Redpaper

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IBM System Storage N series Hardware Reference

Introduction

In this IBM® Redpaper™ publication we include reference figures that are useful for selecting the needed hardware (HW) features before installing and configuring the systems. In particular, we provide figures of:

► N series appliance models with technical specifications
► N7000/6000/3000 series model rear views
► N series Gateway models with technical specifications
► Fibre Channel and Ethernet adapter cards summary
► Serial-attached SCSI (SAS) and special purposes adapter cards summary
► Disk drive summary
► Shelf enclosures and N3300 rear view

For updated information also refer to the following Web site and select the specific model to verify whether updates are available:

http://www-03.ibm.com/systems/storage/network/

http://www-03.ibm.com/systems/storage/network/

The information provided here is updated with the Data ONTAP® 8.0-7 mode release HW reference.

Figure 1 provides a quick summary of the capacity information for currently available IBM N series models (as appliance, with EXNx00 external shelves). You can check your environment's raw capacity needs and number of disk shelves. Check that the capacity provided is the raw one and not the possible user net capacity, which varys depending on your data-protection selection, snapshot criteria, advanced copy services enablement.

IBM N series appliance models (Axx)

Model	N7900	N7700	N6070	N6060	N6040	N3600	N3400	N3300
System Capacity Raw Max (2TB dr)	2352TB	1680TB	1680TB	1344TB	840TB	208TB	272TB	136TB
Max Aggregate [2] (32-bit / 64-bit)	16TB / 100TB	16TB / 70TB	16TB / 70TB	16TB / 50TB	16TB / 40TB	16TB / -	16TB / 30TB	16TB[5] / -
Max EXN3000 Shelves	49	35	35	28	17.5	4	4	-
Max EXN-4000/ 1000 Shelves	84	60	60	48	30	6	8	4
Max Drive Quantity	1176	840	840	672	420	104 (20 Int + 84 Ext)	136 (12 Int + 124 Ext)	68 (12 Int + 56 Ext)
Height (HA/Single)	12U / 6U	12U / 6U	6U / 6U	6U / 6U	6U / 6U	4U / 4U	2U / 2U	2U / 2U
Weight (HA/Single)	242 lb. (109.6 kg) 121 lb. (54.8 kg)	242 lb. (109.6 kg) 121 lb. (54.8 kg)	122 lb. (55.3 kg) 95 lb. (43.1 kg)	122 lb. (55.3 kg) 95 lb. (43.1 kg)	122 lb. (55.3 kg) 95 lb. (43.1 kg)	110 lb. (50 kg) with drives	66 lb. (29.9 kg) with drives	66 lb. (29.9 kg) with drives
AC Power (HA only)	100-120V 11.2A 200-240V 5.8A	100-120V 10.8A 200-240V 5.6A	100-120V 8.1A 200-240V 4A	100-120V 7.7A 200-240V 4.3A	100-120V 5.9A 200-240V 2.9A	100-120V 5.7A 200-240V 2.9A	100-120V 4.6A 200-240V 2.3A	100-120V 4.1A 200-240V 2.2A
Thermal[3] (HA/Single)	3,740 BTU/hr 1,870 BTU/hr	3,624 BTU/hr 1,812 BTU/hr	2,761 BTU/hr 1,602 BTU/hr	2,594 BTU/hr 1,502 BTU/hr	2,026 BTU/hr 1,272 BTU/hr	2,247 BTU/hr 1,988 BTU/hr	1,518 BTU/hr 1,279 BTU/hr	1,587 BTU/hr 1,298 BTU/hr
Processor (HA/Single)	8 / 4 64-bit dual-core	4 / 2 64-bit	4 / 2 64-bit dual-core	4 / 2 64-bit dual-core	2 / 1 64-bit dual-core	2 / 1 32-bit	2 / 1 32-bit dual-core	2 / 1 32-bit
Memory (HA/Single)	64GB / 32GB	32GB / 16GB	32GB / 16GB	16GB / 8GB	8GB / 4GB	4GB / 2GB	8GB / 4GB	2GB / 1GB
NVRAM (HA/Single)	4GB / 2GB	1GB / 512MB	4GB / 2GB onboard	4GB / 2GB onboard	1GB / 512MB onboard	512MB / 256MB NVMEM	1GB / 512MB NVMEM	256MB / 128MB NVMEM
PCI Slots (HA/Single)	10 / 5 (PCIe) 6 / 3 (PCI-X)	10 / 5 (PCIe) 6 / 3 (PCI-X)	8 / 4 (PCIe)	8 / 4 (PCIe)	8 / 4 (PCIe)	2 / 1 (PCIe)	-	-
Ethernet (HA/Single)	12 / 6 GbE RJ45	12 / 6 GbE RJ45	4 / 2 GbE RJ45	4 / 2 GbE RJ45	4 / 2 GbE RJ45	4 / 2 GbE RJ45	8 / 4 GbE RJ45	4 / 2 GbE RJ45
FC Ports (HA/Single)	16 / 8 4Gb SFP[4]	16 / 8 4Gb SFP[4]	8 / 4 4Gb SFP[4]	8 / 4 4Gb SFP[4]	8 / 4 4Gb SFP[4]	4 / 2 4Gb SFP[4]	4 / 2 4Gb SFP[4]	4 / 2 4Gb SFP[4]
SAS Ports (HA/Single)	- / -	- / -	- / -	- / -	- / -	- / -	2 / 1 12Gb QSFP	- / -
Data ONTAP[6] (Min Release)	7.2.4 / 8.0 /	7.2.4 / 8.0	7.2.5 / 8.0	7.2.6 / 7.3.1 / 8.0	7.2.5 / 8.0	7.2.2L1	7.3.2 / 8.0	7.2.2L1

