

December 10, 2003



United States

configuration and options guide

@server xSeries servers

IntelliStation workstations

Storage enclosures

Fibre Channel solutions

Options



IBM Server *Proven™*

ibm.com/pc/us/eserver/xseries/library

Major updates in this issue

- Added xSeries 365
- Added xSeries 455
- Added eServer BladeCenter JS20 blade server
- Added FAStT EXP100 Storage Expansion Unit
- Added Remote Supervisor Adapter II-EXA for xSeries 445
- Added PRO/1000 MT Server Ethernet Adapter by Intel
- Added Sales Building Block (SBB) support to selected systems
- Added product withdrawal dates for selected system models
- Updated xSeries 345 3.2GHz/533MHz processor option number
- Removed xSeries 440
- Removed Intellistation E Pro (6216 and 6226)
- Removed Intellistation M Pro machine type 6219
- Removed ServeRAID-4H and ServeRAID-4Mx adapters

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Information Sources

Europe, Middle East and Africa (EMEA)		
Audience	Where to go	How to get
IBM xSeries Configuration and Options Guide, Rack Configurator, Configuration Aid		
Business Partners and IBM Employees	www.pc.ibm.com/europe/configurators	Download or register for E-mail distribution
Feedback	psg_configure@uk.ibm.com	E-mail
Canada		
IBM xSeries Configuration and Options Guide		
Customers	www.pc.ibm.com/ca/eserver/xseries	Select <Literature>
Business Partners	www.pc.ibm.com/partner/ca	Select Marketing Essentials then Configurators (user ID and password required).
IBM Employees	Marketing Essentials	Main menu --> Configurators
Feedback	www.pc.ibm.com/partner/ca/feedback.html	-
IBM xSeries and Netfinity Rack Configurator		
Customers	www.pc.ibm.com/us/eserver/xseries	Select <Literature>
Business Partners	www.pc.ibm.com/partner/ca	Select Marketing Essentials then Configurators (user ID and password required).
IBM Employees	Marketing Essentials	Main menu --> Configurators
Feedback	xrackcfg@us.ibm.com	E-mail
Latest Product & Technical Information		
Customers	www.pc.ibm.com/ca/eserver/xseries/index.shtml	-
Business Partners	www.pc.ibm.com/partner/ca or call the PSMT	User ID and Password required.
IBM Employees	Marketing Essentials	From main menu or by brand category.
Latin America		
IBM xSeries Configuration and Options Guide		
Customers	www.pc.ibm.com/us/eserver/xseries	Select <Configuration Tools>
Business Partners	Marketing Essentials in ePartner	User ID and password required. ¹
IBM Employees	Marketing Essentials in Lotus Notes PartnerInfo	From main menu or by brand category.
Feedback	laconfig@us.ibm.com	E-mail
IBM xSeries and Netfinity Rack Configurator		
Customers	www.pc.ibm.com/us/eserver/xseries	Select <Configuration Tools>
Business Partners	Marketing Essentials in ePartner	User ID and password required. ¹
IBM Employees	Marketing Essentials in PartnerInfo	From main menu or by brand category.
Feedback	xrackcfg@us.ibm.com	E-mail
Latest Product & Technical Information		
Customers	www.pc.ibm.com/la	-
Business Partners	www.pc.ibm.com/la/ or www.pc.ibm.com/br	User ID and Password required. ¹
IBM Employees	Marketing Essentials in PartnerInfo	-

1. To request a user ID and password, go to www.pc.ibm.com/la. Select PC PartnerInfo, then select country. On the country page, select the link for PartnerInfo user ID and password requests.

The information contained in this document has not been submitted to any formal IBM test. The following paragraph does not apply to the United Kingdom or any country where any such provisions are inconsistent with local law:

The use of this information or the implementation of any of these techniques is a customer responsibility and depends on the customer's ability to evaluate and integrate them into the customer's operational environment. While each item may have been reviewed by IBM for accuracy in a specific situation, there is no guarantee that the same or similar results will be obtained elsewhere. Customers attempting to adapt these techniques to their own environments do so at their own risk.

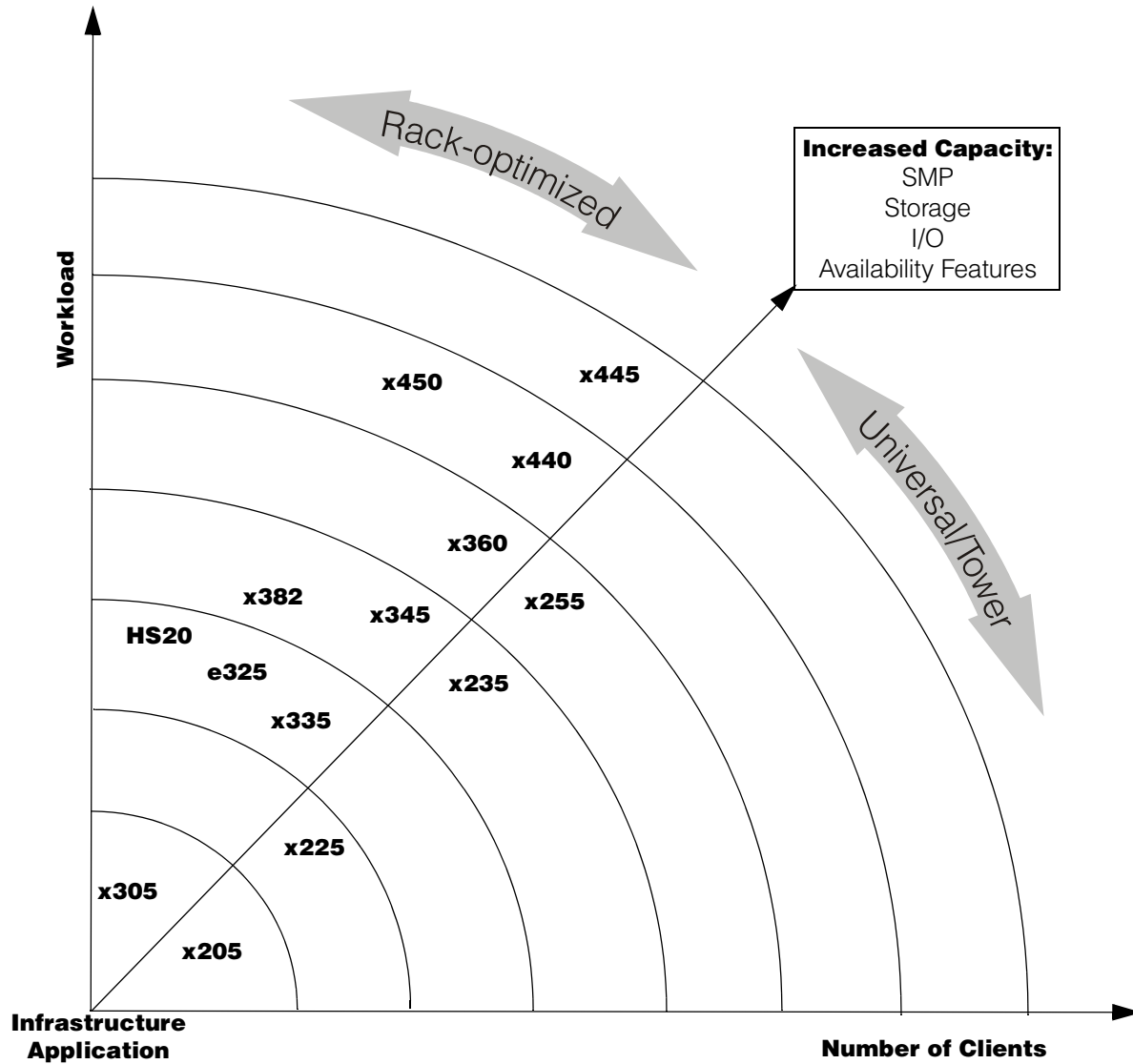
The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

United States		
Audience	Where to go	How to get
IBM xSeries Configuration and Options Guide		
Customers	www.pc.ibm.com/us/eserver/xseries	Select <Configuration Tools>
	www.pc.ibm.com/us/compat	Select <xSeries Compatibility>
Business Partners	www.pc.ibm.com/partner/us/	User ID and password required.
IBM Employees	PC Marketing Essentials (US) on Lotus Notes database D03DB035p_dir\pcpartnr\marketng\me4fe-us.nsf	Main menu --> Configuration and Options Guide
	serverproven.raleigh.ibm.com/cog/index.shtml	internal site
Feedback	cog@us.ibm.com	E-mail
IBM xSeries and Netfinity Rack Configurator		
Customers	www.pc.ibm.com/us/eserver/xseries	Select <Configuration Tools>
Business Partners	www.pc.ibm.com/partner/us/	User ID and password required.
IBM Employees	PC Marketing Essentials (US) on Lotus Notes database D03DB035p_dir\pcpartnr\marketng\me4fe-us.nsf	Main menu --> Configurators
Feedback	xrackcfg@us.ibm.com	E-mail
IBM xSeries Configuration Aid		
Customers, Business Partners, IBM Employees	www.pc.ibm.com/qtechinfo/MIGR-41411.html	-
	www.pc.ibm.com/us/eserver/xseries/library/configtools.html	-
Feedback	psg_configure@uk.ibm.com	E-mail
PC Sales Guide/Configurator and WorkPad Pricer (updated twice per week)		
Business Partners	psg.partner.boulder.ibm.com/partner/fpages.nsf/HTML/United+States.PSGC/\$FILE/pcconfig.html	User ID and password required.
IBM Employees	w3-1.ibm.com/psg/essentials/us/me4fe-us.nsf/\$\$FrameSet?ReadForm	Select Configurators.
Feedback	BMSHD08@us.ibm.com	E-mail
Latest Product & Technical Information		
Customers	www.pc.ibm.com/us/eserver/xseries or call 1-800-772-2227	-
Business Partners	www.pc.ibm.com/partner/us/ or call 1-800-426-7763	Select Products & Services (user ID and password required).
IBM Employees	PC Marketing Essentials (US) on Lotus Notes database D03DB035p_dir\pcpartnr\marketng\me4fe-us.nsf	From main menu or by brand category.
Additional URLs		
Audience	Where to go	How to get
Technical spec sheets (PSREF)	www.pc.ibm.com/us/eserver/xseries/library.html	Select Technical spec sheets (PSREF).
IBM Datacenter Solutions	www.pc.ibm.com/ww/eserver/xseries/windows/datacenter.html	-
Clustering (US, LA, CAN)	www.pc.ibm.com/ww/eserver/xseries/clustering/index.html	Select appropriate category or server.
Benchmark Results	www.pc.ibm.com/ww/eserver/xseries/benchmarks/	Select appropriate category or server.
Options/NOS/Server Compatibility	www.pc.ibm.com/us/compat	Select appropriate Product Type.
Active PCI	www.pc.ibm.com/us/compat	Select <xSeries Compatibility>, <Active PCI Info>.
IBM Storage Products	www.storage.ibm.com	Select appropriate category.
Adobe® Acrobat® Reader v5.0	www.adobe.com/products/acrobat/readstep.html	Follow instructions.
Adv Sys Mgmt Adapter Firmware	www.pc.ibm.com/ww/eserver/xseries	Select Servers, select Intel-based Servers, select Fixes, select Get Fixes, select appropriate category.
Flash BIOS Updates	www.pc.ibm.com/ww/eserver/xseries	Select Servers, select Intel-based Servers, select Fixes, select Get Fixes, select device drivers by server, select appropriate category.
ServeRAID™ Updates	www.pc.ibm.com/ww/eserver/xseries	Select Servers, select Intel-based Servers, select Fixes, select Get Fixes, select appropriate category.
VMware	www.pc.ibm.com/ww/eserver/xseries/vmware.html	-
Options Continuation Program	www.pc.ibm.com/ww/ocp	-

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Server Product Positioning



When in a competitive situation, this table suggests the appropriate IBM xSeries server to bid against other vendors' equipment. However, as an IBM business partner, you may determine that customer-specific requirements may make an alternative IBM solution a better choice.

	Value Universal/Tower	Departmental/Mission Critical Universal/Tower	Modular Rack-optimized	Modular Enterprise Scalable Nodes
IA-64			IBM: xSeries 450 Dell: PowerEdge 7150 HP: ProLiant rx5670	IBM: eServer 325, xSeries 382 Dell: PowerEdge 3250 HP: ProLiant rx2600
IA-32>4-way				IBM: xSeries 440, 445 (Xeon MP)
4-way		IBM: xSeries 255 Dell: PowerEdge 6600 HP: ProLiant ML570	IBM: xSeries 360 Dell: PowerEdge 6650 HP: ProLiant DL580G2	IBM: xSeries 440, 445 (Xeon MP) Dell: PowerEdge 6650 HP: ProLiant DL580G2
2-way	IBM: xSeries 225 Dell: PowerEdge 1600SC HP: ProLiant ML350G3	IBM: xSeries 235 Dell: PowerEdge 2500 HP: ProLiant ML370	IBM: xSeries 335, xSeries 345 Dell: PowerEdge 1650, 2650 HP: ProLiant DL360G2, DL380	IBM: BladeCenter HS20
Uni	IBM: xSeries 205 Dell: PowerEdge 500SC HP: ProLiant tc2100		IBM: xSeries 305 Dell: PowerEdge 350 HP: ProLiant DL320	



xSeries™ Selection Guide

This table provides a reasonable approximation of selecting the appropriate server based on the number of users supported in a particular application environment. Customer environments are unique and are unlikely to be precisely represented by this table. External Storage Units are utilized when internal capacities are exceeded. Steps for using this table are provided after the table footnotes. These are not published benchmark results. See "Benchmark Results" on the "Information Sources" page for a URL to view published benchmark results.

Application/ Expectation of Maximum # of Users		xSeries 205 3.06GHz/ 533MHz- 512KB Pentium 4	xSeries 305 3.06GHz/ 533MHz- 512KB Pentium 4	xSeries 225 Dual 3.06GHz/ 533MHz- 512KB Xeon	xSeries 335 Dual 3.2GHz/ 533MHz-1MB L3 Xeon	xSeries 345 Dual 3.2GHz/ 533MHz-1MB L3 Xeon
DB Transaction Processing Select, Update and Delete; Does not include image or Decision Support	# Users	3336	5004	9100	9739	9739
	# Processors	1	1	2	2	2
	Memory	2GB	2 - 4GB	8GB	8GB	8GB
	# Hard Disk Drives	20 to 30	40 to 50	50 to 70	50 to 70	50 to 70
	# RAID Adapters	≥2 or Fibre	Fibre	≥2	Fibre	≥2
	# Network Connections	1	1Gb	1Gb	1Gb	1Gb
File and Print Application is stored locally. (For server stored applications - cut number of users in half).	# Users	2500	3500	6050	6300	6300
	# Processors	1	1	2	2	2
	Memory	2GB	2 - 3GB	3 - 4GB	3 - 4GB	3 - 4GB
	# Hard Disk Drives	10 to 20	14 to 25	50 to 90	50 to 90	50 to 90
	# RAID Adapters	1 or Fibre	1 or Fibre	≥4	2 or Fibre	≥4
	# 100Mbps Ethernet Connections	1Gb	1Gb	1Gb	1Gb	1Gb
Lotus® Notes® 10% Power Users 40% Mail 50% Mail & DB	# Users	1760	2750	5060	5100	5100
	# Processors	1	1	2	2	2
	Memory	2GB	2GB	3GB	3GB	3GB
	# Hard Disk Drives	15 to 25	15 to 20	20 to 30	20 to 30	20 to 30
	# RAID Adapters	1 to 2	1	2 to 3	2 or Fibre	2 or Fibre
	# Network Connections	≥2	1Gb	1Gb	1Gb	1Gb
Microsoft® Exchange Server 2000 100% Med Users 30MB Mailbox	# Users	1750	1750	3250	3250	3250
	# Processors	1	1	2	2	2
	Memory	1GB	1GB	2GB	2GB	2GB
	# Hard Disk Drives	12	12	22	22	22
	# RAID Adapters	1 4Mx	1 4Mx	1 4Mx	1 4H	1 4H
	# Network Connections	1	1	1	1 to 2	1 to 2
SAP 3-Tier Distributed Version 4.0b Processing Sales and Distribution Application (Minimum of 16-20 Servers)	# Users	-	-	-	-	-
	# Processors	-	-	-	-	-
	Memory	-	-	-	-	-
	# Hard Disk Drives	-	-	-	-	-
	# RAID Adapters	-	-	-	-	-
	# Network Connections	-	-	-	-	-
SAP Central Version 4.0b Processing Sales and Distribution Application (One Server)	# Users	170	170	180	180	180
	# Processors	2	2	2	2	2
	Memory	2GB	2GB	2GB	2GB	2GB
	# Hard Disk Drives	12 to 24	12 to 24	12 to 24	12 to 24	12 to 24
	# RAID Adapters	≥1	≥1	≥1	≥1	≥1
	# Network Connections	1	1	1	1	1
High Availability Features	Hot-Swap HDD Bays	X	-	X	X	X
	Hot-Plug PCI Slots	-	-	-	-	-
	Hot-Swap Power	-	-	X	-	X
	Hot-Swap Fans	-	-	-	-	X
	Integrated HDD Mirroring	-	-	X	X	X
	Clustering Support	-	-	-	X	X
	Sys Mgt Processor	Opt	Opt	Opt	X	X
Other Distinguishing Features	Max # Processors	1	1	2	2	2
	Max Memory	2GB	4GB	8GB	8GB	8GB
	Max Int Storage	293.6GB ²	146.8GB	880.8GB	293.6GB	880.8GB
	Available PCI Slots	5	1	5	2	5
	19in Rack Models	-	X	-	X	X



IBM xSeries Selection Guide

Application/ Expectation of Maximum # of Users		xSeries 235 Dual 3.2GHz/ 533MHz-1MB L3 Xeon	xSeries 255 Quad 2.8GHz/ 400MHz-2MB L3 Xeon MP	xSeries 360 Quad 2.8GHz/ 400MHz-2MB L3 Xeon MP	xSeries 382 Dual 1.5GHz/ 400MHz-6MB L3 Itanium 2¹	xSeries 440 Eight-way 2GHz/ 400MHz-2MB L3 Xeon MP	xSeries 440 16-way 2GHz/ 400MHz-2MB L3 Xeon MP
DB Transaction Processing Select, Update and Delete; Does not include image or Decision Support	# Users	10616	14390	15310	10300	20000	30000
	# Processors	2	4	4	2	8	8
	Memory	12GB	12GB	8GB	16GB	32GB	32GB
	# Hard Disk Drives	40 to 60	170 to 220	190 to 240	30 to 50	150 to 200	150 to 200
	# RAID Adapters	≥2 or Fibre	≥5 or Fibre	≥5 or Fibre	Fibre	≥4 or Fibre	≥4 or Fibre
# Network Connections	1Gb	1Gb	1Gb	1Gb	1Gb	1Gb	
File and Print Application is stored locally. (For server stored applications - cut number of users in half).	# Users	6300	6500	6800	7500	6800	6800
	# Processors	2	4	4	2	4	4
	Memory	3 - 4GB	4GB	4GB	16	4GB	4GB
	# Hard Disk Drives	50 to 90	60 to 120	70 to 130	50 to 90	70 to 130	70 to 130
	# RAID Adapters	≥4	≥4 or Fibre	≥4 or Fibre	Fibre	≥4 or Fibre	≥4 or Fibre
# 100Mbps Ethernet Connections	1Gb	1Gb	1Gb	1Gb	4 or 1Gb	4 or 1Gb	
Lotus® Notes® 10% Power Users 40% Mail 50% Mail & DB	# Users	5100	6700	6700		6700	6700
	# Processors	2	4	4		4	4
	Memory	3GB	4GB	4GB		4GB	4GB
	# Hard Disk Drives	20 to 30	30 to 40	30 to 40		30 to 40	30 to 40
	# RAID Adapters	2 or Fibre	2 or Fibre	2 or Fibre		2 or Fibre	2 or Fibre
# Network Connections	1Gb	1Gb	1Gb		1Gb	1Gb	
Microsoft® Exchange Server 2000 100% Med Users 30MB Mailbox	# Users	3250	6000	6000		6000	6000
	# Processors	2	4	4		4	4
	Memory	2GB	4GB	4GB		4GB	4GB
	# Hard Disk Drives	22	34	34		34	34
	# RAID Adapters	1 4H	1 4H	1 4H		1 4H	1 4H
# Network Connections	1 to 2	2	2		2	2	
SAP 3-Tier Distributed Version 4.0b Processing Sales and Distribution Application (Minimum of 16-20 Servers)	# Users	-	4800	4600		6400	6400
	# Processors	-	4	4		8	8
	Memory	-	≥4GB	8GB		≥4GB	≥4GB
	# Hard Disk Drives	-	48 to 60	48 to 60		48 to 60	48 to 60
	# RAID Adapters	-	≥3	≥3		≥3	≥3
# Network Connections	-	1	1		1	1	
SAP Central Version 4.0b Processing Sales and Distribution Application (One Server)	# Users	180	375	345		480	480
	# Processors	2	4	4		8	8
	Memory	2GB	≥2GB	8GB		≥4GB	≥4GB
	# Hard Disk Drives	12 to 24	24 to 36	24 to 36		24 to 36	24 to 36
	# RAID Adapters	≥1	≥2	≥2		≥2	≥2
# Network Connections	1	1	1		1	1	
High Availability Features	Hot-Swap HDD Bays	X	X	X		X	X
	Hot-Plug PCI Slots	X	X	X		X	X
	Hot-Swap Power	X	X	X		X	X
	Hot-Swap Fans	X	X	X		X	X
	Integrated HDD Mirroring	X	-	-		-	-
	Clustering Support	X	X	X		X	X
	Sys Mgt Processor	X	X	X		X	X
Other Distinguishing Features	Max # Processors	2	4	4		8	16
	Max Memory	12GB	12GB	8GB		32GB	64GB
	Max Int Storage	1321.2GB	1761.6GB	220.2GB		146.8GB	293.6GB
	Available PCI Slots	6	7	6		6	12
19in Rack Models			X		X	X	



IBM xSeries Selection Guide

Application/ Expectation of Maximum # of Users		xSeries 445 Eight-way 2.8GHz/ 400MHz-2MB L3 Xeon MP	xSeries 445 16-way 2.8GHz/ 400MHz-2MB L3 Xeon MP	xSeries 450 Quad 1.5GHz/ 400MHz- 6MB L3 Itanium 2	BladeCenter (chassis)	BladeCenter HS20 Dual 3.2GHz/ 533MHz-1MB L3 Xeon	eServer 325 Dual AMD Opteron Model 246- 1MB L2 Cache ²
DB	# Users	25300	37950	20860	122710	8765	11291
Transaction Processing Select, Update and Delete; Does not include image or Decision Support	# Processors	8	8	4	(BladeCenter	2	2
	Memory	32GB	64GB	56GB	numbers are	8GB	12GB
	# Hard Disk Drives	150 to 200	200 to 300	120 to 170	derived by	50 to 70	40 to 60
	# RAID Adapters	≥4 or Fibre	≥4 or Fibre	≥4 or Fibre	multiplying by	Fibre	Fibre
	# Network Connections	1Gb	1Gb	1Gb	14 HS20s)	1Gb	1Gb
File and Print Application is stored locally. (For server stored applications cut number of users in half).	# Users	6800	6800	6000	79800	5700	6600
	# Processors	4	4	4	(BladeCenter	2	2
	Memory	4GB	4GB	6GB	numbers are	3 - 4GB	3 - 4GB
	# Hard Disk Drives	70 to 130	70 to 130	70 to 130	derived by	50 to 90	50 to 90
	# RAID Adapters	≥4 or Fibre	≥4 or Fibre	≥4 or Fibre	multiplying by	Fibre	2 or Fibre
	# 100Mbps Ethernet Connections	4 or 1Gb	4 or 1Gb	1Gb	14 HS20s)	1Gb	1Gb
Lotus Notes 10% Power Users 40% Mail 50% Mail & DB	# Users	6700	6700	-	65100	4650	5300
	# Processors	4	4	-	(BladeCenter	2	2
	Memory	4GB	4GB	-	numbers are	3GB	3GB
	# Hard Disk Drives	30 to 40	30 to 40	-	derived by	20 to 30	20 to 30
	# RAID Adapters	2 or Fibre	2 or Fibre	-	multiplying by	Fibre	2 or Fibre
	# Network Connections	1Gb	1Gb	-	14 HS20s)	1Gb	1Gb
Microsoft Exchange Server2000 100% Med Users 30MB Mailbox	# Users	-	-	-	45500	3250	
	# Processors	-	-	-	(BladeCenter	2	
	Memory	-	-	-	numbers are	2GB	
	# Hard Disk Drives	-	-	-	derived by	32	
	# RAID Adapters	-	-	-	multiplying by	Fibre	
	# Network Connections	-	-	-	14 HS20s)	2	
SAP 3-Tier Distributed Version 4.0b Processing Sales and Distribution Application (Minimum of 16-20 Servers)	# Users	-	-	-	-	-	
	# Processors	-	-	-	-	-	
	Memory	-	-	-	-	-	
	# Hard Disk Drives	-	-	-	-	-	
	# RAID Adapters	-	-	-	-	-	
	# Network Connections	-	-	-	-	-	
SAP Central Version 4.0b Processing Sales and Distribution Application (One Server)	# Users	-	-	-	-	180	
	# Processors	-	-	-	-	2	
	Memory	-	-	-	-	2GB	
	# Hard Disk Drives	-	-	-	-	12 to 24	
	# RAID Adapters	-	-	-	-	Fibre	
	# Network Connections	-	-	-	-	1	
High Availability Features	Hot-Swap HDD Bays	X	X	X	-	X	
	Hot-Plug PCI Slots	X	X	X	-	-	
	Hot-Swap Power	X	X	X	X	-	
	Hot-Swap Fans	X	X	X	X	-	
	Integrated HDD Mirroring	X	X	X	-	X ³	
	Clustering Support	X	X	X	X	-	
	Sys Mgt Processor	X	X	X	X	-	
Other Distinguishing Features	Max # Processors	8	16	4	28 ⁴	2	2
	Max Memory	32GB	64GB	40GB	112GB ⁵	8GB	12GB
	Max Int Storage	293.6GB	587.2GB	293.6GB	2.62TB ⁶	373.6GB ⁷	293.6GB
	Available PCI Slots	6	12	6	-	-	2
	19in Rack Models	X	X	X	X	-	X



1. Performance numbers for the xSeries 382 are based on using 64-bit software applications.
2. Performance numbers for the xSeries 325 are based on using 32-bit software applications. Usage of 64-bit software applications may increase performance.
3. Onboard mirroring, which is equivalent to RAID 1, is supported in BladeCenter HS20 when an HS20 SCSI Storage Expansion Unit is installed with two matching SCSI hot-swap HDDs.
4. A maximum of 28 processors are supported when 14 HS20s are installed in the BladeCenter.
5. The maximum of 112GB of memory is based on 8GB in each of 14 HS20s.
6. Maximum storage of 1.588TB is based on seven HS20s with two 40GB IDE HDDs in each and a SCSI Storage Expansion Unit attached to each HS20 containing two 146.8GB Ultra320 SCSI hot-swap HDDs.
7. Maximum storage of 373.6GB is based on two 40GB IDE HDDs installed in the blade with a SCSI Storage Expansion Unit attached that contains two 146.8GB Ultra320 SCSI hot-swap HDDs.

