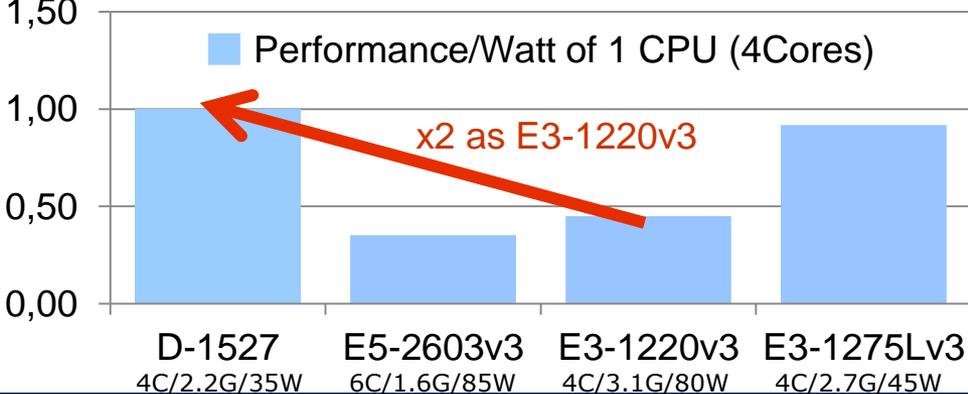
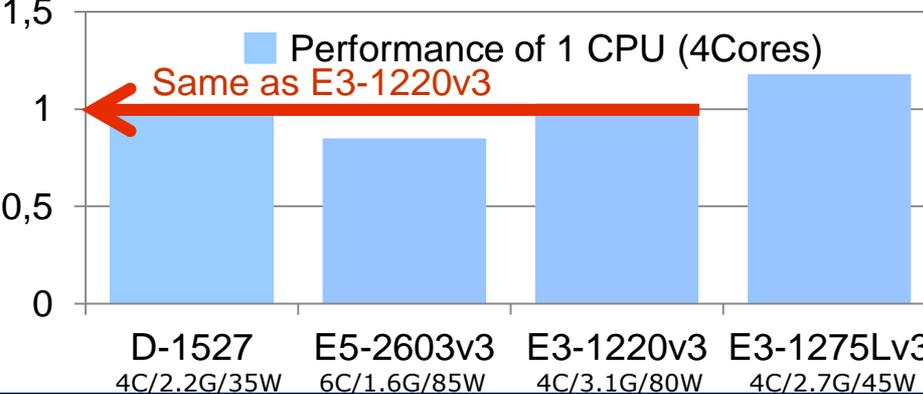
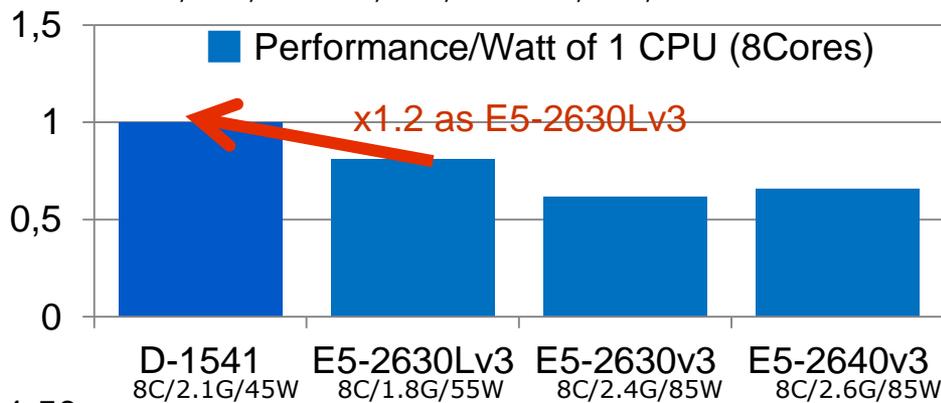