Notes

[1] System capacity is calculated using base 10 arithmetic (i.e. 1TB=1,000,000,000,000 bytes) and is derived based on the type, size, and number of drives.

[2] Maximum volume/aggregate size is calculated using base 2 arithmetic (1TB = 2⁴⁰ bytes).

[3] The thermal dissipation values shown are based on typical system values at 100-120V input voltage. Please refer to the Site Requirements

[4] Autosensing ports: 1, 2, 4Gb.

[5] Beginning with Data ONTAP 7.3.1, N3300 systems support aggregates up to 16TB raw capacity, provided that the root volume is hosted in a dedicated aggregate (no user data) or by maintaining two spare disks per controller.

HA Pair Notes

HA pair configuration means two controllers - both actively serving data - are connected for automatic failover protection. The interconnect options are applicable to HA pair configurations using NVRAM5 and NVRAM6 adapters.

NOTE: In order to achieve the maximum 500 meter distance between controllers in a HA pair, the interconnect cable must be a direct point-to-point connection with no intermediate device between them (such as patch panel).

HA configurations that must go through a patch panel can use specific part numbers in conjunction with the Cu-to-Op converters.

Terms and Abbreviations

BTU – British Thermal Unit
Cu – Copper Connector
FC – Fibre Channel
GbE – Gibabit Ethernet
HA – High Availability (2 clustered nodes)
NVRAM – Non-Volatile RAM

Op – Optical Connector
PSU – Power Supply Unit
SAS – Serial-attached SCSI
SATA – Serial ATA
SFP – Small Form-Factor Pluggable
VAC – Volts Alternating Current

Figure 1 N series appliance models summary

Also, additional information was added (such as the environmentals and the controller internal characteristics) to make the reader aware of the needed elements when selecting the best system choice for his needs. Figure 1 can also be used for pre-installation activities when it is important to verify whether certain topics must be discussed (for example, space in the rack, available HBA slots, power requirements).