Performance numbers are based on Windows 2000 Advanced Server (or later). Other Network Operating System (NOS) results could vary. Extensive SAP sizings are available from IBM/SAP Competency Centers. Contact your IBM Marketing Representative for additional information.

Using the Selection Guide

Step 1: Select the desired server operating environment (or one that most closely matches).

Step 2: Select number of users equal or greater than planned maximum number of users.

Step 3: Move up to the top row of the columns chosen in step 2, to determine which servers should be considered as possible solutions.

Step 4: Evaluate other features of those servers in order to determine which server is the most appropriate.



IntelliStation® Video Adapter Selection Guide

<i>video adapter 1</i>	<i>imaging</i>	<i>dual-head graphics</i>	<i>memory</i>	<i>signal width</i>	<i>resolution supported (each head)</i>	<i>monitor connector type</i>	<i># / type monitors supported</i>	<i>system support²</i>
3DLabs Wildcat4™ 7110 ^{3, 4}	extreme 3D	Y	128/128MB	128/64-bit	2048 x 1536 (analog), 3820 x 2160 (digital) ⁵	2 DVI-I	2 digital, hybrid or analog (any combination)	M Pro 6219, Z Pro 6221
ATI Fire™ GL 8800	advanced 3D	Y	128MB	128-bit	2048 x 1536 (analog), 1600 x 1200 (digital)	1 DVI-I and 1 analog	1 digital/hybrid or 2 analog/hybrid	E Pro 6226
NVIDIA Quadro FX 3000	extreme 3D	Y	256MB	128-bit	2048 x 1536 (analog), 3820 x 2400 (digital) ⁵	2 DVI-I	2 digital, hybrid or analog (any combination)	M Pro 6219, 6230, Z Pro 6221
NVIDIA Quadro FX 1000	extreme 3D	Y	128MB	128-bit	2048 x 1536 (analog), 3820 x 2400 (digital) ⁵	2 DVI-I	2 digital, hybrid or analog (any combination)	M Pro 6219, 6230, Z Pro 6221
NVIDIA Quadro4 980XGL	advanced 3D	Y	128MB	128-bit	2048 x 1536 (analog), 3840 x 2400 (digital) ⁵	2 DVI-I	2 digital, hybrid or analog (any combination)	M Pro 6219, 6230, Z Pro 6221
NVIDIA Quadro4 580XGL	entry 3D	Y	64MB	128-bit	2048 x 1536 (analog), 1600 x 1200 (digital)	analog (both require pigtailed to convert the LFH60)	2 digital/hybrid or 2 analog/hybrid	E Pro 6216, 6226, MPro 6219, 6220, 6230, Z Pro 6221
NVIDIA Quadro4 280NVS	high-performance 2D	Y	64MB	128-bit	2048 x 1536 (analog), 1280 x 1024 (digital)	analog (both require pigtailed to convert the LFH60)	2 digital/hybrid or 2 analog/hybrid	M Pro 6219, Z Pro 6221
NVIDIA Quadro4 200NVS	high-performance 2D	Y	64MB	128-bit	2048 x 1536 (analog), 1280 x 1024 (digital)	analog (both require pigtailed to convert the LFH60)	2 digital/hybrid or 2 analog/hybrid	E Pro 6216, E Pro 6226
Matrox Millennium G450 DVI	entry 2D	Y	32MB	64-bit	2048 x 1536 (analog), 1280 x 1024 (digital)	1 DVI-I	1 digital/hybrid or 2 analog/hybrid (requires pigtail shipped with adapter)	E Pro 6216, E Pro 6226

1. Available only as standard equipment in an IntelliStation workstation model.
2. See IntelliStation system At-A-Glance sections to identify models that include these standard video adapters.
3. Requires more space than the planar provides between slots, preventing the installation of an optional PCI adapter in the first PCI slot.
4. Models shipped with this video adapter do not support video playback in DVD devices
5. The IBM T221 monitor (P/N 9503DG3) is required to run this mode. Smaller resolutions are available on the digital port with other monitors.

Part Number	Monitor Description	Type	Application
9503DG3	T221 Flat Panel Color Monitor 22.2in (564mm, 22.2in viewable image), stealth black	digital	Very high precision 9.2 million pixel monitor. Best suited for 3820x2160 to 3820x2400 digital resolution.
9494HB0	T860 Hybrid Flat Panel Color Monitor 18.1in (460mm, 18.1in viewable image), stealth black	hybrid	Supports up to 1280x1024 analog/digital.
9512AB1	T541 Flat Panel Color Monitor 15in (381mm, 15in viewable image), stealth black	analog	Supports up to 1280x1024 analog.
6656HG2	T560 Hybrid Flat Panel Color Monitor 15in (381mm, 15in viewable image), stealth black	hybrid	Supports up to 1024x768 analog/digital.
6652U3N	P275 Color Monitor 21in (503mm, 19.8in viewable image), stealth black	analog	Supports up to 2048x1536 @ 75Hz analog.

IntelliStation Video Adapter Selection Guide



IntelliStation M Pro 6220

Part Number¹
Processor/FSB Speed (GHz/MHz)
Number of Processors (Std/Max)
L2 ECC Cache (KB)
Memory (Std/Max)²
Video Adapter (AGP)
Form Factor
Onboard Ethernet (Mbps)³
Storage Controller⁴
Internal HDD Storage (Std/Max)
Optical Drive⁷
Bays (Total/Avail)
PCI Slots (Total/Avail)

IntelliStation M Pro 6220 At-A-Glance

Part Number ¹	Processor/FSB Speed (GHz/MHz)	Number of Processors (Std/Max)	L2 ECC Cache (KB)	Memory (Std/Max) ²	Video Adapter (AGP)	Form Factor	Onboard Ethernet (Mbps) ³	Storage Controller ⁴	Internal HDD Storage (Std/Max)	Optical Drive ⁷	Bays (Total/Avail)	PCI Slots (Total/Avail)
6220-20U	2.8/800	1/1	512 KB	256MB/4GB	NVIDIA Quadro4 280NVS	Low-profile Desktop	10/100/1000	IDE	40GB/240GB ⁵	48x-20x CD-ROM	3/1	3/3
6220-24U	2.8/800	1/1	512 KB	512MB/4GB	NVIDIA Quadro4 580XGL	Low-profile Desktop	10/100/1000	SATA	80GB/320GB ⁶	48x-20x CD-ROM	3/1	3/3
6220-40U	3.2/800	1/1	512 KB	256MB/4GB	NVIDIA Quadro4 280NVS	Low-profile Desktop	10/100/1000	IDE	40GB/240GB ⁵	48x-20x CD-ROM	3/1	3/3
6220-44U	3.2/800	1/1	512 KB	512MB/4GB	NVIDIA Quadro4 580XGL	Low-profile Desktop	10/100/1000	SATA	80GB/320GB ⁶	48x-20x CD-ROM	3/1	3/3

1. IntelliStation M Pro 6220 also provides six USB ports (two in front, four in rear), two 9-pin serial ports and one 25-pin parallel port. A floppy diskette drive is not provided. All models ship with a keyboard, mouse and a vertical floor stand. See "Power, Monitors and Accessories" for a list of compatible monitors.

2. Memory in all models is PC2700 CL2.5 ECC DDR UDIMMs. Maximum capacity includes four 1GB UDIMMs, which may require replacement of the UDIMMs.

3. An Intel-based copper gigabit Ethernet controller is integrated into the planar.

4. IDE models support two IDE HDDs and one IDE optical drive. SATA models support two SATA HDDs and one IDE optical drive.

5. Maximum storage is based on two 120GB IDE HDDs, which requires replacing the standard 40GB HDD.

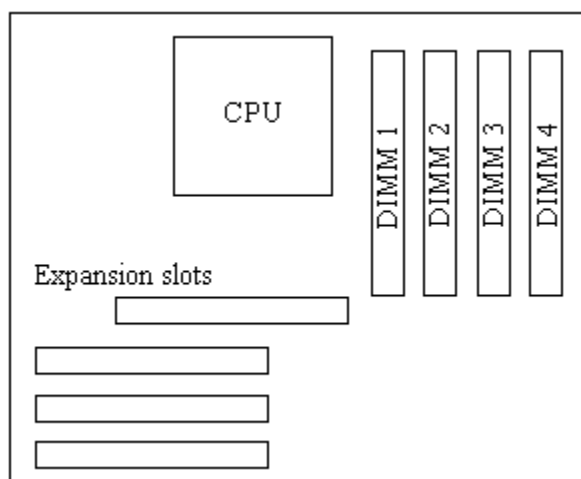
6. Maximum storage is based on two 160GB SATA HDDs which requires replacing the standard 80GB HDD.

7. Variable read rates are provided. Actual playback speed will vary and is often less than the maximum possible.

IntelliStation M Pro 6220 Memory

Part Number	Memory Description ¹
06P4053	256MB PC2700 CL2.5 ECC DDR SDRAM UDIMM
06P4054	512MB PC2700 CL2.5 ECC DDR SDRAM UDIMM
06P4055	1GB PC2700 CL2.5 ECC DDR SDRAM UDIMM

1. A single DIMM configuration is valid if installed in socket DIMM1, otherwise DIMMs must be configured in matched pairs starting with DIMM sockets 1 and 3, then 2 and 4.



Total System Memory ¹	Quantity of DIMMs added to the standard configuration		
	256MB DIMM	512MB DIMM	1GB DIMM
256MB Models (1x256MB)			
512MB	1	-	-
1GB	3	-	-
1.5GB	1	2	-
2.5GB	1	-	2
4GB ²	-	-	4

512MB Models (1x512MB)	256MB DIMM	512MB DIMM	1GB DIMM
	1GB	-	1
1.5GB	2	1	-
2GB	-	3	-
3GB	-	1	2
4GB ²	-	-	4

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller DIMMs may provide a more cost-effective alternative than using larger DIMMs.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Requires replacing the standard DIMM.

IntelliStation M Pro 6220 Hard Disk Drive (HDD) and Optical Storage

SATA (Serial ATA) Models		
Total Internal Storage^{1,2}	Quantity of SATA HDDs added to standard configurations	
	80GB HDD	160GB HDD
80GB	Standard on SATA models	-
160GB	1	-
240GB	-	1
320GB ³	-	2

This table does not represent all possible HDD configurations.

1. Select a total storage row then add the quantity of HDDs from the column of the preferred HDD.
2. Total Storage numbers assume all HDDs are the same size. Mixing HDDs of different sizes is allowed but not shown.
3. Requires replacement of the standard HDD.

EIDE Models			
Total Internal Storage^{1,2}	Quantity of EIDE HDDs added to standard configuration		
	40GB	80GB	120GB
40GB	Standard on EIDE models	-	-
80GB	1	-	-
120GB	-	1	-
160GB	-	-	1
240GB ³	-	-	2

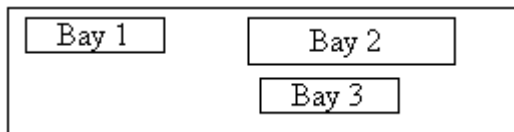
This table does not represent all possible HDD configurations.

1. Select a total storage row then add the quantity of HDDs from all columns to the standard HDD.
2. Total Storage numbers assume all HDDs are the same size. Mixing HDDs of different sizes is allowed but not shown.
3. Requires replacement of the standard HDD.

Bay	Form Factor	Height	Front Access	Usage¹
1	89mm (3.5in)	SL	No	HDD
2	133mm (5.25in)	HH	Yes	Std Optical
3	89mm (3.5in)	SL	No	Std HDD

1. A diskette drive does not ship with any model.

M Pro (6220) Front View



Part Number	Description	Bays Supported	Height	Maximum Quantity
SATA HDDs^{1, 2}				
09N4253	80GB 7200rpm Serial ATA	1, 3	SL	2
09N4254	160GB 7200rpm Serial ATA	1, 3	SL	2
IDE HDDs^{1, 3}				
22P7157	40GB 7200 rpm ATA-100 (EIDE) HDD	1, 3	SL	2
09N4226	80GB 7200 rpm ATA-100 (EIDE) HDD	1, 3	SL	2
09N4231	120GB 7200 rpm ATA-100 (EIDE) HDD	1, 3	SL	2
Removable Media Devices		Bays Supported		
10K3782	48x-20x CD-ROM Black Internal IDE Drive ⁴	2		
22P7042	48x/32x/48x Max CD-RW Drive ⁴	2		
22P6950	16x Max RAM-Read DVD-ROM Drive ⁴	2		
22P7031	48x-24x-48x-16x Max CD-RW/DVD-ROM Combination Drive ⁴	2		

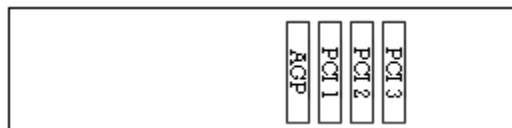
- Standard HDD installed in bay three for both SATA and IDE models.
- SATA models support a maximum of two SATA devices and one IDE device.
- EIDE models support a maximum of three IDE devices including CD-ROM drives and HDDs.
- Installation will require replacing the standard optical drive.

IntelliStation M Pro 6220 I/O Options

Part Number	Description	Adapter Length	PCI Support ¹	Slots Supported ²
Networking^{3, 4}				
Ethernet				
22P6601	Intel Pro/1000 Low Profile Desktop Adapter	Half	32-bit	1 ... 3
31P9601	PRO/1000 MT Server Adapter by Intel	Half	64-bit	1 ... 3
22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter	Half	64-bit	1 ... 3
31P6301	NetXtreme 1000 T Ethernet Adapter	Half	64-bit	1 ... 3
31P6401	NetXtreme Dual Port Gb Ethernet Adapter	Half	64-bit	1 ... 3
Token Ring				
07P2701	16/4 Token-Ring Low Profile PCI Management Adapter	Half	32-bit	1 ... 3
Communications				
19K4162	V90 PCI Data/Fax WinModem (Low Profile Enabled) ⁵	Half	32-bit	1 ... 3

- A 64-bit adapter installed into a 32-bit slot transfers data at 32-bit rates. Adapters rated at 66MHz or higher will operate at 33MHz when installed in a 33MHz slot.
- IntelliStation M Pro 6220 has three half-length PCI expansion slots on a single 32-bit, 33MHz bus.
- Wake on LAN[®] is supported through PCI networking adapters that provide this function.
- The integrated 10/100/1000 Intel-based Ethernet controller supports Wake on LAN.
- Optional modem 19K4162 has been withdrawn from marketing in North America (effective 08/26/03).

M Pro (6220) Rear View





IntelliStation M Pro 6220 Power, Monitors & Accessories

Part Number	Description
Power	
	IntelliStation M Pro 6220 includes a 200w voltage-sensing power supply and a single line cord.
Tower Uninterruptible Power Supply (UPS)	
21301TX	UPS750TLV
21302TX	UPS750THV
21303TX	UPS1000TLV
21304TX	UPS1000THV
Monitors¹	
6652U3N	P275 Color Monitor 21in (503mm, 19.8in viewable image), stealth black
6656HG2	T560 Hybrid Flat Panel Monitor 15in (381mm, 15in viewable image), stealth black
9494HB0	T860 Hybrid Flat Panel Monitor 18.1in (460mm, 18.1in viewable image), stealth black
9503DG3	T221 Flat Panel Monitor 22.2in (564mm, 22.2in viewable image), stealth black
6736HB0	L200p Flat Panel Color Monitor 20.1in (408mm, 20.1in viewable image), stealth black
Keyboard and Mouse²	
22P5185	Rapid Access III USB Keyboard, stealth black
31P7415	Preferred Pro Full-size Keyboard - 104 Keys (stealth black)
28L3673	Sleek 2-Button Stealth Black Mouse
31P8700	Optical 3-button Scrollpoint Pro Mouse - 800dpi - PS/2 and USB
USB Devices	
22P9024	64MB USB 2.0 Memory Key
22P9025	256MB USB 2.0 Memory Key
05K9276	USB Portable Diskette Drive

1. Refer to IntelliStation Video Adapter Selection Guide for information regarding video adapter connections.
 2. IntelliStation M Pro 6220 ships standard with a keyboard and mouse.

IntelliStation M Pro 6230

Part Number ¹ Processor/FSB Speed (GHz/ MHz) Number of Processors (Std/Max) L2 ECC Cache (KB) Memory (Std/Max)² Video Adapter (AGP) Form Factor Onboard Ethernet (Mbps)³ Storage Controller ⁴ IEEE 1394 Internal HDD Storage (Std/Max)⁵ Optical Drive⁹ Bays (Total/Avail) PCI Slots (Total/Avail)

IntelliStation M Pro 6230 At-A-Glance													
6230-20U	2.8/800	1/1	512 KB	256MB/4GB	NVIDIA Quadro4 280NVS	Tower	10/100/1000	IDE		40GB/360GB ⁶	48x-20x CD-ROM ¹⁰	7/4	5/5
6230-25U	2.8/800	1/1	512 KB	512MB/4GB	NVIDIA Quadro4 580XGL	Tower	10/100/1000	U320		36.4GB/587.2GB ⁷	48x-20x CD-ROM ¹⁰	7/4	5/5
6230-27U	2.8/800	1/1	512 KB	512MB/4GB	NVIDIA Quadro4 980XGL	Tower	10/100/1000	IDE	Y	40GB/360GB ⁶	48x/24x/48x CD-RW ¹¹	7/4	5/5
6230-34U	3.0/800	1/1	512 KB	512MB/4GB	NVIDIA Quadro4 580XGL	Tower	10/100/1000	IDE		40GB/360GB ⁶	48x/24x/48x CD-RW ¹¹	7/4	5/5
6230-36U	3.0/800	1/1	512 KB	1GB/4GB	NVIDIA Quadro FX 1000	Tower	10/100/1000	U320	Y	36.4GB/587.2GB ⁷	48x/24x/48x CD-RW ¹¹	7/3 ¹²	5/5
6230-38U	3.0/800	1/1	512 KB	512MB/4GB	NVIDIA Quadro4 980XGL	Tower	10/100/1000	U320	Y	36.4GB/587.2GB ⁷	48x/24x/48x CD-RW ¹¹	7/4	5/5
6230-39U	3.0/800	1/1	512 KB	1GB/4GB	NVIDIA Quadro FX 3000	Tower	10/100/1000	U320	Y	36.4GB/587.2GB ⁷	48x/24x/48x CD-RW ¹¹	7/3 ¹²	5/4 ¹³
6230-41U	3.2/800	1/1	512 KB	512MB/4GB	NVIDIA Quadro4 280NVS	Tower	10/100/1000	SATA	Y	80GB/320GB ⁸	48x-20x CD-ROM ¹⁰	7/4	5/5
6230-46U	3.2/800	1/1	512 KB	1GB/4GB	NVIDIA Quadro FX 1000	Tower	10/100/1000	SATA	Y	80GB/320GB ⁸	48x/24x/48x CD-RW ¹¹	7/4	5/5
6230-49U	3.2/800	1/1	512 KB	1GB/4GB	NVIDIA Quadro FX 3000	Tower	10/100/1000	U320	Y	36.4GB/587.2GB ⁷	48x/24x/48x CD-RW ¹¹	7/3 ¹²	5/4 ¹³

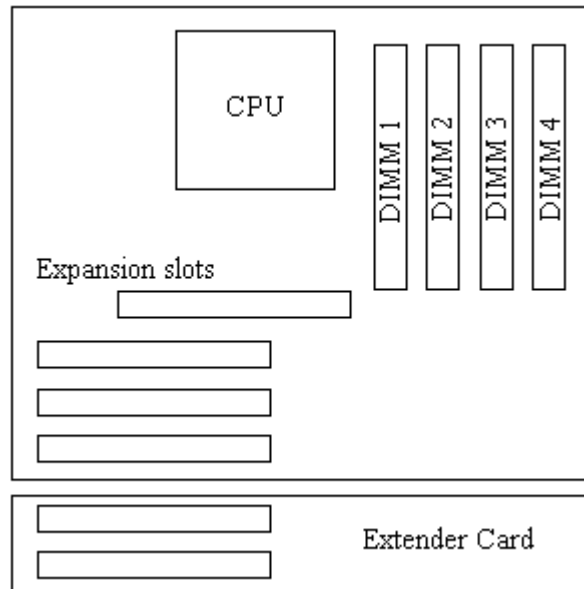
- IntelliStation M Pro 6230 also provides six USB ports (two in front, four in rear), two 9-pin serial ports and one 25-pin parallel port. Select models have two IEEE 1394 ports (one front, one rear). All models ship with a keyboard and mouse. See "Power, Monitors and Accessories" for a list of compatible monitors. All models are rack-mountable using an optional tower-to-rack conversion kit, or they can be turned on the side and installed as desktop units capable of supporting the weight of a monitor.
- Memory in all models is PC2700 CL2.5 ECC DDR UDIMMs. Maximum capacity includes four 1GB UDIMMs, which may require replacement of the UDIMMs.
- An Intel-based copper gigabit Ethernet controller is integrated into the planar.
- Describes the storage controller to which the standard HDD is attached. All models include two Serial ATA (SATA) controllers supporting one device each. All models also include an integrated ATA-100 IDE controller. Four IDE devices are supported in IDE models and three IDE devices in the SCSI models. SCSI models include an integrated single-channel Ultra320 SCSI controller that supports up to four nonhot-swap SCSI HDDs attached with a standard four-drop terminated LVD SCSI cable.
- Maximum storage capacity assumes all drives are of the same type. Higher maximum capacities may be possible by mixing SATA HDDs with IDE HDDs or by mixing SATA HDDs with SCSI HDDs.
- Maximum storage is based on three 120GB IDE HDDs, which requires replacing the standard 40GB HDD.
- Maximum storage is based on four 146.8GB SCSI HDDs which requires replacing the standard 36.4GB HDD.
- Maximum storage is based on two 160GB SATA HDDs which requires replacing the standard 80GB HDD.
- Variable read rates are provided. Actual playback speed will vary and is often less than the maximum possible.
- This model ships standard with a 48x-20x CD-ROM drive.
- This model ships standard with a 48x-24x-48x Max CD-RW drive.
- The NVIDIA Quadro FX 1000 and NVIDIA Quadro FX 3000 video adapters require the use of one power drop that would normally be used for an IDE or SCSI device. In SCSI models with one of these adapters installed, one media bay will not be available for installation of a SCSI or IDE device.
- Installation of the NVIDIA Quadro FX 3000 video adapter physically prevents installation of a PCI adapter in slot PCI 1.