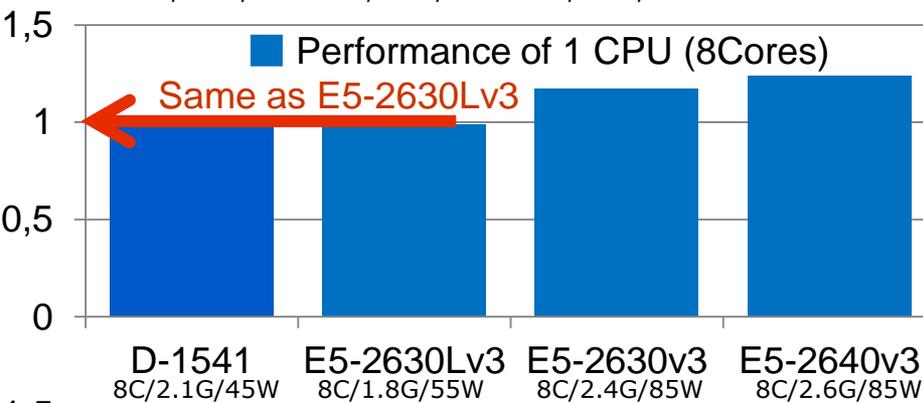
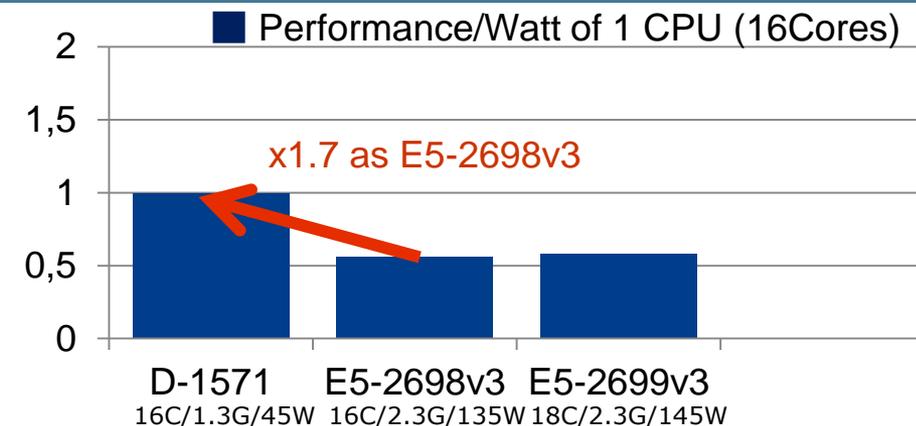
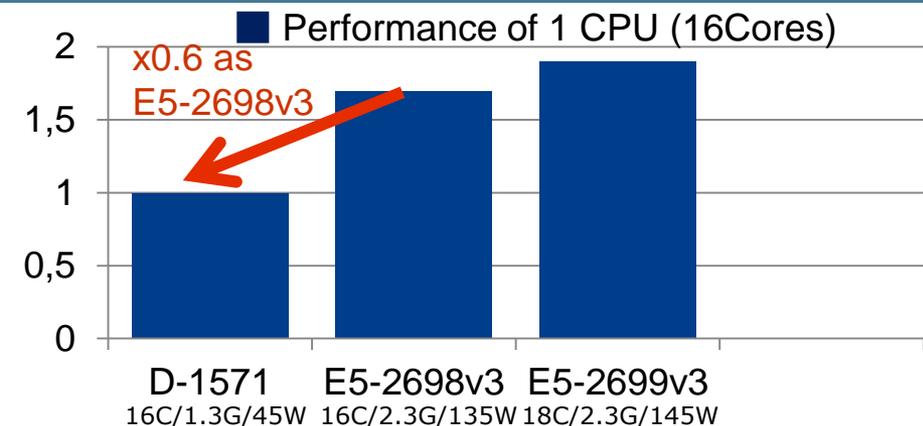
APPENDIX