Figure 2 shows the rear view of the currently available N7000, N6000, and N3000 models (N3400 is shown in Figure 8 on page 8). The purpose is to make the reader aware of the essential components in the controller enclosures and the location of the expansion slots (if available) and the connection/management ports. In addition, dimensions are added (width x height x depth).
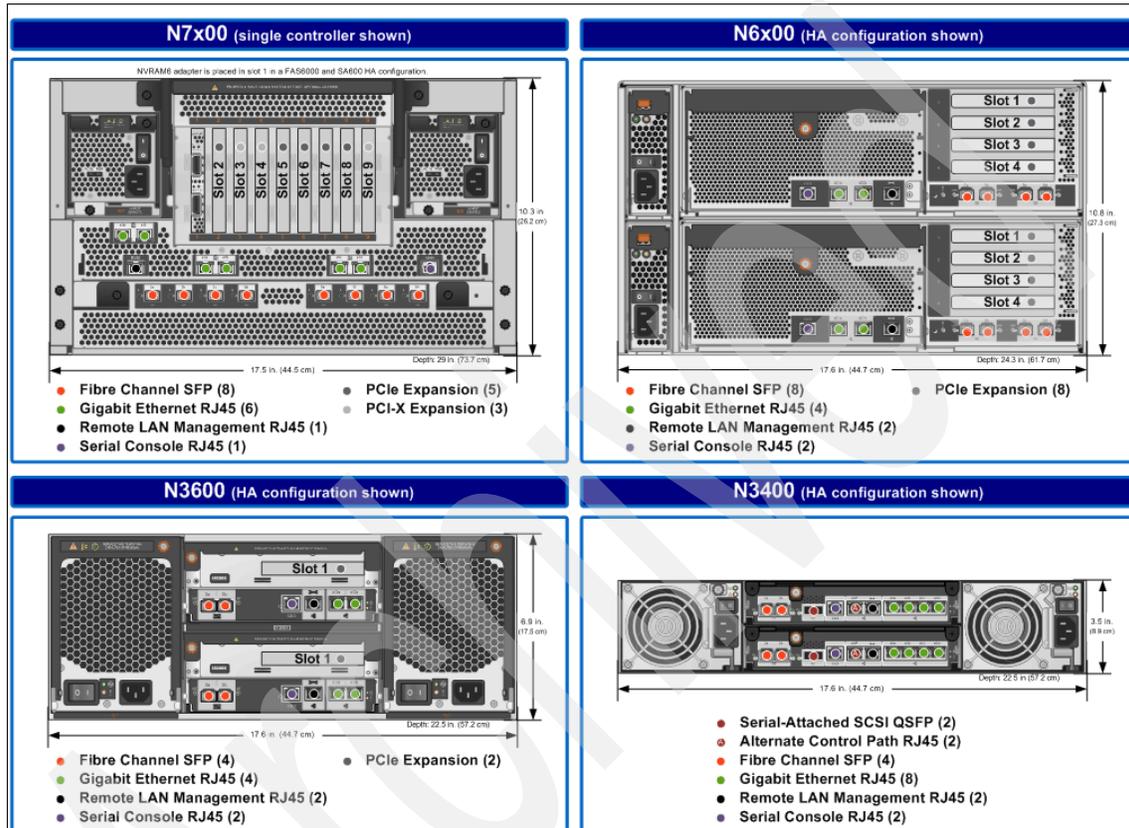

Figure 2   N series model rear views

Figure 3 on page 4 provides a quick summary of the capacity information for currently available IBM N series models (such as the gateway, when connected to external certified storage system or EXNx00 shelves). Additional information was added (such as the environmentals and the controller internal characteristics) to make the reader aware of the required elements when selecting the best system choice for his needs. Figure 3 on page 4 can also be used for pre-installation activities when it is important to verify whether certain topics must be discussed (for example, space in the rack, available HBAs, and power requirements).

IBM N series Gateway

Model	N7900	N7700	N6070	N6060	N6040
System Capacity Raw Maximum[1]	1176TB	840TB	840TB	672TB	420TB
Max Number of LUNs	1176	840	840	672	420

V-Series Supported Arrays

EMC CLARiiON
EMC Symmetrix
Fujitsu ETERNUS
Hitachi TagmaStore USP
Hitachi Lightning
Hitachi Thunder
HP StorageWorks
IBM TotalStorage
3Par InServ
TMS RamSan

Note: Please check the IBM web site for details and the latest N series gateway support matrix.

Environmental — HA Pair/Single Controller

	N7900	N7700	N6070	N6060	N6040
Height (HA/Single)	12U / 6U	12U / 6U	6U / 6U	6U / 6U	6U / 6U
Weight (HA/Single)	242 lb. (109.6 kg) 121 lb. (54.8 kg)	242 lb. (109.6 kg) 121 lb. (54.8 kg)	122 lb. (55.3 kg) 95 lb. (43.1 kg)	122 lb. (55.3 kg) 95 lb. (43.1 kg)	122 lb. (55.3 kg) 95 lb. (43.1 kg)
AC Power (HA only)	100-120V 11.1A 200-240V 5.8A	100-120V 22A 200-240V 10A	100-120V 8.1A 200-240V 4A	100-120V 7.7A 200-240V 4.3A	100-120V 5.9A 200-240V 2.9A
Thermal[2] (HA/Single)	3,740 BTU/hr 1,870 BTU/hr	3,624 BTU/hr 1,812 BTU/hr	2,761 BTU/hr 1,602 BTU/hr	2,594 BTU/hr 1,502 BTU/hr	2,026 BTU/hr 1,272 BTU/hr