IntelliStation M Pro 6230

IntelliStation M Pro 6230 Memory

Part Number	Memory Description ¹
06P4053	256MB PC2700 CL2.5 ECC DDR SDRAM UDIMM
06P4054	512MB PC2700 CL2.5 ECC DDR SDRAM UDIMM
06P4055	1GB PC2700 CL2.5 ECC DDR SDRAM UDIMM

1. A single DIMM configuration is valid if installed in socket DIMM1, otherwise DIMMs must be configured in matched pairs starting with DIMM sockets 1 and 3, then 2 and 4.



Total System Memory¹	Quantity of DIMMs added to the standard configuration		
	256MB DIMM	512MB DIMM	1GB DIMM
256MB Models (1x256MB)			
512MB	1	-	-
1GB	3	-	-
1.5GB	1	2	-
2.5GB	1	1	2
4GB ²	-	-	4

512MB Models (2x256MB)	256MB DIMM	512MB DIMM	1GB DIMM
	1GB	2	-
1.5GB	-	2	-
2.5GB	-	-	2
4GB ²	-	-	4

1GB MB Models (2x512MB)	256MB DIMM	512MB DIMM	1GB DIMM
	1.5GB	2	-
2GB	-	2	-
3GB	-	-	2
4GB ²	-	-	4

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller DIMMs may provide a more cost-effective alternative than using larger DIMMs.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Requires replacing the standard DIMMs.



IntelliStation M Pro 6230 Hard Disk Drive (HDD) and Optical Storage

SCSI models			
Total Internal Storage^{1,2}	Quantity of SCSI HDDs added to standard configuration		
	36.4GB	73.4GB	146.8GB
36.4GB	Standard in SCSI models		
72.8GB	1	-	-
109.8GB	2	1	-
145.6GB	3	-	-
183.2GB	-	2	1
256.6GB	-	3	-
293.6GB	-	4 ³	-
330GB	-	-	2
476.8GB	-	-	3
587.2GB	-	-	4 ³

This table does not represent all possible HDD configurations.

1. Select a total storage row then add the quantity of HDDs from the column of the preferred HDD.
2. Total Storage numbers assume all HDDs are the same size. Mixing HDDs of different sizes is allowed but not shown.
3. Requires replacement of the standard HDD.

EIDE Models			
Total Internal Storage^{1,2}	Quantity of EIDE HDDs added to standard configuration		
	40GB	80GB	120GB
40GB	Standard on EIDE models		
80GB	1	-	-
120GB	2	1	-
160GB	-	-	1
200GB	-	2	-
240GB	-	3 ³	-
280GB	-	-	2
360GB	-	-	3 ³

This table does not represent all possible HDD configurations.

1. Select a total storage row then add the quantity of HDDs from all columns to the standard HDD.
2. Total Storage numbers assume all HDDs are the same size. Mixing HDDs of different sizes is allowed but not shown.
3. Requires replacing the standard HDD.

SATA (Serial ATA) Models		
Total Internal Storage^{1,2}	Quantity of SATA HDDs added to standard configuration	
	80GB HDD	160GB HDD
80GB	Standard on SATA models	
160GB	1	-
240GB	-	1
320GB	-	2 ³

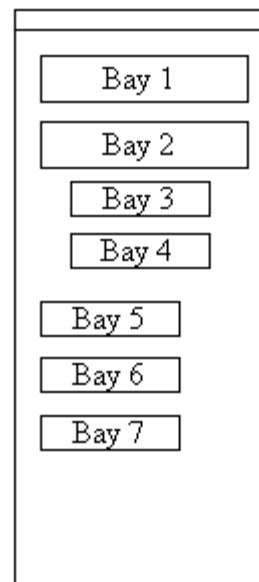
This table does not represent all possible HDD configurations.

1. Select a total storage row then add the quantity of HDDs from the column of the preferred HDD.
2. Total Storage numbers assume all HDDs are the same size. Mixing HDDs of different sizes is allowed but not shown.
3. Requires replacement of the standard HDD.

Bay	Form Factor	Height	Front Access	Usage
1	133mm (5.25in)	HH	Yes	Std Optical ¹
2	133mm (5.25in)	HH	Yes	Optical, Tape, Zip ¹
3	89mm (3.5in)	SL	Yes	Std FDD
4	89mm (3.5in)	SL	Yes	HDD, Tape, Zip
5, 6	89mm (3.5in)	SL	No	HDD ²
7	89mm (3.5in)	SL	No	Std HDD

1. Supports removable media devices only. Hard disk drives are not supported.
 2. IDE HDDs are not supported in bay five.

M Pro (6230) Front View



Part Number	Description	Height	Bays Supported	Maximum Quantity
SATA HDDs^{1, 2}				
09N4253	80GB 7200rpm Serial ATA ³	SL	4, 5, 6, 7	2
09N4254	160GB 7200rpm Serial ATA	SL	4, 5, 6, 7	2
EIDE HDDs⁴				
22P7157	40GB 7200rpm ATA-100 (EIDE) HDD ⁵	SL	4, 6, 7	3
09N4226	80GB 7200rpm ATA-100 (EIDE) HDD	SL	4, 6, 7	3
09N4231	120GB 7200rpm ATA-100 (EIDE) HDD	SL	4, 6, 7	3
Nonhot-swap Ultra320 SCSI HDDs^{6, 7}				
32P0723	36.4GB 10Krpm Ultra320 SCSI HDD	SL	4, 5, 6, 7	4
32P0724	73.4GB 10Krpm Ultra320 SCSI HDD	SL	4, 5, 6, 7	4
32P0725	146.8GB 10Krpm Ultra320 SCSI HDD		4, 5, 6, 7	4
32P0784	36.4GB 15Krpm Ultra320 SCSI HDD	SL	4, 5, 6, 7	4
32P0785	73.4GB 15Krpm Ultra320 SCSI HDD	SL	4, 5, 6, 7	4
Removable Media Devices			Bays Supported	
10K3782	48x-20x CD-ROM Black Internal IDE Drive ⁸		1, 2	
22P7042	48x/32x/48x Max CD-RW Drive ⁸		1, 2	
22P6950	16x Max RAM-Read DVD-ROM Drive ⁸		1, 2	
22P7031	48x-24x-48x-16x Max CD-RW/DVD-ROM Combination Drive ⁸		1, 2	
00N8078	250MB IDE Internal Zip Drive ⁹		1, 2, 4	

- Up to two SATA HDDs can be installed in EIDE and SCSI models. Each SATA HDD option ships with one SATA cable.
- SATA models support a maximum of two SATA devices and three IDE devices.
- Standard HDD on SATA models. Installed in bay seven.
- IDE models support a maximum of four IDE devices.
- Standard HDD on EIDE models. Installed in bay six.
- Up to four SCSI HDDs can be installed in SCSI models. See 'At-A-Glance' footnote concerning models with the NVIDIA FX 3000 or FX 1000 video adapter installed.
- Mixing of 10,000rpm and 15,000rpm HDDs is allowed.
- Either replace the standard CD-ROM or install in the available 5.25in media bay. A two-drop IDE cable is included with the option.
- Hardware for installing into a 5.25in bay is included with the option.

IntelliStation M Pro 6230 I/O Options

Part Number	Description	Adapter Length	PCI Support¹	Slots Supported^{2,3}
Storage Controllers				
71P8594	Single Channel Ultra320 SCSI Controller ³	Half	64-bit	1 ... 5
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller ⁴	Half	64-bit	1 ... 5
71P8592	ATA133 RAID Controller ⁵	Half	32-bit	1 ... 5
Networking^{6, 7}				
Ethernet				
22P6501	Pro/1000 T Desktop Adapter by Intel	Half	32-bit	1 ... 5
31P9601	PRO/1000 MT Server Adapter by Intel	Half	64-bit	1 ... 5
31P6401	NetXtreme Dual Port Gb Ethernet Adapter	Half	64-bit	1 ... 5
22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter	Half	64-bit	1 ... 5
31P6301	NetXtreme 1000 T Ethernet Adapter (copper)	Half	64-bit	1 ... 5
22P6901	Wireless LAN Adapter	Half	32-bit	1 ... 5
Token Ring				
34L5001	16/4 Token-Ring PCI Management Adapter	Half	32-bit	1 ... 5
Communications				
33L4618	V90 PCI Data/Fax Modem	Half	32-bit	1 ... 5

1. A 64-bit adapter installed into a 32-bit slot transfers data at 32-bit rates. Adapters rated at 66MHz or higher will operate at 33MHz when installed in a 33MHz slot.
2. IntelliStation M Pro 6230 has five full-length PCI expansion slots on a single 32-bit, 33MHz bus.
3. Models with the NVIDIA Quadro FX 1000 or 3000 video adapter installed will not have access to PCI slot 1. These adapters physically prevent installation of a PCI adapter in slot PCI 1.
4. The integrated 10/100/1000 Intel-based Ethernet controller supports Wake on LAN.
5. Wake on LAN@ is supported through PCI networking adapters that provide this function.

M Pro (6230) Rear



PCI 1-PCI 5: Bus 3, 33MHz, 32-bit, 5v, full-length, PCI

IntelliStation M Pro 6230 Power, Monitors & Accessories

Part Number	Description
Power	
	IntelliStation M Pro 6230 includes a 340w voltage-sensing power supply and a single line cord.
Tower Uninterruptible Power Supply (UPS)	
21301TX	UPS750TLV
21302TX	UPS750THV
21303TX	UPS1000TLV
21304TX	UPS1000THV
21305TX	UPS1500TLV
21306TX	UPS1500THV
Monitors¹	
6652U3N	P275 Color Monitor 21in (503mm, 19.8in viewable image), stealth black
6656HG2	T560 Hybrid Flat Panel Monitor 15in (381mm, 15in viewable image), stealth black
9494HB0	T860 Hybrid Flat Panel Monitor 18.1in (460mm, 18.1in viewable image), stealth black
9503DG3	T221 Flat Panel Monitor 22.2in (564mm, 22.2in viewable image), stealth black
6736HB0	L200p Flat Panel Color Monitor 20.1in (408mm, 20.1in viewable image), stealth black
Conversion Kit	
09N4300	4Ux20D Tower-to-Rack Kit
Keyboard and Mouse²	
22P5185	Rapid Access III USB Keyboard, stealth black
31P7415	Preferred Pro Full-size Keyboard - 104 Keys (stealth black)
28L3673	Sleek 2-Button Stealth Black Mouse
31P8700	Optical 3-button Scrollpoint Pro Mouse - 800dpi - PS/2 and USB
06P4069	USB Optical Wheel Mouse
33L3252	SpaceBall 3D Input Device
USB Devices	
22P9024	64MB USB 2.0 Memory Key
22P9025	256MB USB 2.0 Memory Key
09N4211	Portable 20GB USB 2.0 Hard Disk Drive
05K9276	Portable USB Diskette Drive

1. Refer to IntelliStation Video Adapter Selection Guide for information regarding video adapter connections.
 2. IntelliStation M Pro 6230 ships standard with an IBM 104-key keyboard and three-button mouse.



IntelliStation M Pro 6230 Tape Options

Part Number	Tape Drives ¹	Bays Supported ²	Interface	Form Factor	Termination Included	Ext Tape Enclosures
48P7042	20/40GB TR7 Internal IDE Tape Drive	1, 2, 4	IDE	89mm (3.5in) SL or 133mm (5.25in) HH	-	-
00N7991	20/40GB DDS/4 4mm Internal Tape Drive	1, 2	68-pin Ultra2 SCSI	89mm (3.5in) HH or 133mm (5.25in) HH	Y ³	3510020
External Tape Enclosures¹						
3510020	External Half-High SCSI Storage Enclosure ⁴	-	50-pin SCSI or 68-pin SCSI	Desktop	N	-
Associated Options						
00N7956	68-pin External Multimode LVD/SE SCSI Terminator	-	68-pin SCSI	External	Y	3510020

Note:
6230 SCSI models include an integrated single-channel Ultra320 SCSI controller, a 68-pin, four-drop multimode terminated U320 SCSI cable and a two-drop IDE cable. Several optical drive options ship with an IDE cable which would allow for two optical drives and an IDE tape drive to be installed in SCSI models. IDE models include two two-drop IDE cables. SATA models include a one-drop IDE cable attached to the standard optical drive and one two-drop IDE cable.

1. SCSI tape drives and external tape enclosures are supported by the Single Channel Ultra320 SCSI Controller (P/N 71P8594). SCSI tape drives installed internally in SCSI models can be connected to the integrated SCSI controller using the cable that ships with the tape drive if the HDDs are attached to an optional SCSI or RAID adapter. SCSI tape drives installed in IDE models require an optional SCSI storage controller.
2. The standard optical drive is installed in bay 1.
3. Termination requires installing the 34in single-drop, terminated LVD SCSI cable provided with the option.
4. Black desktop tape enclosure that supports a single 133mm (5.25in) half-high (HH) 50 or 68-pin SCSI tape drive. Requires 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956). External cables are not included. Refer to Appendix D: Cables - Storage Units - Controllers to select a supported cable.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.



IntelliStation Z Pro 6221

Part Number ¹	Withdrawal Date ¹⁰	Processor/FSB Speed (GHz/MHz) ²	Number of Processors (Std/Max)	Cache	Memory (Std/Max) ³	Video Adapter (AGP)	Form Factor	Onboard Ethernet (Mbps) ⁴	Storage Controller ⁵	IEEE 1394	Internal HDD Storage (Std/Max)	(Optical Drive)	Bays (Total/Avail)	PCI Slots (Total/Avail)
IntelliStation Z Pro 6221 At-A-Glance														
6221-10U	29-Dec	2.4/533	1/2	512KB L2	512MB/8GB	Matrox Millennium G450 DVI	Tower	10/100/1000	IDE	N	40GB/240GB ⁷	48x-20x CDROM	6/3	5/5
6221-22U	29-Dec	2.67/533	1/2	512KB L2	512MB/8GB	NVIDIA Quadro4 280NVS	Tower	10/100/1000	IDE	N	40GB/240GB ⁷	48x-20x CDROM	6/3	5/5
6221-33U	-	2.8/533	1/2	512KB L2	512MB/8GB	NVIDIA Quadro4 280NVS	Tower	10/100/1000	Dual, U320 ⁶	N	36.4GB/440.4GB ⁸	48x-20x CDROM	6/3	5/5
6221-38U	-	2.8/533	1/2	512KB L2	1GB/8GB	NVIDIA Quadro4 980XGL	Tower	10/100/1000	Dual, U320 ⁶	N	36.4GB/440.4GB ⁸	48x/24x/48x CD-RW	6/3	5/5
6221-40U	-	3.06/533	1/2	512KB L2	512MB/8GB	Matrox Millennium G450 DVI	Tower	10/100/1000	IDE	N	40GB/240GB ⁷	48x-20x CDROM	6/3	5/5
6221-42U	-	3.06/533	1/2	512KB L2	512MB/8GB	NVIDIA Quadro4 280NVS	Tower	10/100/1000	IDE	N	40GB/240GB ⁷	48x-20x CDROM	6/3	5/5
6221-46U	-	3.06/533	1/2	512KB L2	1GB/8GB	NVIDIA Quadro4 980XGL	Tower	10/100/1000	Dual, U320 ⁶	Y	36.4GB/440.4GB ⁸	48x/24x/48x/16x CD-RW/DVD	6/3	5/5
6221-47U	-	3.06/533	1/2	512KB L2	1GB/8GB	3Dlabs Wildcat4 7110	Tower	10/100/1000	Dual, U320 ⁶	Y	36.4GB/440.4GB ⁸	48x/24x/48x CD-RW	6/3	5/4 ⁹
6221-48U	-	3.06/533	1/2	512KB L2	1GB/8GB	NVIDIA Quadro FX 1000	Tower	10/100/1000	Dual, U320 ⁶	Y	36.4GB/440.4GB ⁸	48x/24x/48x/16x CD-RW/DVD	6/3	5/5
6221-49U	-	3.06/533	2/2	512KB L2	1GB/8GB	NVIDIA Quadro4 280NVS	Tower	10/100/1000	Dual, U320 ⁶	Y	36.4GB/440.4GB ⁸	DVD	6/3	5/5
6221-52U	-	3.2/533	1/2	1MB L3	512MB/8GB	NVIDIA Quadro4 280NVS	Tower	10/100/1000	IDE	N	40GB/240GB ⁷	48x-20x CDROM	6/3	5/5
6221-53U	-	3.2/533	1/2	1MB L3	512MB/8GB	NVIDIA Quadro4 980XGL	Tower	10/100/1000	IDE	Y	40GB/240GB ⁷	48x-24x-48x CD-RW	6/3	5/5
6221-56U	-	3.2/533	1/2	1MB L3	512MB/8GB	NVIDIA Quadro4 980XGL	Tower	10/100/1000	Dual, U320	Y	36.4GB/440.4GB ⁸	48x-24x-48x CD-RW	6/3	5/5
6221-57U	-	3.2/533	1/2	1MB L3	512MB/8GB	NVIDIA Quadro FX 1000	Tower	10/100/1000	Dual, U320	Y	36.4GB/440.4GB ⁸	48x-24x-48x-16x CD-RW/DVD	6/3	5/5
6221-58U	-	3.2/533	2/2	1MB L3	1GB/8GB	NVIDIA Quadro FX 1000	Tower	10/100/1000	IDE	Y	40GB/240GB ⁷	48x-24x-48x-16x CD-RW/DVD	6/3	5/5
6221-59U	-	3.2/533	1/2	1MB L3	1GB/8GB	NVIDIA Quadro FX 3000	Tower	10/100/1000	Dual, U320	Y	36.4GB/440.4GB ⁸	48x-24x-48x CD-RW	6/3	5/4 ⁹



1. IntelliStation Z Pro 6221 ships with a keyboard and mouse. See "Power, Monitors and Accessories" for a list of compatible monitors. Tower models are rack-mountable using an optional tower-to-rack conversion kit, or they can be turned on the side and installed as desktop units capable of supporting the weight of a monitor.
2. Intel Xeon processor with advanced transfer ECC L2 cache and 533MHz (quad-pumped) Front Side Bus (FSB). Some processors have an additional L3 cache as noted in the table above.
3. High-speed, two-way interleaved 133MHz DDR PC2100 RDIMM. Maximum capacity includes four 2GB RDIMMs, requiring replacement of the two standard RDIMMs.
4. A Broadcom-based copper gigabit Ethernet controller is integrated into the planar.
5. All models include both an integrated ATA-100 IDE controller and an integrated Ultra320 SCSI controller. The IDE controller supports up to four IDE devices. Two two-drop IDE cables are included. Because the standard IDE cable is not long enough to attach to both an IDE HDD and an IDE device installed in either removable media bay, only two IDE HDDs are supported. Channel A of the integrated dual-channel Ultra320 SCSI controller supports one internal connector. The channel B connector supports one external 68-pin high density port with the addition of optional Enabling Cable for External Ultra320 SCSI Port (P/N 24P7929). SCSI models include a three-drop LVD SCSI cable that supports up to three internal nonhot-swap SCSI HDDs.
6. The dual-channel, Ultra320 integrated controller supports both Ultra160 and Ultra320 SCSI HDDs, but the entire SCSI bus will default to the slower rate (MB/second) if HDDs of different technologies are mixed on the same bus. The LSI chipset allows for two HDDs to be allocated for mirroring if a RAID adapter is not installed. One additional HDD may be designated as a hot-spare for HDDs configured in the onboard mirror. Mirrored and hot-spare HDDs must be matched.
7. IDE models include two two-drop ATA-100 IDE cables. One connector of one cable is attached to the standard CD-ROM and the other connector can be used to attach an additional optical drive. The second two-drop cable connects up to two IDE HDDs. Maximum storage is based on two 120GB IDE HDDs, which requires replacing the standard 40GB HDD.
8. Maximum amount requires replacement of the standard 36.4GB 10,000rpm HDD with a 146.8GB HDD and installing two additional 146.8GB HDDs.
9. Installation of the 3DLabs Wildcat4 7110 of the NVIDIA Quadro FX 3000 video adapter will physically prevent installation of a PCI adapter in the adjacent PCI slot (PCI slot one).
10. Not available from IBM after this date. Business Partner inventory may be available.

IntelliStation Z Pro 6221 Processors

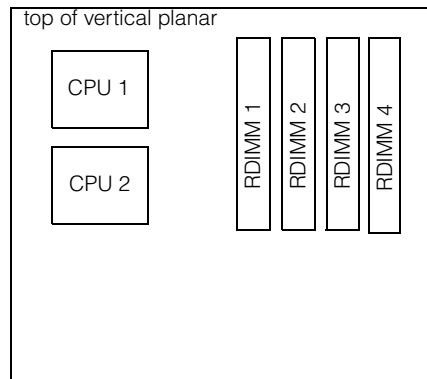
Part Number	Processor Upgrades	SMP Support ¹
24P7468	2.4GHz/533MHz-512KB Cache Xeon Second Processor for 6221	10U
59P5109	2.67GHz/533MHz-512KB Cache Xeon Second Processor for 6221	2xU
59P5110	2.8GHz/533MHz-512KB Cache Xeon Second Processor for 6221	3xU
24P8123	3.06GHz/533MHz-512KB Cache Xeon Second Processor for 6221	4xU
13N0691	3.2GHz/533MHz-1MB L3 Cache Xeon Second Processor for 6221	5xU

1. One additional processor may be installed, providing a maximum of two. All processors must be identical in type, speed and cache size.

IntelliStation Z Pro 6221 Memory

Part Number	Memory Description ¹
33L5037	256MB DDR PC2100 ECC RDIMM
33L5038	512MB DDR PC2100 ECC RDIMM
33L5039	1GB DDR PC2100 ECC RDIMM
33L5040	2GB PC2100 CL2.5 ECC DDR SDRAM RDIMM

1. Due to two-way interleaving, installation of memory options in matched pairs beginning with RDIMMs three and four is required. Standard RDIMMs are installed in sockets three and four.



Total System Memory ¹		Quantity of RDIMMs Added			
512MB (2x256MB) Models	1GB (2x512MB) Models	256MB (33L5037)	512MB (33L5038)	1GB (33L5039)	2GB (33L5040)
1GB	1.5GB	2	-	-	-
1.5GB	2GB	-	2	-	-
2.5GB	3GB	-	-	2	-
4.5GB	5GB	-	-	-	2
5GB ²	-	-	2	-	2
6GB ²	6GB ²	-	-	2	2
8GB ²	8GB ²	-	-	-	4

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Requires replacing the standard RDIMM.

IntelliStation Z Pro 6221 Hard Disk Drive (HDD) Storage

SCSI models			
Total Internal Storage ¹	Quantity added to standard configuration		
	36.4GB HDD	73.4GB HDD	146.8GB HDD
36.4GB ²	-	-	-
54.6GB	-	-	-
72.8GB	1	-	-
109.8GB	-	1	-
183.2GB	-	2	-
220.2GB ³	-	3	-
293.6GB	-	-	2
440.4GB ³	-	-	3

This table does not represent all possible HDD configurations.

1. Select a total storage row then add the quantity of HDDs from the column of the preferred HDD to the standard HDD.
2. 36.4GB HDD ships standard in SCSI models.
3. Requires replacement of the standard HDD.

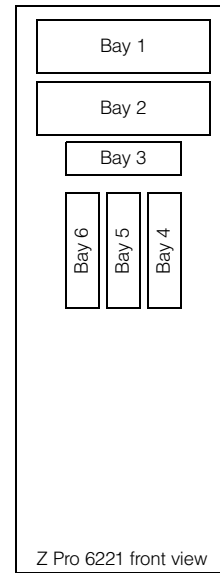
EIDE Models			
Total Internal Storage ^{1, 2}	Quantity added to standard configuration		
	40GB HDD	80GB HDD	120GB HDD
40GB ³	-	-	-
80GB	1	-	-
160GB	-	-	1
200GB ⁴	-	1	1
240GB ⁴	-	-	2

This table does not represent all possible HDD configurations. Total internal storage listed is within +/-0.2GB unless otherwise noted.