10GbE LAN expansion card usage

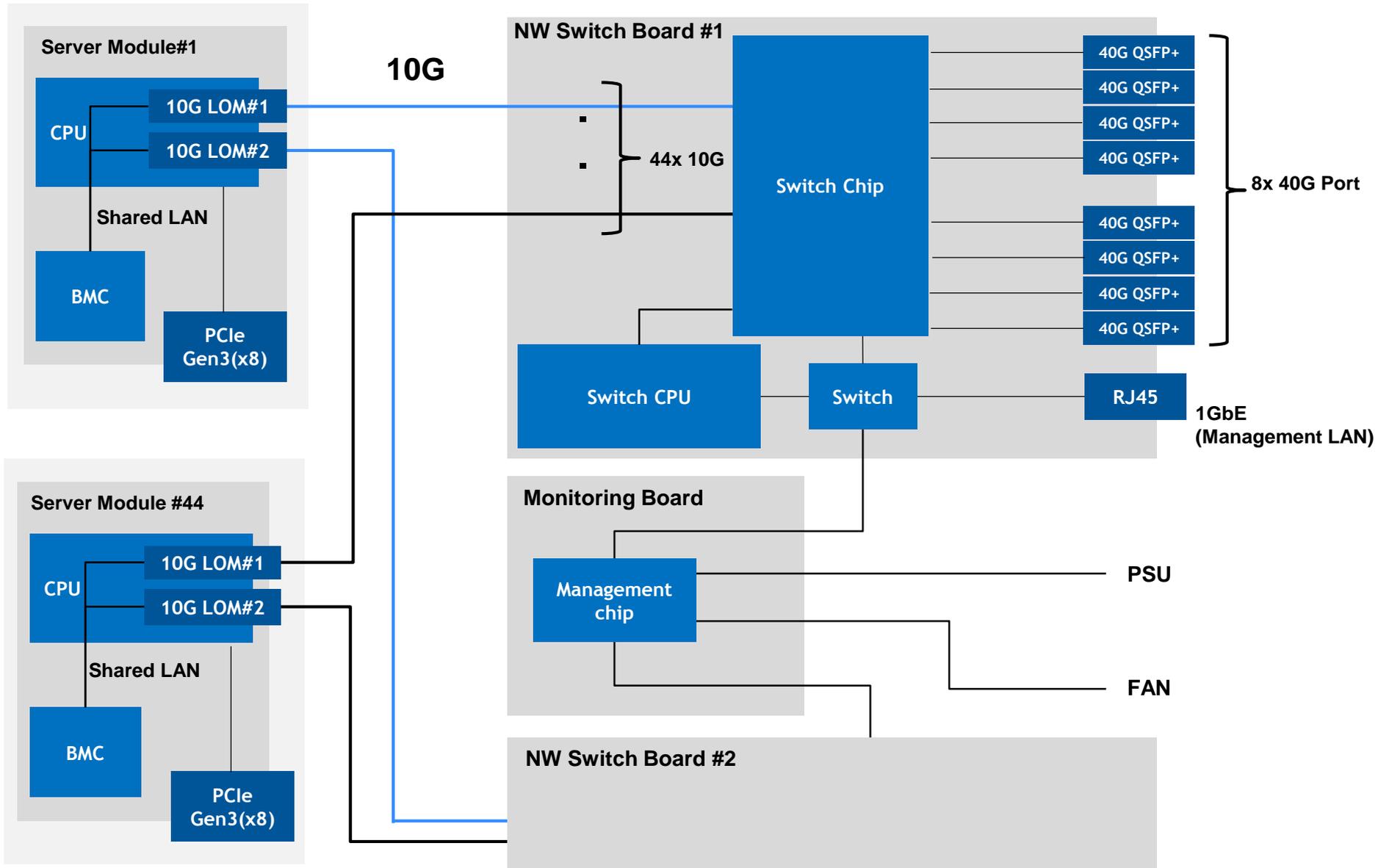
Redundant connection between storage and compute



CPU performance comparison



DX2000 Network and Management System Architecture



NEC EXPRESSScope Engine

Simple and smart remote server management.