Platform Specifications — HA Pair/Single Controller

	N7900	N7700	N6070	N6060	N6040
Processor (HA/Single)	8 / 4 64-bit dual-core	4 / 2 64-bit	4 / 2 64-bit dual-core	4 / 2 64-bit dual-core	2 / 1 64-bit dual-core
Memory (HA/Single)	64GB / 32GB	32GB / 16GB	32GB / 16GB	16GB / 8GB	8GB / 4GB
NVRAM (HA/Single)	4GB / 2GB	1GB / 512MB	4GB / 2GB onboard	4GB / 2GB onboard	1GB / 512MB onboard
PCI Slots (HA/Single)	10 / 5 (PCIe) 6 / 3 (PCI-X)	10 / 5 (PCIe) 6 / 3 (PCI-X)	8 / 4 (PCIe)	8 / 4 (PCIe)	8 / 4 (PCIe)
Ethernet (HA/Single)	12 / 6 GbE RJ45	12 / 6 GbE RJ45	4 / 2 GbE RJ45	4 / 2 GbE RJ45	4 / 2 GbE RJ45
FC Ports (HA/Single)	16 / 8 4Gb SFP[3]	16 / 8 4Gb SFP[3]	8 / 4 4Gb SFP[3]	8 / 4 4Gb SFP[3]	8 / 4 4Gb SFP[3]
Data ONTAP® (Min Release)	7.2.4 / 8.0	7.2.4 / 8.0	7.2.5 / 8.0	7.2.6 / 7.3.1 / 8.0	7.2.5 / 8.0

Notes

[1] System capacity is calculated using base 10 arithmetic (i.e. 1TB = 1012 bytes) and is derived based on the type, size, and number of drives.

[2] The thermal dissipation values shown are based on typical system values at 100-120V input voltage.

[3] Autosensing ports: 1, 2, 4Gb.

[4] Max performance and capacity are calculated using base 10 arithmetic

[5] Assumes deduplication at 20:1.

[6] Assumes that deduplication is disabled and that data is compressible at 2:1.

Terms and Abbreviations

BTU – British Thermal Unit
Cu – Copper Connector
FC – Fibre Channel
GbE – Gibabit Ethernet
HA – High Availability
NVRAM – Non-Volatile RAM
LUN – Logical Unit Number
Op – Optical Connector
SFP – Small Form-Factor Pluggable
VAC – Volts Alternating Current

Figure 3   N series gateway models summary

Maximum capacity is still reported with 1 TB Seral Advanced Technology Attachement (SATA) drives reference. Specific external storage system certification data is not provided here. For that information refer to the interoperability site:

http://www.ibm.com/systems/storage/network/interophome.html

Figure 4 shows the currently available expansion/connection cards that you can order for both FC (internal and external) and IP connectivity. It is extremely important to be aware of the potential system expandibility when you have the need to add more disk shelves or when connecting the systems to new servers (via LAN, SAN, or both). The reader can plan its upgrade checking where the new expansion HBAs can be added (PCIe or PCIx slots), avoiding unplanned conflicts due to having no more available slots.

	Feature Code	Media	Data ONTAP (min release)	N series Appliance						N series Gateway				
				7900	7700	6070	6060	6040	3600	7900	7700	6070	6060	6040
FIBRE CHANNEL — PCIe	1017 FCP TARGET Dual Port 4Gb	Op - LC	7.2	4	4	2	2	2		4	4	2	2	2
	1030 FCP TARGET Quad Port 4Gb	Op - LC	7.3	4	4	4	4	4	1	4	4	4	4	4
	1036 FCP TARGET Dual Port 8Gb	Op - LC	7.3	4	4	4	4	4	1	4	4	4	4	4
	10156 DISK/TAPE Dual Port 4Gb	Op - LC	7.2 10.0.1	3	3	4	4	4	1	3	3	4	4	4
	1029 DISK Quad Port 4Gb	Op - LC	7.2.2	5	5	4	4	4	1	5	5	4	4	4
	1035 DISK/TAPE Quad Port 4Gb	Op - LC	7.2.3	5	5	4	4	4						
	1014 DISK Dual Port 4Gb	Op - LC	7.2 10.0.1	5	5	4	4	4	1	5	5	4	4	4
ETHERNET — PCIe	1022 TOE Quad Port GbE	Cu – RJ45	7.2.1	5	5	4	4	4		5	5	4	4	4
	1031 TOE Dual Port 10GbE	Op - LC	7.2.3 10.0.3	5	5	4	4	4		5	5	4	4	4
	1012 NIC Dual Port GbE	Op - LC	7.2	5	5	4	4	4	1	5	5	4	4	4
	1013 NIC Dual Port GbE	Cu – RJ45	7.2 10.0.1	5	5	4	4	4	1	5	5	4	4	4
	1023 NIC Quad Port GbE	Cu – RJ45	7.2.1 10.0.1	5	5	4	4	4	1	5	5	4	4	4
	1062 NIC Single Port 10GbE	Op - LC	7.3.2						1					
	1065 NIC Dual Port 10GbE	Op - LC	7.3.2	5	5	4	4	4		5	5	4	4	4
	1026 iSCSI Dual Port GbE	Cu – RJ45	7.2.1	5	5	4	4	4	1	5	5	4	4	4
	1021 iSCSI Dual Port GbE target	Op - LC	7.2.1	5	5	4	4	4	1	5	5	4	4	4
ETHERNET — PCI-X	1008 TOE Single Port 10GbE	Op - LC	7.2 10.0.1	2	2					2	2			
	1007 TOE Quad Port GbE	Cu – RJ45	7.2	2	2					2	2			
	1010 iSCSI Dual Port	Cu – RJ45	7.2	3	3					3	3			
	1011 iSCSI Dual Port	Op - LC	7.1.1	3	3					3	3			