1. Select a total storage row then add the quantity of HDDs from all columns to the standard HDD.
2. Supports a maximum of four IDE devices including CD-ROM drives, HDDs and IDE tape drives. Neither of the standard two-drop IDE cables is long enough for attachment to both an IDE HDD and an IDE device installed in either removable media bay.
3. 40GB HDD ships standard in IDE models.
4. Requires replacing the standard HDD.

Bay	Form Factor	Height	Front Access	Usage
1	133mm (5.25in)	HH	yes	standard optical drive ¹
2	133mm (5.25in)	HH	yes	removable media ¹
3	89mm (3.5in)	SL	yes	FDD
4, 5	89mm (3.5in)	SL	no	open
6	89mm (3.5in)	SL	no	standard HDD

1. Supports removable media devices only. Hard disk drives are not supported.



Part Number	Description	RPM	Height	Bays Supported	Maximum Quantity
IDE HDDs^{1, 2}					
22P7157	40GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	4 ... 6	2
09N4226	80GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	4 ... 6	2
09N4231	120GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	4 ... 6	2
Nonhot-swap Ultra320 HDDs²					
32P0723	36.4GB 10Krpm Ultra320 SCSI HDD	10000	SL	4 ... 6	3
32P0724	73.4GB 10Krpm Ultra320 SCSI HDD	10000	SL	4 ... 6	3
32P0725	146.8GB 10Krpm Ultra320 SCSI HDD	10000	SL	4 ... 6	3
32P0784	36.4GB 15Krpm Ultra320 SCSI HDD	15000	SL	4 ... 6	3
32P0785	73.4GB 15Krpm Ultra320 SCSI HDD	15000	SL	4 ... 6	3
Associated Options					
24P7929	Enabling Cable for External Ultra320 SCSI Port ³	-	-	-	1
Removable Media Devices			Bays Supported		
10K3782	48x-20x CD-ROM Black Internal IDE Drive ⁴	1, 2			
22P6950	16x Max RAM-Read DVD-ROM Drive ^{4, 5}	1, 2			
00N8078	250MB IDE Internal Zip Drive ⁶	1, 2			

1. IDE models support a maximum of four IDE devices including optical drives, IDE hard disk drives and IDE tape drives. Neither of the standard two-drop IDE cables is long enough for attachment to both an IDE HDD and an IDE device installed in either removable media bay.

2. Standard HDD installed in bay six for both SCSI and IDE models.

3. Required to enable the external 68-pin high density SCSI port. Attaches to Channel B of the integrated Ultra320 SCSI controller.

4. Either replace the standard CD-ROM or install in the available media bay. A two-drop IDE cable is included with the optional optical drive. The included audio cable must be connected in order to support audio for music CDs.

5. DVD video playback is not supported for models that include a 3Dlabs Wildcat4 7110 video adapter.

6. Hardware for converting a 5.25in bay to 3.5in is included with the option.

IntelliStation Z Pro 6221 I/O Options

Part Number	Description	Adapter Length	PCI Support ³	Slots Supported ⁴
Storage Controllers^{1, 2}				
19K4646	PCI Wide Ultra160 SCSI Adapter	Half	32-bit	1 ... 5
71P8594	Single Channel Ultra320 SCSI Controller	Half	64-bit	1 ... 5
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	Half	64-bit	2 ... 5
71P8592	ATA133 RAID Controller	Half	32-bit	1 ... 5
Networking				
Ethernet⁵				
22P4501	Intel Pro/100S Desktop Adapter ⁶	Half	32-bit	1 ... 5
22P6501	Pro/1000 T Desktop Adapter by Intel ⁶	Half	32-bit	1 ... 5
22P6901	Wireless LAN Adapter	Half	32-bit	2 ... 5
22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter	Half	64-bit	2 ... 5
Token Ring				
34L5001	16/4 Token-Ring PCI Management Adapter ⁶	Half	32-bit	1 ... 5
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter ⁶	Half	32-bit	1 ... 5
Communications⁷				
33L4618	V.90 PCI Data/Fax Modem	Half	32-bit	1

1. The dual-channel, Ultra320 integrated controller supports both Ultra160 and Ultra320 HDDs, but the entire SCSI bus will default to the slower rate (MB/second) if HDDs of different technologies are mixed on the same bus. The LSI chipset allows for two HDDs to be allocated for mirroring if a RAID adapter is not installed. One additional HDD may be designated as a hot-spare for HDDs configured in the onboard mirror. Mirrored and hot-spare HDDs must be matched.

2. Z Pro 6221 includes a dual-channel Ultra320 SCSI controller with two internal connectors. An external high-density 68-pin connector can be enabled using optional Enabling Cable for External Ultra320 SCSI Port (P/N 24P7929) to connect channel B to an external SCSI connector. External connection using this option and the external knockout is not supported if both channels of the integrated controller are connected internally, in which case a supported PCI SCSI controller is required to support an external SCSI device.

3. A 32-bit adapter installed into a 64-bit slot will restrict the data transfer rate to 32-bit. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot. 33MHz adapters will reduce 100MHz buses to 33MHz. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers, but will only operate at the rated bus frequency or frequency of the slowest adapter in the bus in which it is installed. 64-bit adapters are not supported in slot one.

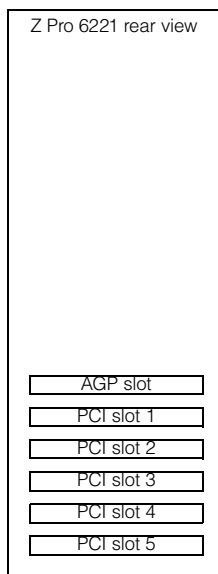
4. When the NVIDIA Wildcat4 7110 video adapter is installed in the AGP slot, slot one is unavailable due to the width of the adapter.

SCSI models do not support 64-bit or PCI-X adapters in slot one due to interference caused by the IEEE 1394 Firewire digital multimedia port.

5. The integrated copper 10/100/1000Mbps Broadcom (BCM5703) single-port Ethernet controller supports Wake on LAN.

6. Wake on LAN is supported through this adapter if proper shut-down procedures were followed.

7. IntelliStation Z Pro 6221 includes four USB ports (two each on front and rear of the chassis), two nine-pin serial ports, one 25-pin parallel port, audio in/out jacks and a microphone in jack. An integrated IEEE 1394 Firewire digital multimedia port is provided in models that support SCSI HDDs (slot one in these models is not available for 64-bit or PCI-X adapters).



Slot 1: Bus C, 32-bit, 33MHz, 5v, half-length
 Slot 2: Bus A, 64-bit, 100MHz, 3.3v, full-length, PCI-X
 Slot 3: Bus A, 64-bit, 100MHz, 3.3v, full-length, PCI-X
 Slot 4: Bus B, 64-bit, 100MHz, 3.3v, full-length extended, PCI-X
 Slot 5: Bus B, 64-bit, 100MHz, 3.3v, full-length, PCI-X



IntelliStation Z Pro 6221 Power, Monitors & Accessories

Part Number	Description
Power	
	IntelliStation Z Pro 6221 includes a 425w voltage-sensing power supply and a single line cord.
Tower Uninterruptible Power Supply (UPS)	
94G3134	APC Smart-UPS 700
94G3135	APC Smart-UPS 1000
Rack-mount Uninterruptible Power Supply (UPS)	
32P1020	APC 2U Smart-UPS 1400RMB
Monitors¹	
6652U3N	P275 Color Monitor 21in (503mm, 19.8in viewable image), stealth black
6656HG2	T560 Hybrid Flat Panel Monitor 15in (381mm, 15in viewable image), stealth black
9494HB0	T860 Hybrid Flat Panel Monitor 18.1in (460mm, 18.1in viewable image), stealth black
9503DG3	T221 Flat Panel Monitor 22.2in (564mm, 22.2in viewable image), stealth black
Conversion Kit	
09N4300	4Ux20D Tower-to-Rack Kit
Keyboard and Mouse²	
22P5185	Rapid Access III USB Keyboard, stealth black
31P7415	Preferred Pro Full-size Keyboard - 104 Keys (stealth black)
28L3673	Sleek 2-button Stealth Black Mouse
33L3252	SpaceBall 3D Input Device

1. Refer to IntelliStation Video Adapter Selection Guide for information regarding video adapter connections.
 2. IntelliStation Z Pro 6221 ships standard with an IBM 104-key keyboard and three-button mouse.

IntelliStation Z Pro 6221 Tape Options

Part Number	Tape Drives	Bays Supported	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures ²
48P7042	20/40GB TR7 Internal IDE Tape Drive ¹	1	-	89mm (3.5in) SL or 133mm (5.25in) HH	-	-
00N7991	20/40GB DDS/4 4mm Internal Tape Drive	2	16 Ultra2 LVD	89mm (3.5in) HH or 133mm (5.25in) HH	Y ³	3510020 ⁴
External Tape Enclosures						
3510020	External Half-High SCSI Storage Enclosure ⁵	-	16 LVD	Desktop	N	-
Associated Options						
00N7956	68-pin External Multimode LVD/SE SCSI Terminator	-	16 LVD/SE	Ext	Y	3510020
24P7929	Enabling Cable for External Ultra320 SCSI Port	-	16 LVD	Int	N	-

Note:
 All models include an integrated Ultra320 SCSI controller. SCSI models include a three-drop multimode terminated LVD SCSI cable. IDE models include two two-drop IDE cables. To enable external attachment to channel B of the integrated SCSI controller, optional Enabling Cable for External Ultra320 SCSI Port (P/N 24P7929) is required, which provides a 68-pin HD external connector. All SCSI tape drives and external tape enclosures are supported by PCI Wide Ultra160 SCSI Adapter (P/N 19K4646), which includes a five-drop multimode terminated LVD SCSI cable and an external 0.8mm VHDCI connector, or Single Channel Ultra320 SCSI Controller (P/N 71P8594), which provides a single channel with one 68-pin internal connector, a four-drop cable and one external 0.8mm VHDCI connector. SCSI tape drives installed internally can be connected to channel A of the integrated controller using the cable that ships with the tape drive if the HDDs or hot-swap backplane are attached to ServeRAID-4Lx.

1. SCSI models include a two-drop IDE cable for attachment to the CD-ROM and an IDE tape drive. IDE models include two two-drop IDE cables.
2. To determine external cable requirements, note the tape drive's SCSI interface, the appropriate SCSI controller from the system configurator section and the desired enclosure, then refer to Appendix D: Cables - Storage Units - Controllers.
3. Termination requires installing the 34in single-drop, terminated LVD SCSI cable provided with the option.
4. Requires 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956).
5. Black desktop tape enclosure that supports a single 133mm (5.25in) half-high (HH) tape drive. Internal and external connectors are 68-pin high-density supporting LVD. Requires 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956). External cables are not included. Refer to Appendix D: Cables - Storage Units - Controllers to select a supported cable.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

xSeries 205

Part Number ¹	Withdrawal Date ¹⁰	Processor Speed (GHz)	Number of Processors (Std/Max)	L2 ECC Cache (KB)	Memory (Std/Max)	Form Factor	Power Supply Quantity (Std/Max)	Hot-Swap (Power, Slots, HDD, Fans)	Redundancy (Optional, Standard)	Adv System Management Processor	Onboard Ethernet (Mbps) ⁵	Storage Controller (Dual, Ultra, RAID)	Removable Media Bays (Total/Avail)	Internal HDD Storage (Std/Max)	CD-ROM (IDE)	Bays (Total/Avail)	Slots (Total/Avail)
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xSeries 205 At-A-Glance																	
8480-33X	30-Dec	2.4 ²	1/1	512	256MB/2GB	Tower	1/1	- - -		10/100/1000	IDE	3/1	40GB/360GB ⁸	48x-20x	7/4	5/5	
8480-42X	30-Dec	2.67 ²	1/1	512	256MB/2GB	Tower	1/1	- - -		10/100/1000	U160 ⁶	3/1	36.4GB/587.2GB ⁷	48x-20x	7/4	5/5	
8480-43X	30-Dec	2.67 ²	1/1	512	256MB/2GB	Tower	1/1	- - -		10/100/1000	IDE	3/1	40GB/360GB ⁸	48x-20x	7/4	5/5	
8480-4AX	30-Dec	2.67 ²	1/1	512	256MB/2GB	Tower	1/1	H - -		10/100/1000	U160 ⁶	3/1	0/367GB ⁷	48x-20x	7/5	5/5	
8480-52X	-	2.8 ²	1/1	512	256MB/2GB	Tower	1/1	- - -		10/100/1000	U160 ⁶	3/1	36.4GB/587.2GB ⁷	48x-20x	7/4	5/5	
8480-53X	-	2.8 ²	1/1	512	256MB/2GB	Tower	1/1	- - -		10/100/1000	IDE	3/1	40GB/360GB ⁸	48x-20x	7/4	5/5	
8480-5AX	-	2.8 ²	1/1	512	256MB/2GB	Tower	1/1	H - -		10/100/1000	U160 ⁶	3/1	0/367GB ⁷	48x-20x	7/5	5/5	
8480-62X	-	3.06 ²	1/1	512	256MB/2GB	Tower	1/1	- - -		10/100/1000	U160 ⁶	3/1	36.4GB/587.2GB ⁷	48x-20x	7/5	5/5	
8480-63X	-	3.06 ²	1/1	512	256MB/2GB	Tower	1/1	- - -		10/100/1000	IDE	3/1	40GB/360GB ⁷	48x-20x	7/5	5/5	
8480-6AX	-	3.06 ²	1/1	512	256MB/2GB	Tower	1/1	H - -		10/100/1000	U160 ⁶	3/1	0/367GB ⁷	48x-20x	7/5	5/5	
8480-95X ⁹	-	2 ⁴	1/1	128	128MB/2GB	Tower	1/1	- - -		10/100/1000	IDE	3/1	40GB/360GB ⁸	48x-20x	7/4	5/5	

1. Ships with standard keyboard and mouse. See Power, Monitors and Accessories section for tower-to-rack conversion kit.
 2. Intel Pentium 4 processor with advanced transfer L2 cache and 533MHz (quad-pumped) Front-side Bus (FSB).
 3. Intel Celeron 1.8GHz processor with 128KB L2 cache and 400MHz (quad-pumped) FSB.
 4. Intel Celeron 2GHz processor with 128KB L2 cache and 400MHz (quad-pumped) FSB.
 5. Broadcom 5702 integrated gigabit Ethernet controller.
 6. Integrated single channel Ultra160 SCSI storage controller.
 7. Maximum capacity for nonhot-swap models is based on four 146.8GB SCSI HDDs. Maximum capacity for hot-swap models is based on three 73.4GB hot-swap SCSI HDDs and one 146.8GB nonhot-swap SCSI HDD.
 8. Maximum capacity is based on three 120GB IDE HDDs.
 9. This VL (value line) model includes a one-year on-site and labor limited warranty.
 10. Not available from IBM after this date. Business Partner inventory may be available.

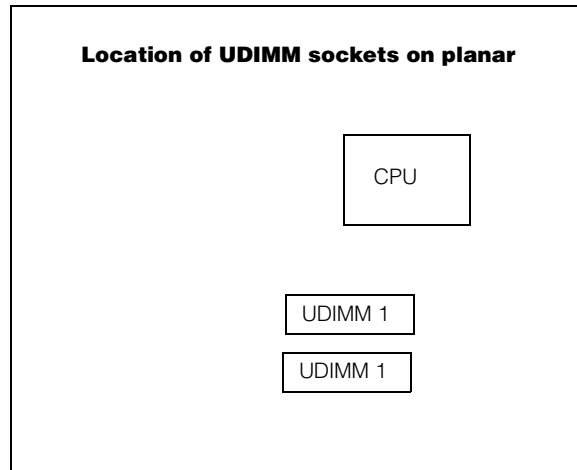
xSeries 205 Memory

Part Number	Memory Description
10K0067	256MB PC2100 CL2.5 ECC DDR SDRAM UDIMM
10K0069	512MB PC2100 CL2.5 ECC DDR SDRAM UDIMM
10K0071	1GB PC2100 CL2.5 ECC DDR SDRAM UDIMM

Total System Memory ¹	Quantity of UDIMMs Added		
	256MB (10K0067)	512MB (10K0069)	1GB (10K0071)
1 x 256MB standard			
512MB	1	-	-
768MB	-	1	-
1GB ²	-	2	-
1.25GB	-	-	1
1.5GB ²	-	1	1
2GB ²	-	-	2

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller UDIMMs may provide a more cost-effective alternative to using larger UDIMMs.

1. Select the desired total memory, then add the selection in that row to the standard memory.
2. Requires removal of standard UDIMM.



xSeries 205 Internal SCSI Cabling

EIDE Configurations

xSeries 205 EIDE models include two two-drop IDE cables. One cable is used to attach to the standard CD-ROM drive. The other attaches to the standard 40GB IDE HDD. Two additional IDE devices may be installed (up to two IDE HDDs or one optical drive and an IDE HDD).

SCSI Configurations

xSeries 205 supports both nonhot-swap and hot-swap SCSI configurations. Both hot-swap and nonhot-swap models include a standard integrated single-channel Ultra160 SCSI controller and a two-drop IDE cable for connection to the standard CD-ROM drive and one other IDE optical drive (optional). Nonhot-swap models include a five-drop 16-bit LVD terminated SCSI cable for connection of SCSI HDDs and an optional SCSI tape drive. Hot-swap models include a nonterminated SCSI cable for connecting the integrated controller to the hot-swap backplane. Support for tape drives on the same SCSI bus as the hot-swap backplane is not provided. If the optional ServeRAID-4Mx or -4Lx controller is installed, the standard cable is used to connect the HDDs in nonhot-swap models or the backplane in hot-swap models to the RAID controller. Tape drives are then connected to the integrated controller using the terminated SCSI cable provided with the optional tape drive. External SCSI connections require a supported SCSI controller.

For additional information regarding internal cabling, refer to Appendix F: Internal Cabling Overview.

xSeries 205 Hard Disk Drive (HDD)

SCSI Models			
Total Internal Storage^{1, 2}	Quantity of HDDs added to standard configuration		
	36.4GB HDD	73.4GB HDD	146.8GB HDD
0GB			
36.4GB	1	-	-
54.6GB	-	-	-
72.8GB	2	-	-
109.2GB	3	-	-
145.6GB	4 ³	-	-
146.8GB	-	2	1
220.2GB	-	3	-
293.6GB	-	4 ³	2
440.4GB	-	-	3
587.2GB	-	-	4 ³

This table does not represent all possible HDD configurations. Total internal storage listed is within +/- 0.2GB unless otherwise noted.

1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.
2. The quantity of HDDs shown are based on the hot-swap SCSI (open bay) models. Nonhot-swap SCSI models ship standard with one 36.4GB 10K rpm Ultra160 SCSI HDD.
3. Only three hot-swap HDDs are supported in hot-swap models. A nonhot-swap HDD installed in bay four and connected to the same SCSI bus as the hot-swap backplane is not supported.

EIDE Models			
Total Internal Storage^{1, 2}	Quantity of HDDs added to standard configuration		
	40GB HDD³	80GB HDD	120GB HDD
40GB	-	-	-
80GB	1	-	-
120GB	-	1	-
160GB	1	1	-
200GB	-	2	-
240GB ⁴	-	3	-
280GB ⁴	-	2	1
320GB ⁴	-	1	2
360GB ⁴	-	-	3

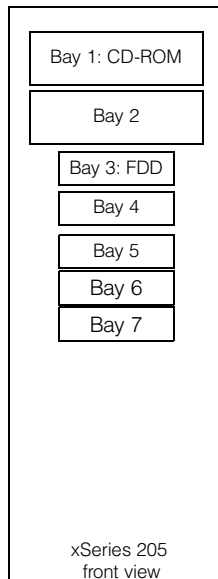
This table does not represent all possible HDD configurations. Total internal storage listed is within +/- 0.2GB unless otherwise noted.

1. Select a total storage row then add the quantity of HDDs from all columns to the standard HDD.
2. The two EIDE controllers support a maximum of four IDE devices per machine including CD-ROM drives, HDDs and IDE tape drives.
3. One 40GB 7200 rpm IDE HDD is standard on IDE models.
4. Requires removal of the standard HDD.



Part Number	Description	RPM	Height	Hot-swap Models		Nonhot-swap Models	
				Bays Supported ³	Maximum Quantity	Bays Supported	Maximum Quantity
IDE HDDs¹							
22P7157	40GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	-	-	4 ... 7	3
09N4226	80GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	-	-	4 ... 7	3
09N4231	120GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	-	-	4 ... 7	3
Nonhot-swap Ultra320 HDDs^{2, 3}							
32P0723	36.4GB 10Krpm Ultra320 SCSI HDD	10000	SL	4	1	4 ... 7	4
32P0724	73.4GB 10Krpm Ultra320 SCSI HDD	10000	SL	4	1	4 ... 7	4
32P0725	146.8GB 10Krpm Ultra320 SCSI HDD	10000	SL	4	1	4 ... 7	4
Hot-swap Ultra160 SCSI HDDs⁴							
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-Swap SL HDD	10000	SL	5 ... 7	3	-	-
06P5756	73.4GB 10Krpm Ultra160 SCSI Hot-Swap SL HDD	10000	SL	5 ... 7	3	-	-
06P5768	36.4GB 15Krpm Ultra160 SCSI Hot-Swap SL HDD	15000	SL	5 ... 7	3	-	-
Optical Devices				Bays Supported			
22P6950	16x Max RAM-Read DVD-ROM Drive ^{5, 6}			1, 2			
10K3782	48x-20x CD-ROM Black Internal IDE Drive ⁵			1, 2			
External Storage Expansion Units⁷				Form Factor			
35311RU	EXP300 Storage Expansion Unit ⁸			Rack (3U)			
09N7296	EXP300 Rack-to-Tower Conversion Kit			-			

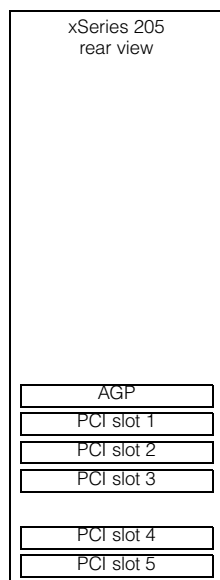
- The xSeries 205 EIDE controllers support a maximum of four IDE devices per machine including CD-ROM drives, hard disk drives and IDE tape drives.
- Nonhot-swap HDDs are supported in bays 4 ... 7 of nonhot-swap models and in bay four of hot-swap models. Nonhot-swap HDDs are not supported on the same SCSI bus as the hot-swap backplane in hot-swap models.
- Ultra320 HDDs are supported, but performance is limited to the Ultra160 speed of the SCSI controller.
- Hot-swap HDDs are supported in bays 5 ... 7 of hot-swap models. Bay four supports nonhot-swap HDDs only. Nonhot-swap HDDs are not supported on the same SCSI bus as the hot-swap backplane in hot-swap models.
- Either replace the standard CD-ROM or install in the available media bay. A two-drop IDE cable is included with the optional optical drive (same cable is standard in the system). If installing as an additional device, connect the cable to each optical device and the IDE connector on the system board. Configure the optional device as a master using the preset configuration if replacing the standard device or as a slave if installed as an additional device.
- Audio not supported for DVD-ROM drives. The drive provides data input/output only.
- Not supported by the onboard SCSI controller. Select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section.
- EXP300 includes a single 2m Ultra2 SCSI cable and dual hot-swap 500w redundant power supplies, each with its own power cord. To convert an EXP300 to a tower form factor, EXP300 Rack-to-Tower Conversion Kit (P/N 09N7296) is required.



Bay	Form Factor	Height	Front Access	Usage
1	133mm (5.25in)	HH	yes	CD-ROM
2	133mm (5.25in)	HH	yes	open ¹
3	89mm (3.5in)	SL	yes	FDD
4	89mm (3.5in)	SL	yes	open
5 ... 7 ²	89mm (3.5in)	SL	yes	open

Note: HDDs are installed in the order of bays seven through four, i.e., 7, 6, 5, 4.

- Supports removable media devices only. Hard disk drives are not supported.
- Bays five, six and seven are configured as hot-swap bays on xAX models. These bays are not front-accessible in nonhot-swap models.

xSeries 205 I/O Options


All PCI slots are 33MHz, 32-bit, full-length on a single PCI bus supporting 5v or universal adapters.