Remote
Monitoring

Remote
Control

Remote
Operation



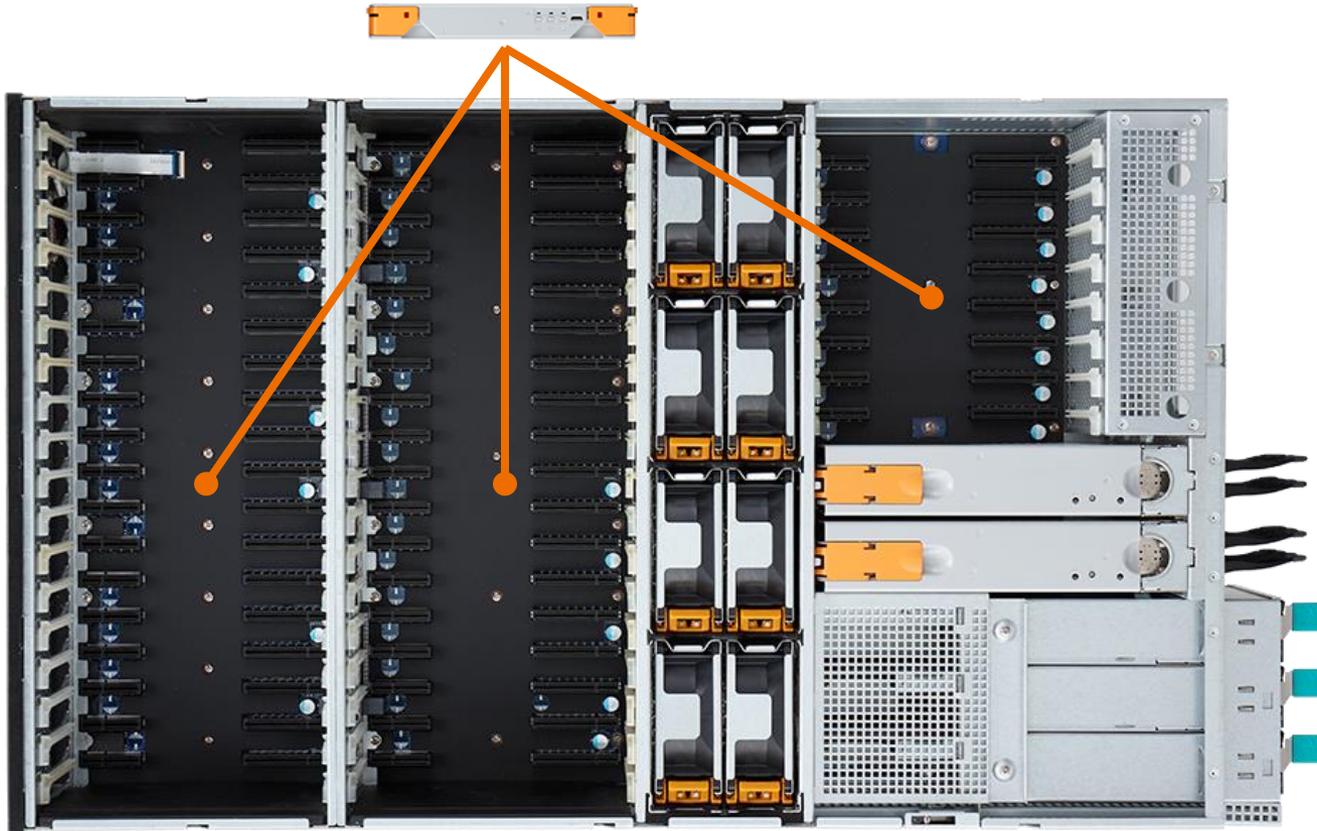
Specially designed baseboard management controller (BMC) chipset, to provide extensive remote management capabilities — from monitoring the health of remote server components including CPUs, memory, and cooling fans, to remotely controlling and powering on/off the servers — regardless of the status of the server's power or operating system.

DX2000 Specification Table

		SPECIFICATIONS	REMARKS	
Server Enclosure	Board slots	44x Slots (22 slots can be used for 10GbE LAN modules) (8 slots can be used for PCIe cards)	The number of installable modules may vary according to configuration and technical specification	
	FAN	8x Hot-Plug Chassis Fan	N+1	
	Power	3x Hot-Plug Power Supply (2+1)	1600W (@200v) 80PLUS Platinum	
	Dimension (WxDxH)	448mm x 769mm x 130mm (3U)	Fits standard 19" server rack Max 13 chassis per rack (39U)	
	Weight	Max 48kg	(similar to equivalent number of 3x1U server)	
Microboards	CPU Boards	CPU	1x D-1527(4C/2.2GHz/6MB) or D-1541(8C/2.1GHz/12MB)	1x Intel® Xeon® 4 Cores or 8 Cores Module (16Cores version planned)
		Memory	4x DDR4 2133MHz ECC SO-DIMM	Max 64GB
		Storage	128GB/256GB/512GB	1x M.2 SATA SSD
		LAN	2x 10GbE links to switch modules 2x additional 10GbE links to switch modules with an optional 10GbE LAN module	Occupies one module slot when optional LAN Module (10GbE x2) is used
		BMC	NEC EXPRESSScope Engine3	
	LAN Switch Board	CSC	1x Chassis Sensor Cards	
		LAN Switch Chip	1x chip @ LAN switch board	
		LAN I/F	2x L2 NW Switch Module External: 8x 40G QSFP (Data LAN) per switch + 1x 1000Base-T (Management LAN) per switch	
Others	Temperature & humidity conditions	Operating: 10 to 35°C/ 50 to 95°F , 20 to 80% Non-operating: -10 to 55°C/14 to 131°F, 20 to 80%	*In specific configurations, the operable ambient temperature is up to 40°C/104°F	
	Support OS	Red Hat® Enterprise Linux® 7.2 VMware ESXi™6.0 Microsoft® Windows® Server 2012 R2	More planned	

DX2000 Product Detail – example layouts

Empty Node Chassis



DX2000 Product Detail – example layouts

Chassis with 14 Nodes

- Minimum configuration, available with 4 and 8 cores modules



DX2000 Product Detail – example layouts

Chassis with 34 Nodes

- Available with 4 and 8 cores modules (and =max qty for 8 cores module)



DX2000 Product Detail – example layouts

Full 44 Nodes

- Only available with 4 cores based module



DX2000 Product Detail – example layouts

22x Nodes & 22x LAN modules