Please refer to the IBM configuration guidelines for proper platform and expansion slot assignment information.

Figure 4   N series FC and Ethernet adapter cards

See Figure 1 on page 2 and Figure 3 on page 4 for appliance or gateway compatibility.

Figure 5 shows the currently available expansion/connection cards for SAS/SCSI and specific features connectivity. It is extremely important to be aware of the potential system expandibility when adding more disk shelves, when connecting the system to new servers (via LAN, SAN, or both), or when enabling new features. The reader can plan the upgrade by checking where the new expansion HBAs can be added (PCIe or PCIx slots).

Figure 5   N series SAS/SCSI and special-purpose adapter cards

Refer to Figure 1 and Figure 3 for appliance or gateway compatibility.

Figure 6 shows the schema of the currently available disk drive technologies and external disk shelves compatibility for the N series family. Here you can check which drives can be ordered and installed in the shelves and the FC speed that can be set up in the loop.

Figure 6   N series disk drive summary

Older (72 GB/10 K, 72 GB/15 K, 144 GB/10 K, 144 GB/15 K, 300 GB/10 K, 250 GB/7.2 K, 750 GB/7.2 K) drives are no longer available as new features and are not reported here.

In Figure 7 and Figure 8 we provide the essential technical specification needed to plan the selection and installation of the currently available external disk shelves (EXN1000/3000/4000) for adding capacity to the N series nodes.

| Model	Feature Code	Weight	Disk	Rack	Power (Amps @100-120V)		Thermal (BTU/hr)		EOA/EOS	(min release)
EXN2000		Empty 50.06 lb. (23 kg) With Drives 77 lb. (35 kg)	14	3U	**10K RPM** 72GB: 3.43A 144GB: 3.43A 300GB: 3.89A	**15K RPM** 72GB: 3.63A 144GB: 3.75A 300GB: 4.32A	**10K RPM** 72GB: 1,167 144GB: 1,167 300GB: 1,320	**15K RPM** 72GB: 1,234 144GB: 1,272 300GB: 1,470 450GB: 1,470	05.2008 06.2013	6.4.1 / 7.X 8.0 / 10.0
EXN4000	4006 (300GB drives) 4007 (450GB drives) 4008 (600GB drives)	Empty 50.06 lb. (23 kg) W/O Drives: 68 lb. (30.8 kg) With Drives 77 lb. (35 kg)	14	3U	**10K RPM** 72GB: 3.01A 144GB: 3.36A 300GB: 3.78A	**15K RPM** 72GB: 3.65A 144GB: 3.45A 300GB: 4.27A 450GB: 4.27A 600GB: 4.27A	**10K RPM** 72GB: 1,020 144GB: 1,140 300GB: 1,287	**15K RPM** 72GB: 1,238 144GB: 1,174 300GB: 1,452 450GB: 1,452 600GB: 1,452	-	7.2.1 / 7.3 8.0 / 10.0.1
EXN1000	4012 (500GB drives) 4019 (750GB drives) 4016 (1TB drives) 4021 (2TB drives)	Empty 50.06 lb. (23 kg) W/O Drives: 68 lb. (30.8 kg) With Drives 77 lb. (35 kg)	14	3U	250GB: 2.72A 500GB: 2.90A 750GB: 3.22A 1000GB: 3.10A 2000GB: 3.10A		250GB: 923 500GB: 1,095 750GB: 1,050 1000GB: 1,050 2000GB: 1,050		-	6.5 / 7.X 8.0 / 10.0
EXN3000	4012 (300GB SAS) 4016 (450GB SAS) 4017 (600GB SAS) 4018 (500GB SATA) 4020 (1TB SATA) 4021 (2TB SATA)	Empty: 21.1 lb. (9.6 kg) W/O Drives: 53.7 lb. (24.4 kg) With Drives: 110 lb. (49.9 kg)	24	4U	**SAS** 300GB: 6.0A 450GB: 6.3A 600GB: 6.3A	**SATA** 500GB: 4.4A 1000GB: 4.4A 2000GB: 4.4A	**SAS** 300GB: 2,048 450GB: 2,150 600GB: 2,150	**SATA** 500GB: 1,501 1000GB: 1,501 2000GB: 1,501	-	7.3.2 8.0