Part Number	Description	Adapter Length	PCI Support ¹	Slots Supported ²
Storage Controllers³				
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	Half	64-bit	1 ... 5
71P8592	ATA133 RAID Controller ⁴	Half	32-bit	1 ... 5
19K4646	PCI Wide Ultra160 SCSI Adapter	Half	32-bit	1 ... 5
71P8594	Single Channel Ultra320 SCSI Controller ⁸	Half	64-bit	1 ... 5
Networking⁵				
Ethernet⁶				
06P3601	10/100 Ethernet Server Adapter ⁷	Half	32-bit	1 ... 5
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals ⁷	Half	64-bit	1 ... 5
22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter	Half	64-bit	1 ... 5
31P6301	NetXtreme 1000 T Ethernet Adapter (copper) ⁷	Half	64-bit	1 ... 5
31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper) ⁷	Half	64-bit	1 ... 5
Token Ring				
34L5001	16/4 Token-ring PCI Management Adapter ⁷	Half	32-bit	1 ... 5
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter ⁷	Half	32-bit	1 ... 5
System Management				
09N7585	Remote Supervisor Adapter ⁸	Half	32-bit	1



Communications⁹				
Point of Sale (POS)				
08L2683	PCI Store Loop Adapter ¹⁰	-	-	1 ... 5
08L2684	PCI NVRAM Adapter ¹⁰	-	-	1 ... 5

1. A 64-bit adapter installed into a 32-bit slot will transfer data at 32-bit rates. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot.
2. The xSeries 205 has five full-length PCI expansion slots on a single 32-bit, 33MHz bus.
3. xSeries 205 has an integrated Ultra160 SCSI Controller with a single internal channel. Nonhot-swap models ship with a five-drop, multimode terminated LVD SCSI cable. Hot-swap models ship with a nonterminated LVD SCSI cable.
4. ATA133 RAID Controller (P/N 71P8592) supports RAID levels 0, 1 and 10 on up to four ATA66, 100 or 133 EIDE HDDs (only four IDE devices can be installed). The dual channel IDE controller includes two internal 40-pin connectors, two 18-inch single-drop IDE cables (P/N 02R0719) and two 23-inch two-drop IDE cables (P/N 02R0721).
5. xSeries 205 includes an integrated copper-based Broadcom 5702 full-duplex, 10/100/1000Mbps Ethernet controller.
6. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. Two optional Ethernet adapters are copper and Intel-based (P/N 06P3601, 22P6801). One is Broadcom-based (P/N 31P6301).
7. Wake on LAN is supported for this option when installed in slots one through five.
8. When installing this option in xSeries 205, the external power supply provided with the option is not required. All power is supplied through the internal 20-pin ribbon cable.
9. xSeries 205 includes two USB ports (on rear of chassis), two 9-pin serial ports, one 25-pin parallel port, AC 97 audio line in/out jacks, and a microphone in jack.
10. The PCI Store Loop adapter contains NVRAM, which is required to run the 4690 OS system. POS solutions implemented via Ethernet or Token Ring use the PCI NVRAM adapter to provide NVRAM.

xSeries 205 Power, Monitors & Accessories

Part Number	Description
Power¹	
Tower Uninterruptible Power Supply (UPS)²	
94G3134	APC Smart-UPS 700
21301TX	UPS750TLV
21302TX	UPS750THV
94G3135	APC Smart-UPS 1000
21303TX	UPS1000TLV
21304TX	UPS1000THV
94G3136	APC Smart-UPS 1400
21305TX	UPS1500TLV
21306TX	UPS1500THV
Rack-mount Uninterruptible Power Supply (UPS)²	
32P1020	APC 2U Smart-UPS 1400RMB
2130R30	UPS3000XLV ³
2130R31	UPS3000XHV ³
32P1692	UPS Extend Run Battery Pack ³
37L6861	APC Smart-UPS 5000RMB ⁴
Monitors⁵	
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black ⁶
63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black ⁶
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁷
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard) ⁷
32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁷
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard) ⁷
9494HBO	T860 Hybrid Flat Panel Monitor 18.1in (460mm, 18.1in viewable image), stealth black ³

1. The xSeries 205 includes a 340w voltage sensing power supply with a single line cord.
2. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
3. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
4. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
5. The xSeries 205 contains an ATI Rage XL video controller with 4MB of video memory.
6. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).
7. Includes a 15in Flat Panel Monitor.

Part Number	Description
Conversion Kits	
09N4300	4Ux20D Tower-to-Rack Kit
Rack and NetBAY¹	
	Refer to the Rack Cabinets and Options section for information concerning IBM racks and rack-supported devices.
Console Connectivity²	
1735L04	NetBAY Local Console Manager
1735R16	NetBAY Remote Console Manager
32P1636	250mm KVM Conversion Option
32P1652	1.5m KVM Conversion Option
09N4290	NetBAY 1x4 Console Switch
09N4291	NetBAY 2x8 Console Switch
Keyboard and Mouse³	
28L3644	Space Saver II Keyboard ^{4, 5}
10K3849	106-key Preferred USB Keyboard with 2-port USB Hub (stealth black) ^{6, 7}
31P7415	Preferred Pro Full-size Keyboard - 104 Keys (stealth black)
28L3673	Sleek 2-button Stealth Black Mouse

1. Rack installation of an xSeries 205 requires 4Ux20D Tower-to-Rack Kit (P/N 09N4300) and one of the racks listed in the Rack Cabinets and Options section.
2. Refer to the Rack Console Options section for information regarding console connectivity using these options.
3. xSeries 205 models ship standard with both a mouse and nonspace saver keyboard.
4. Installation within a rack requires optional keyboard tray (P/N 28L4707) which stows in ready-to-use position, or NetBAY 1U or 2U Flat Panel Monitor Console Kit (P/N 32P1032, 32P1702). Standard with 1U and 2U NetBAY console kits (P/N 32P1031, 32P1702).
5. Advanced TrackPoint IV features are not available on IBM xSeries systems.
6. Installation within a rack requires optional keyboard tray P/N 28L4707. This keyboard cannot share a keyboard tray with a flat panel display.
7. USB accessories attach to a single USB-capable server. They are not compatible with the NetBAY console switches.

xSeries 205 Tape Options

Part Number	Tape Drives	Bays Supported	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures ¹
48P7042	20/40GB TR7 Internal IDE Tape Drive ²	2, 4	-	89mm (3.5in) SL or 133mm (5.25in) HH	-	-
00N7991	20/40 GB DDS/4 4mm Internal Tape Drive ³	2	16 Ultra2 LVD	89mm (3.5in) HH or 133mm (5.25in) HH	Y ⁴	3510020 ⁵
24P2396	100/200GB LTO Half-High Tape Drive ^{3, 7, 8}	2	16 Ultra2 LVD	133mm (5.25in) HH	Y ⁴	3510020 ⁵
24P2398	40/80GB Half-High DLTVS Internal SCSI Tape Drive ^{3, 8}	2	16 Ultra2 LVD	133mm (5.25in) HH	Y ⁴	3510020 ⁵
59P6746	VXA-2 80/160GB Tape Drive ³	2	16 Ultra2 LVD	133mm (5.25in) HH	Y ⁴	3510020 ⁵
External Tape Enclosures						
3510020	External Half High SCSI Storage Enclosure ⁶	-	16 LVD	Desktop	N	-
Associated Options						
00N7956	68-pin External Multimode LVD/SE SCSI Terminator	-	16 LVD/SE	External	Y	3510020

Note: Hot-swap models do not support installation of a SCSI tape drive on the same bus that supports the hot-swap backplane.

1. To determine external cable requirements, note the tape drive's SCSI interface, the appropriate SCSI controller from the system configurator section and the desired enclosure, then refer to Appendix D: Cables - Storage Units - Controllers.
2. SCSI models include a two-drop EIDE cable for attachment to the CD-ROM and an IDE tape drive.
3. EIDE models require optional PCI Wide Ultra 160 SCSI Adapter (P/N 19K4646), which includes a five-drop multimode LVD SCSI cable.
4. When installed internally, termination requires installing the 34in single-drop, terminated LVD SCSI cable provided with the option.
5. Requires 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956).
6. Black desktop tape enclosure that supports a single 133mm (5.25in) half-high (HH) tape drive. Internal and external connectors are 68-pin high-density supporting LVD. Requires 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956). External cables are not included. Refer to Appendix D: Cables - Storage Units - Controllers to select a supported cable.
7. This tape drive must be shipped separately as an option and installed at a customer site. Factory or vendor installation prior to shipping is not supported.
8. Supported only in new builds of External Half-High SCSI Storage Enclosure (P/N 3510020), indicated by AI Header J1PJK on the outside box label of the tape enclosure.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.



xSeries 205 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

File and Print Server

Part Number	Description	Quantity
8480-42X	xSeries 205 2.67GHz/533MHz-512KB Pentium 4, 256MB ECC, 18.2GB, 48x	1
10K0069	512MB PC2100 CL2.5 ECC DDR SDRAM UDIMM	1 ¹
06P5750	18.2GB 10Krpm Ultra160 SCSI SL HDD	3 ²
24P2396	100/200GB LTO Half-High Tape Drive	1
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black	1
94G3134	APC Smart-UPS 700	1

1. For a total of 768MB of system memory.
2. For a total of 72.8GB of internal storage.

Application Server

Part Number	Description	Quantity
8480-5AX	xSeries 205 2.8GHz/533MHz-512KB Pentium 4, 256MB ECC, open hot-swap, 48x	1
10K0069	512MB PC2100 CL2.5 ECC DDR SDRAM UDIMM	2 ¹
06P5754	18.2 GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	3 ²
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	1
00N7991	20/40GB DDS/4 4mm Internal Tape Drive	1
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black	1
94G3134	APC Smart-UPS 700	1

1. For a total of 768MB of system memory.
2. Three HDDs are used for RAID 5 protection. Effective capacity is two HDDs or 36.4GB.



xSeries 225

Part Number ¹	Withdrawal Date ¹⁰	Processor Speed (GHz) ²	Number of Processors (Std/Max)	L2 ECC Cache (KB)	Memory (Std/Max) ³	Form Factor	Power Supply Quantity (Std/Max)	Hot-Swap (Power, Slots, HDD, Fans)	Redundancy (Optional, Standard) ⁴	System Management Processor	Onboard Ethernet (Mbps) ⁵	SCSI Controller (Dual, Ultra, RAID) ⁶	Removable Media Bays (Total/Avail)	Internal HDD Storage (Total/Avail)	CD-ROM (IDE) ⁸	Bays (Total/Avail) ⁹	Slots (Total/Avail) ⁹
xSeries 225 At-A-Glance																	
8647-3AX	30-Dec	2.4	1/2	512	512MB/8GB	Tower	1/1	H	-	N	10/100/1000	D, U320	3/1	0/880.8GB	48x-20x	9/7	5/5
8647-42X	-	2.67	1/2	512	256MB/8GB	Tower	1/1	-	-	N	10/100/1000	D, U320	3/1	36.4GB/587.2GB	48x-20x	7/4	5/5
8647-4AX	-	2.67	1/2	512	512MB/8GB	Tower	1/1	H	-	N	10/100/1000	D, U320	3/1	0/880.8GB	48x-20x	9/7	5/5
8647-4BX	-	2.67	1/2	512	512MB/8GB	Tower	2/2	P, H	S-Power	N	10/100/1000	D, U320	3/1	0/880.8GB	48x-20x	9/7	5/5
8647-52X	-	2.8	1/2	512	256MB/8GB	Tower	1/1	-	-	N	10/100/1000	D, U320	3/1	36.4GB/587.2GB	48x-20x	7/4	5/5
8647-5AX	-	2.8	1/2	512	512MB/8GB	Tower	1/1	H	-	N	10/100/1000	D, U320	3/1	0/880.8GB	48x-20x	9/7	5/5
8647-5BX	-	2.8	1/2	512	512MB/8GB	Tower	2/2	P, H	S-Power	N	10/100/1000	D, U320	3/1	0/880.8GB	48x-20x	9/7	5/5
8647-62X	-	3.06	1/2	512	256MB/8GB	Tower	1/1	-	-	N	10/100/1000	D, U320	3/1	36.4GB/587.2GB	48x-20x	7/4	5/5
8647-6AX	-	3.06	1/2	512	512MB/8GB	Tower	1/1	H	-	N	10/100/1000	D, U320	3/1	0/880.8GB	48x-20x	9/7	5/5
8647-6BX	-	3.06	1/2	512	512MB/8GB	Tower	2/2	P, H	S-Power	N	10/100/1000	D, U320	3/1	0/880.8GB	48x-20x	9/7	5/5

- Ships with standard keyboard and mouse. See Power, Monitors and Accessories section for tower-to-rack conversion kit.
- Intel Xeon processor with advanced transfer L2 cache and 533MHz (quad-pumped) access to memory and I/O buses.
- High-speed, two-way interleaved 133MHz DDR PC2100 RDIMM. Maximum capacity includes four 2GB RDIMMs, requiring replacement of the two standard RDIMMs.
- Nonredundant power models include a single 425w nonhot-swap power supply. Redundant power models with 3.06GHz processors include two 514w power supplies. Redundant power models with other processors include two 350w hot-swap power supplies. Each power supply includes a separate power cord.
- A Broadcom 5703 copper gigabit Ethernet controller is integrated into the planar.
- The dual-channel, Ultra320 integrated controller supports both Ultra160 and Ultra320 HDDs, but the entire SCSI bus will default to the slower rate (MB/second) if HDDs of different technologies are mixed on the same bus. The LSI chipset allows for two HDDs to be allocated for mirroring if a RAID adapter is not installed. One additional HDD may be designated as a hot-spare for HDDs configured in the onboard mirror. Mirrored and hot-spare HDDs must be matched.
- Maximum storage capacity is based on four 146.8GB nonhot-swap Ultra320 HDDs in nonhot-swap models and six 146.8GB hot-swap Ultra320 HDDs in hot-swap models. Nonhot-swap models include a terminated LVD four-drop SCSI cable and hot-swap models include a single-drop nonterminated LVD SCSI cable.
- Variable read rate. Actual playback speed will vary and is often less than the maximum possible.
- Nonhot-swap models include seven total bays and hot-swap models include nine bays.
- Not available from IBM after this date. Business Partner inventory may be available.

xSeries 225 Processors

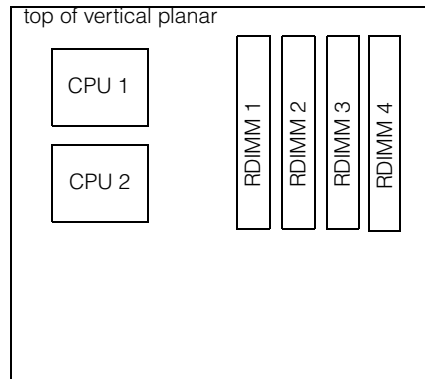
Part Number	Processor Upgrades	SMP Support ¹
59P5108	2.4BGHz/533MHz-512KB L2 Cache Upgrade with Xeon Processor	3xX
24P7861	2.67GHz/533MHz-512KB L2 Cache Upgrade with Xeon Processor	4xX
24P8054	2.8GHz/533MHz-512KB L2 Cache Upgrade with Xeon Processor	5xX
24P8122	3.06GHz/533MHz-512KB L2 Cache Upgrade with Xeon Processor	6xX

1. One additional processor may be installed, providing a maximum of two. All processors must be identical in type, speed and cache size.

xSeries 225 Memory

Part Number	Memory Description ¹
33L5036	128MB DDR PC2100 ECC RDIMM
33L5037	256MB DDR PC2100 ECC RDIMM
33L5038	512MB DDR PC2100 ECC RDIMM
33L5039	1GB DDR PC2100 ECC RDIMM
33L5040	2GB PC2100 CL2.5 ECC DDR SDRAM RDIMM

1. Due to two-way interleaving, installation of memory options in matched pairs beginning with RDIMMs three and four is required. Standard RDIMMs are installed in sockets three and four.



Total System Memory ¹		Quantity of RDIMMs Added				
256MB (2 x 128) Models	512MB (2 x 256) Models	128MB (33L5036)	256MB (33L5037)	512MB (33L5038)	1GB (33L5039)	2GB (33L5040)
512MB	768MB	2	-	-	-	-
768MB	1GB	-	2	-	-	-
1.25GB	1.5GB	-	-	2	-	-
2.25GB	2.5GB	-	-	-	2	-
4.25GB	4GB	-	-	-	-	2
5GB ²	5GB ²	-	-	2	-	2
6GB ²	6GB ²	-	-	-	2	2
8GB ²	8GB ²	-	-	-	-	4

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Requires replacing the standard RDIMM.

xSeries 225 Internal SCSI Cabling

xSeries 225 nonhot-swap models are cabled internally with a four-drop, 16-bit wide Ultra320 SCSI cable with a built-in active terminator at one end of the cable. The other end of the cable is attached to the internal 68-pin connector of channel A of the integrated Ultra320 SCSI controller. SCSI HDDs can be connected to any of the four cable connectors.

xSeries 225 hot-swap models are cabled internally with a single-drop, nonterminated 16-bit wide Ultra320 SCSI cable. One end is connected to the internal 68-pin connector of channel A of the integrated Ultra320 SCSI controller and the other end to the hot-swap backplane, which provides termination for the SCSI bus.

RAID Configurations

Optional Ultra160 ServeRAID-4Lx, -4Mx or -4H can be used to support HDDs installed in either nonhot-swap or hot-swap models of xSeries 225. In either installation, the standard SCSI cable is removed from the integrated Ultra320 SCSI controller and connected to an internal connector of the RAID controller. An internal SCSI tape drive can be attached to channel A of the integrated Ultra320 controller when the HDDs are attached to a ServeRAID-4x adapter. If ServeRAID-5i is installed, cabling remains connected and both channels of the integrated controller are managed by the optional adapter. Channel B can be attached to an internal SCSI device if ServeRAID-5i is configured to support a SCSI bus.

Configuration Alternatives

Optional External SCSI Interface Kit (32P8164) can be installed to enable a 0.8mm VHDCI external connector. Support for external tape drives is limited to half-high LVD SCSI tape drives if the integrated controller is managed by ServeRAID-5i. External SCSI support can be obtained by installing an optional SCSI adapter to support external tape storage, or a RAID controller can be installed to support external SCSI HDD storage.

In addition to the SCSI controller, an IDE controller provides the interface for the IDE CD-ROM drive. A two-drop IDE cable connects the IDE controller to the IDE CD-ROM. The second drop can be used to connect a second optional IDE device.

For additional information regarding internal cabling, refer to Appendix F: Internal Cabling Overview.

xSeries 225 Hard Disk Drive (HDD) Storage

Nonhot-swap SCSI models			
Total Internal Storage¹	Quantity of HDDs added to standard configuration		
	36.4GB HDD	73.4GB HDD	146.8GB HDD
36.4GB ²			
54.6GB	-	-	-
72.8GB	1	-	-
91GB	-	-	-
109.2GB	2	-	-
145.6GB	3	-	-
183.2GB	-	2	1
256.6GB	-	3	-
293.6GB ³	-	4	2
476.8GB	-	-	3
587.2GB (max) ³	-	-	4

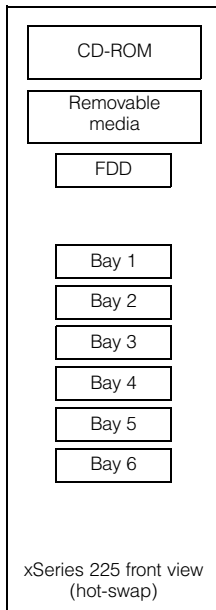
This table does not represent all possible HDD configurations. Total internal storage listed is within +/- 0.2GB unless otherwise noted.

1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.
2. 36.4GB HDD ships standard in nonhot-swap models.
3. Requires removing the standard 36.4GB HDD.

Hot-swap SCSI models			
Total Internal Storage ¹	Quantity of HDDs added to standard configuration		
	36.4GB HDD	73.4GB HDD	146.8GB HDD
0GB ²			
18.2GB	-	-	-
36.4GB	1	-	-
54.6GB	-	-	-
72.8GB	2	-	-
91GB	-	-	-
109.2GB	3	-	-
146.8GB	-	2	1
220.2GB	-	3	-
293.6GB	-	4	2
367GB	-	5	-
440.4GB	-	6	3
587.2GB	-	-	4
734GB	-	-	5
880.8GB	-	-	6

This table does not represent all possible HDD configurations. Total internal storage listed is within +/- 0.2GB unless otherwise noted.

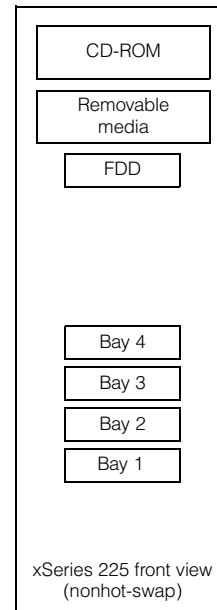
1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.
2. Hot-swap models ship open-bay.



Bay	Form Factor	Height	Front Access	Usage
A	133mm (5.25in)	HH	yes	CD-ROM
B	133mm (5.25in)	HH	yes	open ¹
C	89mm (3.5in)	SL	yes	FDD
1 ... 6	89mm (3.5in)	SL	yes	open

Note: HDDs are installed in the order of bays six through one. The boot disk must be installed in bay six.

1. Supports removable media devices only. Hard disk drives are not supported.



Bay	Form Factor	Height	Front Access	Usage
A	133mm (5.25in)	HH	yes	CD-ROM
B	133mm (5.25in)	HH	yes	open ¹
C	89mm (3.5in)	SL	yes	FDD
2 ... 4	89mm (3.5in)	SL	no	open ²
1	89mm (3.5in)	SL	no	HDD ²

Note: HDDs are installed in the order of bays one through four. The boot disk must be installed in bay one.

1. Supports removable media devices only. Hard disk drives are not supported.
2. HDD bays are not front-accessible in nonhot-swap models.

Part Number	Description	RPM	Height	Hot-swap Models		Nonhot-swap Models		
				Bays Supported	Maximum Quantity ¹³	Bays Supported	Maximum Quantity ¹³	
Nonhot-swap Ultra320 SCSI HDDs¹								
32P0723	36.4GB 10K rpm Ultra320 SCSI HDD	10000	SL	-	-	1 ... 4	4	
32P0724	73.4GB 10K rpm Ultra320 SCSI HDD	10000	SL	-	-	1 ... 4	4	
32P0725	146.8GB 10K rpm Ultra320 SCSI HDD	10000	SL	-	-	1 ... 4	4	
32P0784	36.4GB 15K rpm Ultra320 SCSI HDD	15000	SL	-	-	1 ... 4	4	
32P0785	73.4GB 15K rpm Ultra320 SCSI HDD	15000	SL	-	-	1 ... 4	4	
Hot-swap Ultra160 SCSI HDDs¹								
06P5754	18.2GB 10K rpm Ultra 160 SCSI Hot-swap SL HDD	10000	SL	1 ... 6	6	-	-	
06P5755	36.4GB 10K rpm Ultra 160 SCSI Hot-swap SL HDD	10000	SL	1 ... 6	6	-	-	
06P5756	73.4GB 10K rpm Ultra160 SCSI Hot-swap SL HDD	10000	SL	1 ... 6	6	-	-	
06P5767	18.2GB 15K rpm Ultra160 SCSI Hot-swap SL HDD	15000	SL	1 ... 6	6	-	-	
06P5768	36.4GB 15K rpm Ultra160 SCSI Hot-swap SL HDD	15000	SL	1 ... 6	6	-	-	
Hot-swap Ultra320 SCSI HDDs¹								
32P0726	36.4GB 10K rpm Ultra320 SCSI Hot-swap SL HDD	10000	SL	1 ... 6	6	-	-	
32P0727	73.4GB 10K rpm Ultra320 SCSI Hot-swap SL HDD	10000	SL	1 ... 6	6	-	-	
32P0728	146.8GB 10K rpm Ultra320 SCSI Hot-swap SL HDD	10000	SL	1 ... 6	6	-	-	
32P0734	36.4GB 15K rpm Ultra320 SCSI Hot-swap HDD	15000	SL	1 ... 6	6	-	-	
32P0735	73.4GB 15K rpm Ultra320 SCSI Hot-swap HDD	15000	SL	1 ... 6	6	-	-	
Associated Options								
32P8164	External SCSI Interface Kit ²	-	-	-	1	-	1	
Optical Devices				Bays Supported				
10K3782	48x-20x CD-ROM Black Internal IDE Drive ³	1, 2						
22P6950	16x Max RAM-Read DVD-ROM Drive ^{3, 4}	1, 2						
External Storage Expansion Units⁵				Form Factor				
35311RU	EXP300 Storage Expansion Unit ⁶	Rack (3U)						
17331RU	EXP400 Storage Expansion Unit ⁶	Rack (3U)						
09N7296	EXP Rack-to-Tower Conversion Kit ⁷	-						
17401RU	FAStT EXP700 Storage Expansion Unit ⁸	Rack (3U)						
172260U	FAStT600 Storage Server (US line cord, English pubs) ⁹	Rack (3U)						
35601RU	FAStT EXP500 Storage Expansion Unit ¹⁰	Rack (3U)						
35421RU	FAStT200 Storage Server ^{11, 12}	Rack (3U)						
35422RU	FAStT200 HA Storage Server ¹¹	Rack (3U)						
19K1121	FAStT200 Redundant RAID Controller	-						

1. The integrated Ultra320 SCSI controller supports both Ultra320 and Ultra160 HDDs, but if mixed on the same bus, bus speed is limited to the lower rated performance.

2. Required to enable a 0.8mm VHDCI external connector for external SCSI attachment to the second channel of the integrated controller. Refer to Appendix D: Cables - Storage Units - Controllers for additional information.

3. Either replace the standard CD-ROM or install in the available media bay. A two-drop IDE is included with the optional optical drive (same cable is standard in the system). If installing as an additional device, connect the cable to each optical device and the IDE connector on the system board. Configure the optional device as a master using the preset configuration if replacing the standard device or as a slave if installed as an additional device.

4. Audio not supported for DVD-ROM drives. The drive provides data input/output only.

5. To configure a SCSI storage device, select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.

6. In order to attach EXP300 or EXP400 to the integrated controller when ServerRAID-5i is installed, External SCSI Interface Kit (P/N 32P8164) is required to enable a 0.8mm VHDCI external connector on the system chassis.

7. To convert an EXP Storage Unit to a tower form factor the EXP Rack-to-Tower Conversion Kit is required.

8. FAStT EXP700 Storage Expansion Unit (P/N 17401RU) includes dual hot-swap 400w power supplies, each with its own power cord.

9. FAStT600 Storage Server includes two 390w auto-ranging redundant power supplies, each with its own power cord.

10. FAStT EXP500 Storage Expansion Unit (P/N 35601RU) includes dual hot-swap 350w power supplies, each with its own power cord.

11. The FAStT200 includes two hot-swap, 350w auto-ranging redundant power supplies, each with its own power cord.

12. Can be upgraded to FAStT200 HA Storage Server through the addition of a FAStT200 Redundant RAID Controller (P/N 19K1121).

13. When integrated mirroring is enabled, the maximum quantity of HDDs supported is three (two mirrored and one hot-spare).



xSeries 225 I/O Options

Part Number	Description	Adapter Length	PCI Support ³	Slots Supported ¹	Hot-Plug ⁴	PCI Voltage	MHz
Storage Controllers^{1, 2}							
02R0988	ServeRAID-6M Controller (256MB Cache)	Full	64-bit	2 ... 4 ⁵	-	3.3	133
32P0033	ServeRAID-6M Controller (128MB Cache)	Full	64-bit	2 ... 4 ⁵	-	3.3	133
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	Half	64-bit	2 ... 4 ⁵	-	Universal	66
19K4646	PCI Wide Ultra160 SCSI Adapter	Half	32-bit	1 ... 5	-	Universal	33
71P8594	Single Channel Ultra320 SCSI Controller	Half	64-bit	2 ... 5	-	Universal	133
25P3492	ServeRAID-5i Controller	Full	64-bit	4	-	Universal	66
Internal RAID Cable							
02R2068	Ultra320 Internal Single-drop 24in LVD SCSI Cable ⁵	-	-	-	-	-	-
Fibre Storage Controllers and Options⁶							
24P0960	FC2-133 Host Bus Adapter	Half	64-bit	2 ... 5	-	Universal	133
17421RU	FAST700 Fibre Channel Storage Server	-	-	-	-	-	-
172260U	FAST600 Storage Server (US line cord, English pubs)	-	-	-	-	-	-
35421RU	FAST200 Storage Server	-	-	-	-	-	-
35422RU	FAST200 HA Storage Server	-	-	-	-	-	-
3534F08	TotalStorage SAN Switch F08, 8-port	-	-	-	-	-	-
2109F16	SAN Fibre Channel Switch, 16-Port	-	-	-	-	-	-
Networking⁷							
Ethernet⁸							
06P3601	10/100 Ethernet Server Adapter ⁹	Half	32-bit	1 ... 5	-	Universal	33
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD ⁹	Half	64-bit	2 ... 5	-	Universal	133
22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter	Half	64-bit	2 ... 5	-	Universal	133
31P6301	NetXtreme 1000 T Ethernet Adapter (copper) ⁹	Half	64-bit	2 ... 4	-	Universal	133
31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper) ⁹	Half	64-bit	2 ... 5	-	Universal	133
Token Ring							
34L5201	High-speed 100/16/4 Token-ring PCI Mgmt Adapter ⁹	Half	32-bit	1 ... 5	-	Universal	33
34L5001	16/4 Token-ring PCI Management Adapter ⁹	Half	32-bit	1 ... 5	-	Universal	33
Communications¹⁰							
33L4618	V.90 PCI Data/Fax Modem ¹¹	Half	32-bit	1	-	5	33
System Management							
09N7585	Remote Supervisor Adapter ¹²	Half	32-bit	1	-	Universal	33

1. The dual-channel, Ultra320 integrated controller supports both Ultra160 and Ultra320 HDDs, but the entire SCSI bus will default to the slower rate (MB/second) if HDDs of different technologies are mixed on the same bus. The LSI chipset allows for two HDDs to be allocated for mirroring if a RAID adapter is not installed. One additional HDD may be designated as a hot-spare for HDDs configured in the onboard mirror. Mirrored and hot-spare HDDs must be matched.

2. xSeries 225 includes a dual-channel Ultra320 SCSI controller with two internal connectors. An external high density 68-pin connector can be enabled using optional External SCSI Interface Kit (P/N 32P8164) to connect channel B to an external SCSI connector. External connection using this option and the external knockout is not supported if both channels of the integrated controller are connected internally, in which case a supported PCI SCSI controller is required to support an external SCSI device.

3. A 32-bit adapter installed into a 64-bit slot will restrict the data transfer rate to 32-bit. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot. 33MHz adapters will reduce 100MHz buses to 33MHz. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers, but will only operate at the rated bus frequency or frequency of the slowest adapter in the bus in which it is installed. 64-bit adapters are not supported in slot one.

4. xSeries 225 does not support hot-plug PCI slots.

5. ServeRAID-6M and ServeRAID-4Lx installations in slots 3-5 on hot-swap models for internal HDDs, require cable option 02R2068.

6. See Fibre Channel Solutions Overview section for additional configuration information.

7. The integrated copper 10/100/1000Mbps Broadcom (BCM5703) single-port Ethernet controller supports Wake on LAN.

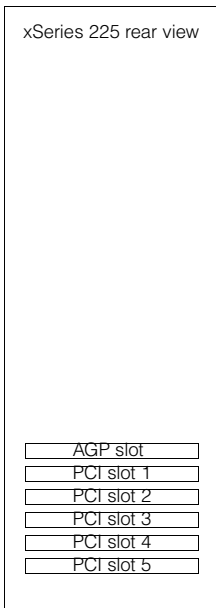
8. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. Two optional adapters are copper and Intel-based (P/N 06P3601, 22P6801). Two are Broadcom-based (22P7801, 31P6301).

9. The Wake on LAN (WoL) function provided by this Ethernet PCI adapter is supported in this system.

10. xSeries 225 includes four USB ports (two each on front and rear of the chassis), two nine-pin serial ports, one 25-pin parallel port, audio in/out jacks and a microphone in jack.

11. Due to homologation variances, modem availability may differ by country.

12. Connect the 20-pin ribbon cable provided with the option between the planar connector and the adapter. RSA provides full system management functionality through a customer-supplied Ethernet cable or modem connection or as part of an interconnected system management bus (option includes all interconnect hardware). The 20-pin ribbon cable connecting RSA to the planar does not meet power requirements. Connection of the external AC power supply provided with RSA is required.



Slot 1: Bus C, 32-bit, 33MHz, 5v, half-length
 Slot 2: Bus A, 64-bit, 100MHz, 3.3v, full-length, PCI-X
 Slot 3: Bus A, 64-bit, 100MHz, 3.3v, full-length, PCI-X
 Slot 4: Bus B, 64-bit, 100MHz, 3.3v, full-length extended, PCI-X
 Slot 5: Bus B, 64-bit, 100MHz, 3.3v, full-length, PCI-X

xSeries 225 Power, Monitors & Accessories

Part Number	Description
Power¹	
Tower Uninterruptible Power Supply (UPS)²	
94G3134	APC Smart-UPS 700
21301TX	UPS750TLV
21302TX	UPS750THV
94G3135	APC Smart-UPS 1000
21303TX	UPS1000TLV
21304TX	UPS1000THV
94G3136	APC Smart-UPS 1400
21305TX	UPS1500TLV
21306TX	UPS1500THV
Rack Mount Uninterruptible Power Supply (UPS)²	
32P1020	APC 2U Smart-UPS 1400RMB
2130R30	UPS3000XLV ³
2130R31	UPS3000XHV ³
32P1692	UPS Extend Run Battery Pack ³
37L6861	APC Smart-UPS 5000RMB ⁴
Monitors⁵	
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black ⁶
63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black ⁶
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁷
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard) ⁷
32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁷
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard) ⁷

1. xSeries 225 nonredundant power models include a single 425w nonhot-swap power supply. Redundant power models include either two 514w power supplies (models with 3.06GHz processors) or two 350w power supplies. Each power supply includes a 6ft NEMA 5-15P power cord.
 2. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
 3. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
 4. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
 5. xSeries 225 uses an integrated ATI Rage XL video controller with 8MB of memory.
 6. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).
 7. Includes a 15in Flat Panel Monitor.



Part Number	Description
Conversion Kits	
59P4817	4U Extended Depth Tower to Rack Conversion Kit
Rack and NetBAY¹	
	Refer to the Rack Cabinets and Options section for information concerning IBM racks and rack-supported devices.
Console Connectivity²	
1735L04	NetBAY Local Console Manager
1735R16	NetBAY Remote Console Manager
32P1636	250mm KVM Conversion Option
32P1652	1.5m KVM Conversion Option
09N4290	NetBAY 1x4 Console Switch
09N4291	NetBAY 1x4 Console Switch
Keyboard and Mouse³	
28L3644	Space Saver II Keyboard ^{4, 5}
10K3849	106-key Preferred USB Keyboard with 2-port USB Hub (stealth black) ^{5, 6, 7}
31P7415	Preferred Pro Full-size Keyboard - 104 Keys (stealth black)
28L3673	Sleek 2-Button Stealth Black Mouse

1. Rack installation of xSeries 225 requires 4U Extended Depth Tower to Rack Conversion Kit (P/N 49P4817) and one of the racks listed in the Rack Cabinets and Options section.

2. Refer to the Rack Console Options section for information regarding console connectivity using these options.

3. The xSeries 225 includes both a mouse and nonspace saver keyboard.

4. Installation within a rack requires optional keyboard tray (P/N 28L4707), which stows in ready-to-use position, or NetBAY 1U or 2U Flat Panel Monitor Console Kit (P/N 32P1032, 32P1702). Standard with 1U and 2U NetBAY console kits (P/N 32P1031, 32P1702).

5. Advanced TrackPoint IV features are not available on IBM xSeries systems.

6. Installation within a rack requires optional keyboard tray (P/N 28L4707). This keyboard cannot share a keyboard tray with a flat panel display.

7. USB accessories attach to a single USB-capable server. They are not compatible with the NetBAY console switches.

xSeries 225 Tape Options

Part Number	Tape Drives	Bays Supported	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures ²
48P7042	20/40GB TR7 Internal IDE Tape Drive ¹	2	-	89mm (3.5in) SL or 133mm (5.25in) HH	-	-
00N7991	20/40GB DDS/4 4mm Internal Tape Drive	2	16 Ultra2 LVD	89mm (3.5in) HH or 133mm (5.25in) HH	Y ³	3510020 ⁴ 0034BOX
00N8016	100/200GB LTO Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ³	0034BOX
24P2396	100/200GB LTO Half-High Tape Drive ^{7,8}	2	16 Ultra2 LVD	133mm (5.25in) HH	Y ³	3510020 ⁴ 0034BOX
24P2398	40/80GB Half-High DLTVS Internal SCSI Tape Drive ⁸	2	16 Ultra2 LVD	133mm (5.25in) HH	Y ³	3510020 ⁴ 0034BOX
59P6744	LTO FH Generation-2 Tape Drive Option	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ³	0034BOX
59P6746	VXA-2 80/160GB Tape Drive	2	16 Ultra2 LVD	133mm (5.25in) HH	Y ³	3510020 ⁴ 0034BOX
Tape Autoloaders						
360716X	3607 Series 1760GB/3.5TB Stupor Tape Autoloader	-	16 Ultra2 LVD	2U Rack	Y	-
External Tape Enclosures						
0034BOX	NetBAY Tape Enclosure (Rack Mount) ⁵	-	16 Ultra2 LVD	4U Rack	N	-
3510020	External Half-High SCSI Storage Enclosure ⁶	-	16 LVD	Desktop	N	-
Associated Options						
00N7956	68-pin External Multimedia LVD/SE SCSI Terminator	-	16 LVD/SE	Ext	Y	3510020
32P8164	External SCSI Interface Kit	-	16 LVD	In	N	-

Note:

All models include an integrated Ultra320 SCSI controller. Neonate-swap models include a four-drop multimedia terminated LVD SCSI cable. Hot-swap models include a one-drop non terminated cable. To enable external attachment to channel B of the integrated SCSI controller, optional External SCSI Interface Kit (P/N 32P8164) is required, which provides a 0.8mm VHDCI external connector. All SCSI tape drives and external tape enclosures are supported by PCI Wide Ultra160 SCSI Adapter (P/N 19K4646), which includes a five-drop multimode terminated LVD SCSI cable and an external 0.8mm VHDCI connector, or Single Channel Ultra320 SCSI Controller (P/N 71P8594), which includes a four-drop multimode LVD SCSI cable. SCSI tape drives installed internally can be connected to channel A of the integrated controller using the cable that ships with the tape drive if the HDDs or hot-swap backplane are attached to ServerRAID-4Lx. If ServeRAID-5i is installed, channel B can be configured to support half-high SCSI tape drives installed in an external tape enclosure or installed in bay two.

1. All models include a two-drop IDE cable for attachment to the CD-ROM and an IDE tape drive.
2. To determine external cable requirements, note the tape drive's SCSI interface, the appropriate SCSI controller from the system configurator section and the desired enclosure, then refer to Appendix D: Cables - Storage Units - Controllers.
3. Termination requires installing the 34in single-drop, terminated LVD SCSI cable provided with the option.
4. Requires 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956).
5. NetBAY Tape Enclosure (P/N 0034BOX) is a 4U rack-mounted enclosure that supports four full-high or six half-high tape drives. The backplate includes six 0.8mm VHDCI external connectors for attachment of up to six servers. Internal connection of tape drives requires the single-drop terminated LVD SCSI cable that ships with the tape drive, which also provides termination for the SCSI bus. A single 320w power supply with a low-voltage power cord is standard. An external SCSI storage cable is not provided. Refer to Appendix D: Cables - Storage Units - Controllers to select a supported cable.
6. Black desktop tape enclosure that supports a single 133mm (5.25in) half-high (HH) tape drive. Internal and external connectors are 68-pin high-density supporting LVD. Requires 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956). External cables are not included. Refer to Appendix D: Cables - Storage Units - Controllers to select a supported cable.
7. This tape drive must be shipped separately as an option and installed at a customer site. Factory or vendor installation prior to shipping is not supported.
8. Supported only in new builds of External Half-High SCSI Storage Enclosure (P/N 3510020), indicated by AI Header J1PJK on the outside box label of the tape enclosure.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.



xSeries 225 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

Sales and Distribution Application Server (tower solution for 150 users)		
Part Number	Description	Quantity
8647-42X	xSeries 225 2.67GHz/533MHz-512KB Xeon, 256MB ECC, 36.4GB, 48x	1
24P7861	2.67GHz/533MHz-512KB L2 Cache Upgrade with Xeon Processor	1
33L5038	512MB DDR PC2100 ECC RDIMM	2 ¹
25P3492	ServeRAID-5i Controller	1
32P0723	36.4GB 10Krpm Ultra320 SCSI HDD	3 ²
48P7042	20/40GB TR7 Internal IDE Tape Drive	1
32P8164	External SCSI Interface Kit	1
35311RU	EXP300 Storage Expansion Unit	1
09N7296	EXP300 Rack-to-Tower Conversion Kit	1
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	8 ³
9512AB1	T541 Flat Panel Color Monitor 15in (381mm, 15in viewable image), stealth black	1
94G3136	APC Smart-UPS 1400	1
94G3134	APC Smart-UPS 700 ⁴	1

1. For a total of 1.25GB of system memory.
2. Three HDDs are configured in RAID-5. Effective capacity is two HDDs or 72.8GB.
3. Eight HDDs are configured in RAID-5 with one hot-spare. Effective capacity is six HDDs or 218.4GB.
4. This UPS is optional if required to support the EXP300 Storage Expansion Unit.

File and Print Server (tower solution for 2,000 users)		
Part Number	Description	Quantity
8647-52X	xSeries 225 2.8GHz/533MHz-512KB Xeon, 256MB ECC, 36.4GB, 48x	1
24P8054	2.8GHz/533MHz-512KB L2 Cache Upgrade with Xeon Processor	1
33L5038	512MB DDR PC2100 ECC RDIMM	2 ¹
32P0723	36.4GB 10Krpm Ultra320 SCSI HDD	3 ²
00N7991	20/40GB DDS/4 4mm Internal Tape Drive	1
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	2 ³
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals	1
35311RU	EXP300 Storage Expansion Unit	1
09N7296	EXP300 Rack-to-Tower Conversion Kit	1
03K9310	Netfinity 2m Ultra2 SCSI Cable	1
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	12 ⁴
9512AB1	T541 Flat Panel Color Monitor 15in (381mm, 15in viewable image), stealth black	1
94G3136	APC Smart-UPS 1400	1
94G3134	APC Smart-UPS 700 ⁵	1

1. For a total of 1.25GB of system memory.
2. Two HDDs are mirrored using the integrated HDD mirroring function of the onboard controller. A third identical HDD is assigned as a hot-spare. The SCSI tape drive is attached to channel B.
3. Redundant RAID connections are provided to support the external HDD enclosure.
4. Twelve HDDs are configured in twin-tail RAID-5 buses each with one hot-spare. Effective capacity is eight HDDs or 291.2GB.
5. This UPS is optional if required to support the EXP300 Storage Expansion Unit.

Microsoft Exchange Server (rack solution for 2,200 users)		
Part Number	Description	Quantity
8647-3AX	xSeries 225 2.4BGHz/533MHz-512KB Xeon, 512MB ECC, open hot-swap, 48x	1
59P5108	2.4BGHz/533MHz-512KB L2 Cache Upgrade with Xeon Processor	1
33L5039	1GB DDR PC2100 ECC RDIMM	2 ¹
25P3492	ServeRAID-5i Controller	1
32P0726	36.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	2 ²
32P0728	146.8GB 10Krpm Ultra320 SCSI Hot-swap HDD	4 ³
48P7042	20/40GB TR7 Internal IDE Tape Drive	1
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)	1
32P1020	APC 2U Smart-UPS 1400RMB	1
59P4817	4U Extended Depth Tower to Rack Conversion Kit	1 ⁴

1. For a total of 2.5GB of system memory.
2. Two HDDs are configured for NOS mirroring.
3. Four HDDs are configured in RAID-5. Effective capacity is three HDDs or 440.4GB.
4. Rack and rack options are not included in this list of options.

Lotus Notes Server (rack solution for 2,200 users)		
Part Number	Description	Quantity
8647-5BX	xSeries 225 2.8GHz/533MHz-512KB Xeon, 512MB ECC, open hot-swap, 48x	1
24P8054	2.8GHz/533MHz-512KB L2 Cache Upgrade with Xeon Processor	1
33L5039	1GB DDR PC2100 ECC RDIMM	2 ¹
25P3492	ServeRAID-5i Controller	1
32P0726	36.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	2 ²
32P0727	73.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	4 ³
32P8164	External SCSI Interface Kit	1
3510020	External Half-High SCSI Storage Enclosure	1 ⁴
00N7956	68-pin External Multimode LVD/SE SCSI Terminator	1
03K9310	Netfinity 2m Ultra2 SCSI Cable	1
00N7991	20/40GB DDS/4 4mm Internal Tape Drive	1
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)	1
32P1020	APC 2U Smart-UPS 1400RMB	1
59P4817	4U Extended Depth Tower to Rack Conversion Kit	1 ⁵

1. For a total of 2.5GB of system memory.
2. Two HDDs are configured for NOS mirroring.
3. Four HDDs are configured in RAID-5. Effective capacity is three HDDs or 220.2GB.
4. Connected to channel B of the integrated controller through the External SCSI Interface Kit external connector and 2m external SCSI cable.
5. Rack and rack options are not included in this list of options.



xSeries 235

Part Number¹
 Withdrawal Date¹³
 Processor/FSB Speed (GHz/MHz)
 Number of Processors (Std/Max)
 Cache
 Memory (Std/Max) (DIMM)⁵
 Form Factor
 Power Supply Quantity (Std/Max)
 Hot-Swap (Power, Slots, HDD, Fans)
 Redundancy (Optional, Standard)⁶
 System Management Processor
 Onboard Ethernet (Mbps)⁷
 SCSI Controller (Dual, Ultra, RAID)⁸
 Removable Media Bays (Total/Avail)⁹
 Internal HDD Storage (Std/Max)¹⁰
 CD-ROM (IDE)
 Bays (Total/Avail)¹¹
 Slots (Total/Avail)¹²

xSeries 235 At-A-Glance

Part Number	Withdrawal Date	Processor/FSB Speed (GHz/MHz)	Number of Processors (Std/Max)	Cache	Memory (Std/Max) (DIMM)	Form Factor	Power Supply Quantity (Std/Max)	Hot-Swap (Power, Slots, HDD, Fans)	Redundancy (Optional, Standard)	System Management Processor	Onboard Ethernet (Mbps)	SCSI Controller (Dual, Ultra, RAID)	Removable Media Bays (Total/Avail)	Internal HDD Storage (Std/Max)	CD-ROM (IDE)	Bays (Total/Avail)	Slots (Total/Avail)
8671-41X	30-Dec	2.4/400 ²	1/2	512KB L2	256MB /12GB	Tower	1/2	S, H, F	O - Power, S - Fans	Y	10/100/1000	D,U320	4/2	0/1321.2GB	48x-20x	10/8	6/6
8671-4AX	30-Dec	2.4/400 ²	1/2	512KB L2	512MB/12GB	Tower	2/2	P, S, H, F	S - Power, S - Fans	Y	10/100/1000	D,U320	4/2	0/1321.2GB	48x-20x	10/8	6/6
8671-61X	-	2.67/533 ³	1/2	512KB L2	512MB/12GB	Tower	1/2	S, H, F	O - Power, S - Fans	Y	10/100/1000	D,U320	4/2	0/1321.2GB	48x-20x	10/8	6/6
8671-6AX	-	2.67/533 ³	1/2	512KB L2	512MB/12GB	Tower	2/2	P, S, H, F	S - Power, S - Fans	Y	10/100/1000	D,U320	4/2	0/1321.2GB	48x-20x	10/8	6/6
8671-71X	-	2.8/533 ³	1/2	512KB L2	512MB/12GB	Tower	1/2	S, H, F	O - Power, S - Fans	Y	10/100/1000	D,U320	4/2	0/1321.2GB	48x-20x	10/8	6/6
8671-7AX	-	2.8/533 ³	1/2	512KB L2	512MB/12GB	Tower	2/2	P, S, H, F	S - Power, S - Fans	Y	10/100/1000	D,U320	4/2	0/1321.2GB	48x-20x	10/8	6/6
8671-81X	-	3.06/533 ³	1/2	512KB L2	512MB/12GB	Tower	1/2	S, H, F	O - Power, S - Fans	Y	10/100/1000	D,U320	4/2	0/1321.2GB	48x-20x	10/8	6/6
8671-8AX	-	3.06/533 ³	1/2	512KB L2	512MB/12GB	Tower	2/2	P, S, H, F	S - Power, S - Fans	Y	10/100/1000	D,U320	4/2	0/1321.2GB	48x-20x	10/8	6/6
8671-G1X	-	3.2/533 ⁴	1/2	1MB L3	512MB/12GB	Tower	1/2	S, H, F	O - Power, S - Fans	Y	10/100/1000	D,U320	4/2	0/1321.2GB	48x-20x	10/8	6/6
8671-GAX	-	3.2/533 ⁴	1/2	1MB L3	512MB/12GB	Tower	2/2	P, S, H, F	S - Power, S - Fans	Y	10/100/1000	D,U320	4/2	0/1321.2GB	48x-20x	10/8	6/6