Figure 7   N series disk shelves
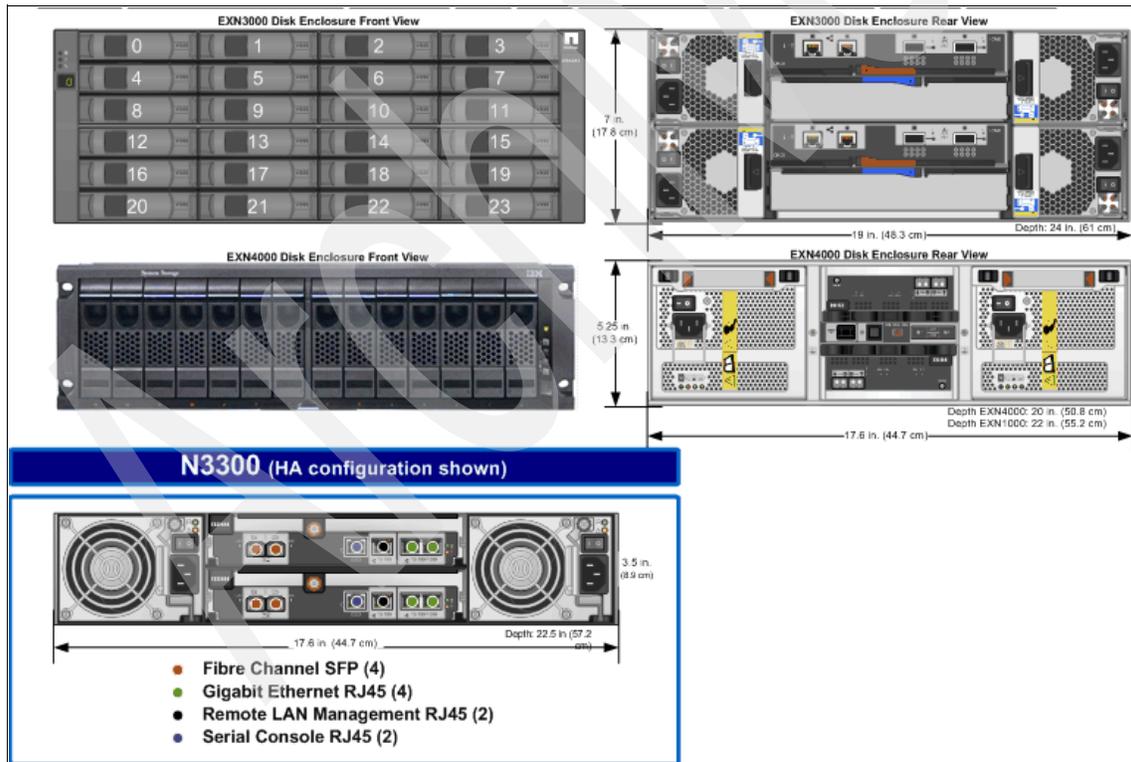
Figure 8   N3300 rear view

The rear view of the N3300 is added also. Refer to Figure 2 on page 3 for the other model rear views.

The team who wrote this IBM Redpaper publication

This paper was produced by a team of specialists from around the world working at the International Technical Support Organization, San Jose Center.

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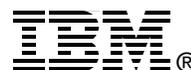
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