- Ships with standard keyboard and mouse. See Power, Monitors and Accessories section for tower-to-rack conversion kit.
- Intel Xeon processor with advanced transfer L2 cache and a 400MHz (quad-pumped) Front Side Bus (FSB).
- Intel Xeon processor with advanced transfer L2 cache and a 533MHz (quad-pumped) Front Side Bus (FSB).
- Intel Xeon processor with advanced transfer L2 cache, an additional L3 cache, and a 533MHz (quad-pumped) Front Side Bus (FSB).
- High-speed, two-way interleaved 133MHz DDR PC2100 DIMM.
- Power supply redundancy for models shipping without standard redundancy requires removal of the standard 560w power supply and the addition of two hot-swap power supplies and a hot-swap power backplane provided with power upgrade kits. 560w Power Upgrade Kit (P/N 33P2753) is restricted to use in 400MHz FSB models. 560w Power Supply for 533MHz FSB (02R1874) is available for 533MHz FSB models with 2.xxGHz processors. 660w Redundant Power Supply for 533MHz FSB Option with US line cord (P/N 02R2015) is required for 533MHz FSB models with 3.xxGHz processors and is supported for installation by the other two planars. Redundant models (N+N for full configurations) include two standard hot-swap power supplies and a hot-swap power backplane. See xSeries 235 Power, Monitor & Accessories for additional information.
- The standard Ethernet controller is a Broadcom 5703 gigabit Ethernet controller integrated into the planar.
- The dual-channel, Ultra320 integrated controller supports both Ultra160 and Ultra320 HDDs, but the entire SCSI bus will default to the slower rate (MB/second) if HDDs of different technologies are mixed on the same bus. The LSI chipset allows for two HDDs to be allocated for mirroring if a RAID adapter is not installed. One additional HDD may be designated as a hot-spare for HDDs configured in the onboard mirror. Mirrored and hot-spare HDDs must be matched.
- xSeries 235 includes two available removable media bays that can be converted to three slim-line (SL) hot-swap bays with the addition of optional Ultra320 3-Pack Kit (P/N 33P2751).
- Assumes installation of optional Ultra320 3-Pack Kit (P/N 33P2751), which converts the two available removable media bays into three slim-line (SL) hot-swap bays. Maximum storage is based on nine 146.8GB 10Krpm Ultra320 SCSI Hot-swap HDDs (P/N 32P0728).
- The total number of bays can be increased to 11 by installing an optional Ultra320 3-pack Kit (P/N 33P2751), which converts the two available removable media bays to three SL hot-swap HDD bays.
- Includes two hot-plug PCI-X 64-bit 133MHz slots, three 64-bit 100MHz nonhot-plug slots and one 32-bit 33MHz slot. See I/O Options for additional information.
- Not available from IBM after this date. Business Partner inventory may be available.

xSeries 235 Processors

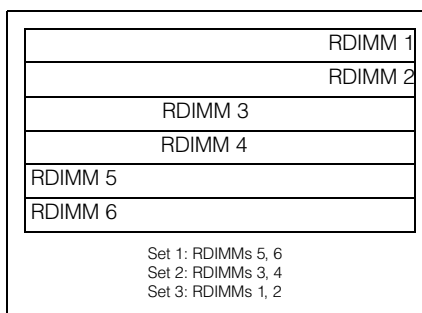
Part Number	Processor Upgrades	SMP Support¹
37L3533	2.4GHz/400MHz-512KB L2 Cache Xeon Processor	4xX
71P8966	2.67GHz/533MHz-512KB L2 Cache Xeon Processor	6xX
71P8967	2.8GHz/533MHz-512KB L2 Cache Xeon Processor	7xX
02R1988	3.06GHz/533MHz-512KB L2 Cache Xeon Processor	8xX
23K4523	3.2GHz/533MHz-1MB L3 Cache Xeon Processor	GxX

1. One additional processor may be installed, providing a maximum of two. All processors must be identical in type, speed, and cache size.

xSeries 235 Memory

Part Number	Memory Description¹
33L5036	128MB DDR PC2100 ECC RDIMM
33L5037	256MB DDR PC2100 ECC RDIMM
33L5038	512MB DDR PC2100 ECC RDIMM
33L5039	1GB DDR PC2100 ECC RDIMM
33L5040	2GB DDR PC2100 ECC RDIMM

1. Due to two-way interleaving, installation of memory options in matched pairs beginning with set 1 is required.





Total System Memory ¹		Quantity of RDIMMs Added ²				
256MB (2 x 128) Models	512MB (2 x 256) Models	128MB (33L5036)	256MB (33L5037)	512MB (33L5038)	1GB (33L5039)	2GB (33L5040)
512MB	768MB	2	-	-	-	-
768MB	1GB	4	-	-	-	-
1GB	1.25GB	2	2	-	-	-
1.25GB	1.5GB	-	4	-	-	-
1.75GB	2GB	-	2	2	-	-
2GB	2.5GB	-	-	4	-	-
2.5GB	2.75GB	2	-	-	2	-
2.75GB	3GB	-	2	-	2	-
3.25GB	3.5GB	-	-	2	2	-
4.25GB	4.5GB	-	-	-	4	-
6GB ³	6GB ³	-	-	-	6	-
8GB ³	8GB ³	-	-	-	4	2
10GB ³	10GB ³	-	-	-	2	4
12GB ³	12GB ³	-	-	-	-	6

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. To obtain the quantity of memory identified in the "Total Memory" column, select the appropriate row and order the quantity of RDIMMs identified in all columns for that row.
3. Requires replacing the standard RDIMMs.

xSeries 235 Internal SCSI Cabling

The xSeries 235 contains 10 drive bays in the standard base configuration. The six 3.5in hot-swap bays on the lower half of the chassis front support Ultra320 or Ultra160 hot-swap HDDs. The four media bays above the HDD bays include a 3.5in bay for the standard floppy disk drive (FDD) and a 5.25in bay containing the standard CD-ROM. The two open 5.25in media bays are available for removable media devices such as tape drives, or an Ultra320 3-bay kit can be installed in two available media bays to provide a hot-swap backplane that supports three slim-line hot-swap HDDs.

The standard six-bay hot-swap backplane connects to one channel of the dual-channel integrated Ultra320 storage controller through a single-drop 16-bit LVD SCSI cable. If internal RAID is required, this cable cannot be used to connect optional ServeRAID-4H, -4Mx or -4Lx controllers to the hot-swap backplane. Instead, optional Single-drop Internal LVD Ultra160 SCSI Cable (P/N 71P8995) must be purchased. If the RAID controller is ServeRAID-5i, a cable is not required and both channels of the integrated controller are managed by ServeRAID-5i. The standard SCSI cable cannot be used to connect to an optional SCSI media device because it is not terminated.

One full-high or half-high tape drive can be installed in the available media bays. The terminated LVD SCSI cable provided with the tape drive can be used to connect the tape drive to the integrated controller if ServeRAID-4H, -4Mx or -4Lx are installed (or if no RAID controller is installed). If ServeRAID-5i is installed, only supported tape drives can be connected to the RAID bus (see Tape Options section). If the tape drive is not supported for RAID attachment or the configuration does not require the tape drive to be installed on the RAID bus, PCI Wide Ultra160 SCSI Adapter (P/N 19K4646) is required.

External tape drive support requires installation of External SCSI Interface Kit (P/N 32P8164) to connect the external port to the second channel of the integrated controller. The external port cannot be enabled if both channels of the integrated controller are connected internally. If ServeRAID-5i is installed, only RAID-supported tape drives can be installed in the tape enclosure. An external tape enclosure is also supported by installing PCI Wide Ultra160 SCSI Adapter (P/N 19K4646), in which case the External SCSI Interface Kit is no longer required.

For additional information regarding internal cabling, refer to Appendix F: Internal Cabling Overview.

xSeries 235 Hard Disk Drive (HDD) Storage

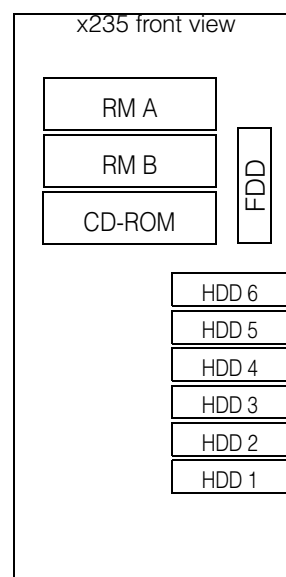
Total Internal Storage ¹	Quantity of HDDs added to standard configuration		
	36.4GB	73.4GB	146.8GB
0GB			
18.2GB	-	-	
36.4GB	1	-	
54.6GB	-	-	
72.8GB	2	-	
91GB	-	-	
109.2GB	3	-	
145.6GB	4	-	
182GB	5	-	
218.4GB	6	-	
327.6GB	9 ²	-	
440.4GB	-	6	
660.6GB	-	9 ²	
880.8GB	-	-	6
1321.2GB	-	-	9 ²

This table does not represent all possible HDD configurations. Total internal storage listed is within +/-0.2GB unless otherwise noted.

1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.
2. Requires converting the two available removable bays to three hot-swap HDD bays using an optional Ultra320 3-Pack Kit (P/N 33P2751).

Bay	Form Factor	Height	Front Access	Usage
A ¹	133mm (5.25in)	HH ²	Yes	Open
B ¹	133mm (5.25in)	HH ²	Yes	Open
C ³	133mm (5.25in)	HH	Yes	IDE CD-ROM
D ⁴	89mm (3.5in)	SL	Yes	Diskette
1 ... 6	HS	SL	Yes	Open

1. Removable media bays A and B can be converted to three hot-swap HDD bays using the optional Ultra320 3-Pack Kit (P/N 33P2751).
2. Two half-high (HH) bays can be combined to support a single full-high (FH) device.
3. This bay supports optical drives only.
4. This bay supports a floppy disk drive only.





Part Number	Description	RPM	Height	Bays Supported ¹	Maximum Quantity ²
Hot-Swap Ultra160 HDDs					
06P5755	36.4GB 10K rpm Ultra160 SCSI Hot-swap HDD	10000	SL	1 ... 6	9
32P0750	146.8GB 10K rpm Ultra160 SCSI Hot-swap HDD	10000	SL	1 ... 6	9
06P5756	73.4GB 10K rpm Ultra160 SCSI Hot-swap HDD	10000	SL	1 ... 6	9
06P5768	36.4GB 15K rpm Ultra160 SCSI Hot-swap HDD	15000	SL	1 ... 6	9
Hot-Swap Ultra320 HDDs					
32P0726	36.4GB 10K rpm Ultra320 SCSI Hot-swap HDD	10000	SL	1 ... 6	9
32P0727	73.4GB 10K rpm Ultra320 SCSI Hot-swap HDD	10000	SL	1 ... 6	9
32P0728	146.8GB 10K rpm Ultra320 SCSI Hot-swap HDD	10000	SL	1 ... 6	9
32P0734	36.4GB 15K rpm Ultra320 SCSI Hot-swap HDD	15000	SL	1 ... 6	9
32P0735	73.4GB 15K rpm Ultra320 SCSI Hot-swap HDD	15000	SL	1 ... 6	9
Associated Options					
33P2751	Ultra320 3-Pack Kit ³	-	-	A+B	1
32P8164	External SCSI Interface Kit ⁴	-	-	-	1
24P7973	Ultra320 External SCSI Connector Cable Option ⁴	-	-	-	1
Optical Devices			Bays Supported		
22P6950	16X Max RAM-Read DVD-ROM Drive ^{5, 6}	A, B, C			
External Storage Expansion Units⁷			Form Factor		
35311RU	EXP300 Storage Expansion Unit ⁸	Rack (3U)			
17331RU	EXP400 Storage Expansion Unit ⁸	Rack (3U)			
09N7296	EXP Rack-to-Tower Conversion Kit ⁹	-			
171010U	FASiT EXP100 Storage Expansion Unit	Rack (3U)			
17401RU	FASiT EXP700 Storage Expansion Unit	Rack (3U)			
172260U	FASiT600 Storage Server (US line cord, English pubs)	Rack (3U)			
35601RU	FASiT EXP500 Storage Expansion Unit	Rack (3U)			
35421RU	FASiT200 Storage Server ¹⁰	Rack (3U)			
35422RU	FASiT200 HA Storage Server	Rack (3U)			
19K1121	FASiT200 Redundant RAID Controller	-			

1. Install HDDs in the order indicated in the system bay diagram (from bottom of chassis). If an Ultra320 3-pack Kit is installed, install HDDs from bottom to top.
2. Maximum quantity of HDDs can be increased to nine by converting the two removable media bays to three SL HDD bays using the 3-Pack Ultra320 3-Pack Kit (P/N 33P2751). When integrated mirroring is enabled, the maximum quantity of HDDs supported on the standard backplane is three (two mirrored and one hot-spare).
3. Removable media bays A and B can be converted to three SL hot-swap bays using the optional Ultra320 3-Pack Kit (P/N 33P2751). The hot-swap backplane is cabled as an independent bus. All HDDs installed in the bus must be Ultra320 in order for the bus to operate at Ultra320. If one or more HDDs installed are Ultra160, the entire bus will operate at Ultra160 speeds.
4. Required to enable a 0.8mm VHDCI external connector for external SCSI attachment to the second channel of the integrated controller. Refer to Appendix D: Cables - Storage Units - Controllers for additional information.
5. Either replace standard CD-ROM or install in one of the media bays. A two-drop IDE cable is included with the optional optical drive. If installing as an additional device, connect the cable to each optical device and the IDE connector on the system board. Configure the optional device as a master using the preset configuration if replacing the standard device or as a slave if installed as an additional device.
6. Audio and video are not supported for DVD-ROM drives. These drives are for data retrieval only.
7. To configure a SCSI storage device, select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.
8. In order to attach EXP300 or EXP400 to the integrated controller when ServeRAID-5i is installed, External SCSI Interface Kit (P/N 32P8164) is required to enable a 0.8mm VHDCI external connector on the system chassis.
9. To convert an EXP Storage Unit to a tower form factor the EXP Rack-to-Tower Conversion Kit is required.
10. Can be upgraded to FASiT200 HA Storage Server through the addition of a FASiT200 Redundant RAID Controller (P/N 19K1121).

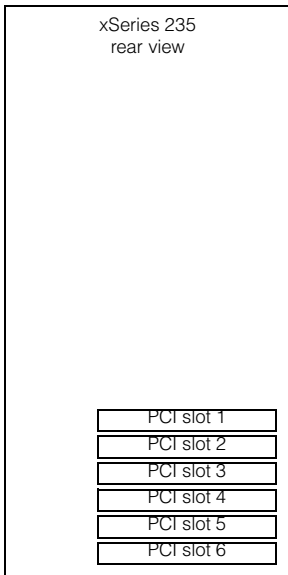
xSeries 235 I/O Options

Part Number	Description	Adapter Length	PCI Support ¹	Slots Supported ^{1, 14}	Hot-Plug ²	PCI Voltage Key	MHz
Storage Controllers³							
02R0988	ServeRAID-6M Controller (256MB Cache) ⁴	Full	64-bit	2 ... 4	-	3.3	133
32P0033	ServeRAID-6M Controller (128MB Cache) ⁴	Full	64-bit	2 ... 4	-	3.3	133
71P8595	ServeRAID-6i Controller	Full	64-bit	4	-	3.3	133
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller ⁴	Half	64-bit	2 ... 4	X	Universal	66
19K4646	PCI Wide Ultra160 SCSI Adapter	Half	32-bit	2 ... 6	-	Universal	33
71P8594	Single Channel Ultra320 SCSI Controller	Half	64-bit	2 ... 6	-	Universal	133
25P3492	ServeRAID-5i Controller	Full	64-bit	4	-	Universal	66
Internal RAID Cable							
02R2068	Ultra320 Internal Single-drop 24in LVD SCSI Cable ⁴	-	-	-	-	-	-
Fibre Storage Controllers and Options⁵							
00N6881	FAST Host Adapter	Half	64-bit	2 ... 6	X	Universal	66
24P0960	FC2-133 Host Bus Adapter	Half	64-bit	2 ... 6	X	Universal	133
174290U	FAST900 Storage Server (US line cord)	-	-	-	-	-	-
17421RU	FAST700 Fibre Channel Storage Server	-	-	-	-	-	-
172260U	FAST600 Storage Server (US line cord, English pubs)	-	-	-	-	-	-
35421RU	FAST200 Storage Server	-	-	-	-	-	-
35422RU	FAST200 HA Storage Server	-	-	-	-	-	-
3534F08	TotalStorage SAN Switch F08, 8-port	-	-	-	-	-	-
2109F16	SAN Fibre Channel Switch, 16-Port	-	-	-	-	-	-
Networking⁶							
Ethernet⁷							
06P3601	10/100 Ethernet Server Adapter ⁸	Half	32-bit	2 ... 6	X	Universal	33
31P9601	PRO/1000 MT Server Adapter by Intel	Half	64-bit	1 ... 7	X	Universal	133
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals ⁸	Half	64-bit	2 ... 6	X	Universal	133
22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter	Half	64-bit	2 ... 6	X	Universal	133
31P6301	NetXtreme 1000 T Ethernet Adapter (copper) ⁸	Half	64-bit	2 ... 6	X	Universal	133
31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper) ⁸	Half	64-bit	2 ... 6	X	Universal	133
Token Ring							
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter	Half	32-bit	2 ... 6	X	Universal	33
34L5001	16/4 Token-Ring PCI Management Adapter ⁸	Half	32-bit	2 ... 6	X	Universal	33
Communications⁹							
19K4162	V90 PCI Data/Fax WinModem (Low Profile Enabled) ^{10, 11}	Half	32-bit	1	-	Universal	33
33L4618	V90 PCI Data/Fax Modem ¹⁰	Half	32-bit	1	-	5	33
System Management							
09N7585	Remote Supervisor Adapter ¹²	Half	32-bit	1	-	Universal	33
59P2984	Remote Supervisor Adapter II ¹³	Half	32-bit	1	-	Universal	33



Note: xSeries 235 supports the IXA Adapter (P/N 1519100) for connection to iSeries models for Windows 2000 Server and Advanced Server. Installation is restricted to slot four and Remote Supervisor Adapter (P/N 09N7585) must be installed.

1. A 64-bit adapter installed into a 32-bit slot will transfer data at 32-bit rates. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot. 33MHz adapters will reduce 66MHz buses to 33MHz. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.
2. Slots five and six (bus 2) are hot-plug capable. For Network Operating System support, access www.pc.ibm.com/us/compat.
3. xSeries 235 includes a dual-channel Ultra320 SCSI controller with two internal connectors. An external 0.8mm VHDCI connector can be enabled using optional External SCSI Interface Kit (P/N 32P8164) to connect channel A to the external connector. External connection using this option and the external knockout is not supported if both channels of the integrated controller are connected internally, in which case a supported PCI SCSI controller is required to support an external SCSI device. See "Internal SCSI Cabling" for cabling alternatives.
4. Cable option 02R2068 is required when connecting internal HDDs to ServeRAID-6M and ServeRAID-4Lx.
5. See Fibre Channel Solutions Overview section for additional configuration information.
6. xSeries 235 includes a copper integrated 10/100/1000Mbps Broadcom (BCM5703) single-port Ethernet controller.
7. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. Two optional Ethernet adapters are copper and Intel-based (P/N 06P3601, 22P6801). Two are Broadcom-based (P/N 22P7801, 31P6301).
8. The Wake on LAN (WoL) function provided by this Ethernet PCI adapter is supported in this system.
9. xSeries 235 provided three USB ports (two on the rear of the chassis and one on the front), one serial port, two RS-485 ports for system management and one parallel port.
10. Due to homologation variances, modem availability may differ by country.
11. Optional modem 19K4162 has been withdrawn from marketing in North America (effective 08/26/03)
12. When installed in xSeries 235, Remote Supervisor Adapter (RSA) shares functionality with the integrated service processor and serves as interface for both. RSA provides full system management functionality through a customer-supplied Ethernet cable or modem connection or as part of an interconnected system management bus (option includes all interconnect hardware). An external Cat5 connection between RSA and the integrated service processor using the pigtail cable and short Cat5 cable supplied with RSA is not required. The 20-pin ribbon cable connecting RSA to the planar meets all powering and signaling requirements. Connection of the external AC power supply provided with RSA is not required.
13. Remote Supervisor Adapter II (P/N 59P2984) includes an internal 20-pin ribbon cable for connection to the system planar, an interconnect cable, a 56w AC power adapter, an intrack power cable and a country-specific wall power cord. External connectors include an RS230 (9-pin) serial port, 10/100 base T Ethernet port (RJ-45), interconnect port (RJ-11) and power connector. The interconnect cable includes a single RJ-11 connector and dual RJ-48 ports. Supports an interconnect network of up to 24 RSAs or ISMPs with aggregate cable connection length of 300ft (91.4m) or less. No more than 12 ASMPs are supported in an interconnect network. RJ-45 bus is self-terminating, i.e., terminators are not required for the interconnect bus.
14. Models 4xX with 400MHz FSB support most PCI adapters also in slot one



- Slot 1: Bus 0, 32-bit, 33MHz, 5v, full-length
- Slot 2: Bus 1 (primary), 64-bit, 100MHz, 3.3v, full-length PCI-X
- Slot 3: Bus 1 (primary), 64-bit, 100MHz, 3.3v, full-length PCI-X
- Slot 4: Bus 1 (secondary), 64-bit, 100MHz, 3.3v, full-length extended PCI-X (supports RAID 5i)
- Slot 5: Bus 2, 64-bit, 100MHz, 3.3v, full-length Active PCI-X
- Slot 6: Bus 2, 64-bit, 100MHz, 3.3v, full-length Active PCI-X

xSeries 235 Power, Monitors & Accessories

Part Number	Description
Power¹	
33P2753	560w Power Upgrade Kit ²
02R1874	560w Power Supply for 533MHz FSB ³
02R2015	660w Redundant Power Supply for 533MHz FSB Option with US line cord ⁴
Tower Uninterruptible Power Supply (UPS)⁵	
94G3134	APC Smart-UPS 700
21301TX	UPS750TLV
21302TX	UPS750THV
94G3135	APC Smart-UPS 1000
21303TX	UPS1000TLV
21304TX	UPS1000THV
94G3136	APC Smart-UPS 1400
21305TX	UPS1500TLV
21306TX	UPS1500THV
Rack-mount Uninterruptible Power Supply (UPS)⁵	
32P1020	APC 2U Smart-UPS 1400RMB
2130R30	UPS3000XLV ⁶
2130R31	UPS3000XHV ⁶
32P1692	UPS Extend Run Battery Pack ⁶
37L6861	APC Smart-UPS 5000RMB ⁷
Monitors⁸	
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black ⁹
63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black ⁹
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ¹⁰
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard) ¹⁰
32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ¹⁰
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard) ¹⁰

1. xSeries 235 redundant power models include two hot-swap 560w power supplies, each with two power cords, except for 533MHz FSB redundant models with 3.06GHz processors, which include two 660w power supplies (533MHz FSB models use a different 560w power supply than 400MHz FSB models). Nonredundant power models include a single nonhot-swap power supply with a single power cord. N+N power supply redundancy for these models may be achieved by removing the standard power supply and installing a hot-swap power backplane and two hot-swap redundant power supplies provided in the respective power supply upgrade options.

2. 560w Power Upgrade Kit (P/N 33P2753) includes a power backplane, two power supplies and two 9ft power cords. Compatible only with 400MHz FSB models.

3. 560w Power Supply for 533MHz FSB (P/N 02R1874) includes a power backplane, two power supplies and two 9ft power cords. Compatible only with 533MHz FSB models.

4. 660w Redundant Power Supply for 533MHz FSB Option with US line cord (P/N 02R2015) includes a power backplane, two power supplies and two 9ft power cords. Compatible only with 533MHz FSB models; required for models with 3.06GHz processors.

5. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.

6. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.

7. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.

8. xSeries 235 uses an integrated ATI Rage XL video controller with 8MB of memory.

9. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).

10. Includes a 15in Flat Panel Monitor.



Part Number	Description
Conversion Kits	
59P4211	5Ux24D Tower-to-Rack Kit III
Rack and NetBAY¹	
	Refer to the Rack Cabinets and Options section for information concerning IBM racks and rack-supported devices.
Console Connectivity²	
1735L04	NetBAY Local Console Manager
1735R16	NetBAY Remote Console Manager
32P1636	250mm KVM Conversion Option
32P1652	1.5m KVM Conversion Option
09N4290	NetBAY 1x4 Console Switch
09N4291	NetBAY 2x8 Console Switch
Keyboard and Mouse³	
28L3644	Space Saver II Keyboard ^{4, 6}
10K3849	106-key Preferred USB Keyboard with 2-port USB Hub (stealth black) ^{5, 7}
31P7415	Preferred Pro Full-size Keyboard - 104 Keys (stealth black) ⁵
28L3673	Sleek 2-Button Stealth Black Mouse

1. Rack installations require a supported IBM rack and a tower-to-rack conversion kit.
2. Refer to the Rack Console Options section for information regarding console connectivity using these options.
3. xSeries 235 includes tower models only and ships with a keyboard and mouse.
4. Installation within a rack requires optional keyboard tray (P/N 28L4707) which stows in ready-to-use position, or NetBAY 1U or 2U Flat Panel Monitor Console Kit (P/N 32P1032, 32P1702). Standard with 1U and 2U NetBAY console kits (P/N 32P1031, 32P1702).
5. Installation within a rack requires optional keyboard tray (P/N 28L4707). This keyboard cannot share a keyboard tray with a flat panel display.
6. Advanced TrackPoint IV features are not available on IBM xSeries systems.
7. USB accessories attach to a single USB-capable server. They are not compatible with the NetBAY console switches.

xSeries 235 Tape Options

Part Number	Tape Drives	Bays Supported	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures
00N7991	20/40GB DDS/4 4mm Internal Tape Drive ¹	A, B	16 Ultra2 LVD	89mm (3.5in) HH or 133mm (5.25in) HH	Y ²	3510020 ³ 0034B0X
00N8016	100/200GB LTO Tape Drive	A+B	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X 0034B0X
24P2396	100/200GB LTO Half-High Tape Drive ^{1, 9, 10}	A, B	16 Ultra2 LVD	133mm (5.25in) HH	Y ²	3510020 ³ 0034B0X
24P2398	40/80GB Half-High DLTVS Internal SCSI Tape Drive ^{1, 10}	A, B	16 Ultra2 LVD	133mm (5.25in) HH	Y ²	3510020 ³ 0034B0X
59P6736	160/320GB SDLT Tape Drive	A+B	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X 0034B0X
59P6744	LTO FH Generation-2 Tape Drive Option	A+B	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X 0034B0X
59P6746	VXA-2 80/160GB Tape Drive	A, B	16 Ultra2 LVD	133mm (5.25in) HH	Y ²	3510020 ³ 0034B0X
Tape Autoloaders						
00N7992	120/240GB DDS/4 Tape Autoloader	A+B	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X 0034B0X
360716X	3607 Series 1760GB/3.5TB SDLTpro Tape Autoloader	-	16 Ultra2 LVD	2U Rack	Y	-
360726X	3607 Series 1.6TB/3.2TB LTO Tape Autoloader	-	16 Ultra2 LVD	2U Rack	Y	-
External Tape Enclosures						
3510020	External Half-High SCSI Storage Enclosure ⁵	-	16 LVD	Desktop	N	-
3503B1X	Full-High SCSI Tape Enclosure ⁶	-	16 Ultra2 LVD	Desktop or 3U Rack	Y	-
0034B0X	NetBAY Tape Enclosure (Rack Mount) ⁷	-	16 Ultra2 LVD	4U Rack	N	-
Associated Options						
00N7956	68-pin External Multimode LVD/SE SCSI Terminator	-	16 LVD/SE	External	Y	3510020
32P8164	External SCSI Interface Kit ⁸	-	16 LVD	Internal	N	-
24P7973	Ultra320 External SCSI Connector Cable Option ⁹	-	Ultra320 LVD	Internal	N	-



Note: Optional External SCSI Interface Kit (P/N 32P8164) or Ultra320 External SCSI Connector Cable Option (P/N 24P7973) is required to enable the external 0.8mm VHDCI connector on the rear of the chassis to support external tape enclosures. Attachment of internal media bay devices to one connector of the Ultra320 controller requires a supported terminated SCSI cable that is provided with optional tape drives. If the hot-swap HDD backplane is connected to ServeRAID-4H, 4Mx or 4Lx, an internal tape drive can be connected to the integrated controller. If ServeRAID-5i supports the internal HDD backplanes, some tape drives can be supported on channel B of the integrated controller (which is managed by the ServeRAID-5i adapter) if the bus is designated as conventional SCSI during set-up and Microsoft Windows 2000 is installed. ServeRAID-5i supports the same tape drives in an external tape enclosure on the second channel if the external SCSI port is enabled (the external port cannot be enabled if both channels of the integrated controller are connected internally). Optional PCI Wide Ultra160 SCSI Adapter (P/N 19K4646) or Single Channel Ultra320 SCSI Controller (P/N 71P8594) support external tape enclosures and internal tape drives.

1. Supported by ServeRAID-5i when installed on an internal bus connected to an integrated controller connector or in an external tape enclosure when connected to the second channel of the integrated controller through the enabled external SCSI port.
2. Termination requires installing the 34in single-drop, terminated LVD SCSI cable provided with the option.
3. Requires 68-pin External Multimode LVD/SE SCSI terminator (P/N 00N7956).
4. If installed in a rack, a fixed shelf is required. Allow an additional 1U for the fixed shelf. One unit only per shelf is supported.
5. Black desktop tape enclosure that supports a single 133mm (5.25in) half-high (HH) tape drive. Internal and external connectors are 68-pin high-density supporting LVD. Requires 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956). External cables are not included. Refer to Appendix D: Cables - Storage Units - Controllers to select a supported cable.
6. Black desktop or 3U rack tape enclosure supports a single 133mm (5.25in) full-high LVD tape device including DLT tape drives. Requires a fixed shelf if installed in a rack (allow additional 1U for fixed shelf). Includes a 90w power supply, cooling fan, external terminator, power cord (country-specific), and 2m 68-pin to 0.8mm external cable.
7. NetBAY Tape Enclosure (P/N 0034B0X) is a 4U rack-mounted enclosure that supports four full-high or six half-high tape drives. The backplate includes six 0.8mm VHDCI external connectors for attachment of up to six servers. Internal connection of tape drives requires the single-drop terminated LVD SCSI cable that ships with the tape drive, which also provides termination for the SCSI bus. A single 200w power supply with a low-voltage power cord is standard. An external SCSI storage cable is not provided. Refer to Appendix D: Cables - Storage Units - Controllers to select a supported cable.
8. Required to connect one channel of the integrated Ultra320 storage controller to the 0.8mm VHDCI external port, which cannot be enabled if both channels of the integrated controller are connected internally.
9. This tape drive must be shipped separately as an option and installed at a customer site. Factory or vendor installation prior to shipping is not supported.
10. Supported only in new builds of External Half-High SCSI Storage Enclosure (P/N 3510020), indicated by AI Header J1PJK on the outside box label of the tape enclosure.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

xSeries 235 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

File and Print Server (2,000 users)

Part Number	Description	Quantity
8671-71X	xSeries 235 2.8GHz/533MHz-512KB Xeon, 512MB ECC, open hot-swap, 48X	1
33L5036	128MB DDR PC2100 ECC DIMM	2 ¹
06P5754	18.2GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	2 ²
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	4 ³
25P3492	ServeRAID-5i Controller	1
00N7991	20/40GB DDS/4 4mm Internal Tape Drive	1
63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black	1
94G3136	APC Smart-UPS 1400	1

1. For a total of 512MB of system memory.
2. Two HDDs are used to provide NOS mirroring.
3. Three HDDs are used for RAID 5 protection. One HDD is identified as a hot-spare. Effective capacity is two HDDs or 72.8GB.

High-availability Microsoft Exchange Server Solution

Part Number	Description	Quantity
8671-7AX	xSeries 235 2.8GHz/533MHz-512KB Xeon, 512MB ECC, open hot-swap, 48X	1
71P8967	Upgrade Xeon Processor 2.8GHz/533MHz-512KB L2 Cache	1 ¹
33L5037	256MB DDR PC2100 ECC DIMM	2
25P3492	ServeRAID-5i Controller	1
09N7585	Remote Supervisor Adapter	1
06P5754	18.2GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	2 ²
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	4 ³
32P8164	External SCSI Interface Kit	1
02R1874	560w Power Supply for 533MHz FSB	1
59P4211	5Ux24DTower-to-Rack Kit	1
9306250	NetBAY25 Standard Rack Cabinet	1
0034B0X	NetBAY Tape Enclosure (Rack Mount)	1
24P2398	40/80GB Half-High DLTVS Internal SCSI Tape Drive	1
63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black	1
32P1020	APC 2U Smart-UPS 1400RMB	1
94G6670	Blank Filler Panel Kit	1

1. For a total of 1GB of system memory.
2. Two HDDs are used to provide NOS mirroring.
3. Three HDDs are used for RAID 5 protection. One HDD is identified as a hot-spare. Effective capacity is two HDDs or 72.8GB.



xSeries 255

Part Number	Processor/FSB Speed (GHz/MHz) ³		Number of Processors (Std/Max)	L3 Cache	Memory (Std/Max) ⁴	Form Factor	Power Supply Quantity	Hot-Swap (Power, Slots, HDD, Fans)	Redundancy (Optional, Standard) ⁵	System Management Processor	Onboard Ethernet (Mbps)	SCSI Controller (Dual, Ultra, RAID)	Removable Media Bays (Total/Avail)	Internal HDD Storage (Std/Max) ⁶	CD-ROM (IDE)	Bays (Total/Avail) ⁷	Slots (Total/Avail)
xSeries 255 At-A-Glance																	
8685-71X ¹	2	1/4	1MB	512MB/24GB	Tower	2/4	P, S, H, F	S-Fans O-Power	Y	10/100/1000	D, U 160	4/2	0/1761.6GB	48x-20x	16/14	7/7	
8685-7RX ²	2	1/4	1MB	512MB/24GB	Rack (7U)	2/4	P, S, H, F	S-Fans O-Power	Y	10/100/1000	D, U 160	4/2	0/1761.6GB	48x-20x	16/14	7/7	
8685-81X ¹	2.5	1/4	1MB	1GB/24GB	Tower	2/4	P, S, H, F	S-Fans O-Power	Y	10/100/1000	D, U 160	4/2	0/1761.6GB	48x-20x	16/14	7/7	
8685-8RX ²	2.5	1/4	1MB	1GB/24GB	Rack (7U)	2/4	P, S, H, F	S-Fans O-Power	Y	10/100/1000	D, U 160	4/2	0/1761.6GB	48x-20x	16/14	7/7	
8685-91X ¹	2.8	1/4	2MB	1GB/24GB	Tower	2/4	P, S, H, F	S-Fans O-Power	Y	10/100/1000	D, U 160	4/2	0/1761.6GB	48x-20x	16/14	7/7	
8685-9RX ²	2.8	1/4	2MB	1GB/24GB	Rack (7U)	2/4	P, S, H, F	S-Fans O-Power	Y	10/100/1000	D, U 160	4/2	0/1761.6GB	48x-20x	16/14	7/7	

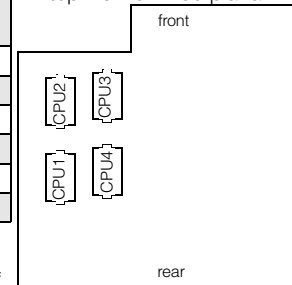
Note: xSeries 255 supports the IXA Adapter (P/N 1519100) for connection to iSeries models for Windows 2000 Server and Advanced Server. Installation is restricted to slot two and Remote Supervisor (P/N 09N7585) must be installed.

1. Ships with standard keyboard and mouse. See Power, Monitors and Accessories section for tower-to-rack conversion kit.
2. Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
3. Intel Xeon MP processor with integrated full-speed ECC L3 cache and 400MHz (quad-pumped) access to memory and I/O buses. Processors in models 7 ... 9RX are not compatible with processors in models 4 ... 6RX.
4. Advanced Chipkill ECC memory corrects two-, three-, and four-bit memory errors. Standard memory supports two-way interleaving. Two or four optional RDIMMs are installed in pairs to support two-way interleaving (up to a total of six RDIMMs). Four-way interleaving is supported with the selection of two optional RDIMMs and selection of an additional four or eight RDIMMs in groups of four. Hot-spare memory is supported for both two-way interleaving (up to six RDIMMs) and four-way interleaving (see Memory section). Four-way interleaving outperforms two-way interleaving. Memory options must match in density and technology in order to support interleaving and hot-spare memory. Maximum memory is based on 12 2GB RDIMMs. When 2GB RDIMMs are installed, the BIOS and diagnostic firmware must be later than version 1.02.
5. Two optional 370w Reversed Fan Hot-swap Redundant Power Supplies (P/N 31P6133) are required to support N+N redundancy. Refer to the Power section in xSeries 255 Power, Monitor & Accessories for additional information.
6. Maximum internal HDD storage capacity is based on 12 hot-swap 146.8GB HDDs, which requires optional 6-pack Ultra320 Hot-swap Expansion Kit (P/N 32P8163). Both the standard and optional hot-swap HDD backplanes are Ultra320. The integrated controller is Ultra160.
7. Total number of bays includes the standard bays plus six additional bays provided by installation of optional 6-pack Ultra320 Hot-swap Expansion Kit (P/N 32P8163).

xSeries 255 Processor Upgrades

Part Number	Processor Upgrades	SMP Support ¹	Processor Speed Upgrade ²
59P6815	1.5GHz/400MHz-1MB L3 Cache Xeon Processor MP	4xX	-
59P6816	1.9GHz/400MHz-1MB L3 Cache Xeon Processor MP	5xX	4xX
59P6817	2GHz/400MHz-2MB L3 Cache Xeon Processor MP	6xX	4xX, 5xX
73P8805	2GHz/400MHz-1MB L3 Cache Upgrade with Xeon Processor MP	7xX	-
73P8806	2.5GHz/400MHz-1MB L3 Cache Upgrade with Xeon Processor MP	8xX	7xX
73P8807	2.8GHz/400MHz-2MB L3 Cache Upgrade with Xeon Processor MP	9xX	7xX, 8xX

top view of x255 planar

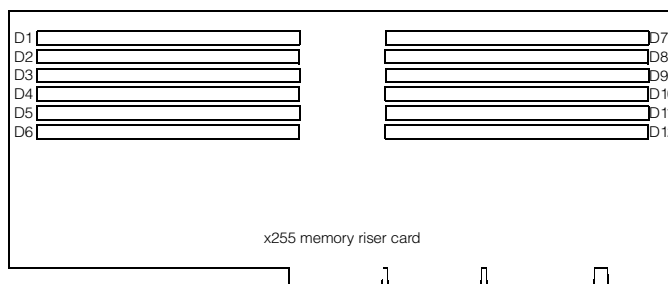


- Three additional processors may be installed, providing a maximum of four. All processors must be identical in type, speed, and cache size. See diagram for order of installation.
- Requires removal of the standard processor. A maximum of four processors may be installed (see xSeries 255 planar diagram for order of installation). All processors must be identical in type, speed and cache size. Upgrades may require a BIOS update. To obtain the latest Flash BIOS, access www.pc.ibm.com/support and enter machine "Type-Model" in Quick Path. Select "Downloadable files" and then "BIOS."

xSeries 255 Memory

Part Number	Memory Description ¹
33L3281	256MB PC1600 ECC DDR SDRAM RDIMM
33L3283	512MB PC1600 ECC DDR SDRAM RDIMM
33L3285	1GB PC1600 ECC DDR SDRAM RDIMM
33L3287	2GB PC1600 CL2 ECC DDR SDRAM RDIMM Memory Upgrade ²

- To support two-way interleaving, optional RDIMMs must be installed in pairs up to a maximum of six RDIMMs including the standard RDIMMs. To support four-way interleaving, the first two optional RDIMMs are installed to complete one four-way set, then the next two sets are installed, each of which includes four matching RDIMMs. All RDIMMs in a set must be the same density and technology, but the sets are not required to match other sets. Four-way interleaving provides improved performance benefits over two-way interleaving. Chipkill support is provided on the memory card. See RDIMM Order of Installation table below.
- When 2GB RDIMMs are installed, the BIOS and diagnostic firmware must be later than version 1.02.



RDIMM Order of Installation and Hot Spare Memory Configuration

Interleaving	Quantity of RDIMMs	RDIMM Set	Bank	Hot Spare Memory ²
2-way ¹	2	D2, D8	3	-
2-way	4	D4, D10	2	Bank 3
2-way	6	D6, D12	1	Bank 3
4-way ²	4	D1, D2, D7, D8	3	-
4-way	8	D3, D4, D9, D10	2	Bank 3
4-way	12	D5, D6, D11, D12	1	Bank 3

- Two RDIMMs installed in D2 and D8 are standard in base models with two-way interleaving enabled. If two-way interleaving is maintained, then a pair of RDIMMs can be installed in D4 and D8 and two more in D6 and D12. If four-way interleaving is enabled, RDIMMs must be added in D1 and D7 to complete Bank 3, then four RDIMMs are added in Bank 2 and four more RDIMMs can be added in Bank 1.
- If Hot Spare Memory is enabled by the system BIOS, memory bank 3 is used as a spare bank in the event of RDIMM failure. Bank 3 serves as a hot spare for both banks 1 and 2. Hot Spare Memory does not apply when only two RDIMMs are installed or when only four RDIMMs are installed with four-way interleaving. Hot Spare Memory is not addressable by the CPU until activated. Memory density and technology must be the same in both the active and spare banks.



Total Memory ¹		Quantity of RDIMMs Added ²			
512MB (2x256MB models)	1GB (2x512MB models)	256MB (33L3281)	512MB (33L3283)	1GB (33L3285)	2GB (33L3287) ⁴
1GB	-	2	-	-	-
2GB	-	6	-	-	-
-	2GB	-	2	-	-
3GB	-	10	-	-	-
-	3GB	4	2	-	-
4GB	-	6	4	-	-
-	4GB	8	2	-	-
5GB	-	2	8	-	-
-	5GB	4	6	-	-
-	6GB	-	2	4	-
7GB	-	2	4	4	-
-	7GB	4	2	4	-
-	8GB	-	6	4	-
9GB	-	2	-	8	-
10GB ³	-	-	4	8	-
-	10GB	-	2	8	-
12GB ³	12GB ³	-	-	12	-
16GB ³	16GB ³	-	-	8	4
20GB ³	20GB ³	-	-	4	8
24GB ³	24GB ³	-	-	-	12

This table does not represent all possible memory configurations. Four-way interleaving is assumed for the purposes of this table. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. To obtain the Quantity of memory identified in the "Total Memory" column, select the appropriate row and order the quantity of RDIMMs identified in all columns for that row.
3. Requires removal of standard RDIMMs.

xSeries 255 Internal SCSI Cabling

The xSeries 255 contains 10 standard bays with the option of adding an additional six HDD bays. The six standard slim-line hot-swap HDD bays are located on the upper left half of the front of both tower and rack models. Four removable media bays are located on the right-side front of the chassis. The top bay contains the standard floppy disk drive and the second bay from the top contains the standard CD-ROM drive. The remaining two removable media bays support tape or optical drive options.

The standard Ultra320 hot-swap backplane supports six hot-swap HDD bays. The backplane is connected to the integrated dual-channel, Ultra160 SCSI controller through a standard 16-bit LVD SCSI cable. If internal RAID support is required, this cable can be used to connect the backplane to a supported RAID controller. A second optional hot-swap backplane with six hot-swap HDD bays is supported for installation directly below the standard backplane. The optional backplane can be configured as an independent SCSI bus with the addition of an optional SCSI storage controller or it can be configured with the six standard hot-swap HDD bays by connecting each of the hot-swap backplanes to separate connectors of a two- or four-channel RAID controller. The optional backplane cannot be connected to the integrated SCSI controller if the standard backplane remains connected, and there is no accommodation for connecting the two backplanes directly.

Supported internal tape drives include a 34-inch terminated SCSI cable for connecting optional tape drives to either a supported SCSI controller or to channel A of the integrated SCSI controller if the hot-swap backplane is connected to an optional controller. The standard CD-ROM is cabled to the IDE port on the planar through a two-drop IDE cable.

External attachment of supported SCSI devices requires installation of the optional External SCSI Interface Kit (P/N 32P8164), which provides a SCSI cable with an external 0.8mm VHDCI connector that attaches to the rear of the chassis and connects at the other end to the 68-pin connector of channel B on the planar.

For additional information regarding internal cabling, refer to Appendix F: Internal Cabling Overview.

xSeries 255 Hard Disk Drive (HDD) Storage

Total Int Storage ¹	10,000rpm HDDs			15,000rpm HDDs	
	36.4GB (32P0726, 06P5755) ²	73.4GB (32P0727, 06P5756) ²	146.8GB (32P0728) ²	36.4GB (06P5768, 32P0734) ²	73.4GB (32P0735) ²
0GB	Standard on base models				
18.2GB	-	-	-	-	-
36.4GB	1	-	-	1	-
54.6GB	-	-	-	-	-
72.8GB	2	-	-	2	-
91GB	-	-	-	-	-
109.2GB	3	-	-	3	-
127.4GB	-	-	-	-	-
145.6GB	4	-	-	4	-
163.8GB	-	-	-	-	-
182GB	5	-	-	5	-
200.2GB	-	-	-	-	-
218.4GB	6	-	-	6	-
254.8GB	7	-	-	7	-
291.2GB	8	-	-	8	-
327.6GB	9	-	-	9	-
364GB	10	-	-	10	-
367GB	-	5	-	-	5
400.4GB	11	-	-	11	-
436.8GB	12	-	-	12	-
440.4GB	-	6	3	-	6
513.8GB	-	7	-	-	7
587.2GB	-	8	4	-	8
660.6GB	-	9	-	-	9
734GB	-	10	5	-	10
807.4GB	-	11	-	-	11
880.8GB	-	12	6	-	12
1027.8GB	-	-	7	-	-
1174.4GB	-	-	8	-	-
1321.2GB	-	-	9	-	-
1468GB	-	-	10	-	-
1614.8GB	-	-	11	-	-
1761.6GB	-	-	12	-	-

This table does not represent all possible HDD configurations. Total internal storage listed is within +/-0.2GB unless otherwise noted.

1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice. Quantities exceeding six require installation of 6-pack Ultra320 Hot-swap Expansion Kit (P/N 32P8163), which supports bays seven through 12.
2. xSeries 255 ships standard with a dual-channel, Ultra160 SCSI storage controller. The standard backplane supports Ultra160 HDDs at Ultra160 speeds when connected to the standard integrated storage controller or at Ultra320 speeds (320MBps) with the addition of an optional Ultra320 storage controller (future).



Part Number	Description	RPM	Height	Bays Supported ²	Maximum Quantity ²
Hot-swap Ultra160 SCSI HDDs¹					
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	10000	SL	1 ... 12	12
06P5756	73.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	10000	SL	1 ... 12	12
06P5768	36.4GB 15Krpm Ultra160 SCSI Hot-swap SL HDD	15000	SL	1 ... 12	12
Hot-swap Ultra320 HDDs¹					
32P0726	36.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	10000	SL	1 ... 12	12
32P0727	73.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	10000	SL	1 ... 12	12
32P0728	146.8GB 10Krpm Ultra320 SCSI Hot-swap HDD	10000	SL	1 ... 12	12
32P0734	36.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	15000	SL	1 ... 12	12
32P0735	73.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	15000	SL	1 ... 12	12
Associated Options					
32P8163	6-pack Ultra320 Hot-swap Expansion Kit ³	-	-	6 ... 12	1
32P8164	External SCSI Interface Kit ⁴	-	-	-	1
Optical Devices			Bays Supported		
22P6950	16x Max RAM-Read DVD-ROM Drive ^{5, 6}	A, B, C			
External Storage Expansion Units⁷			Form Factor		
35311RU	EXP300 Storage Expansion Unit ⁸	Rack (3U)			
17331RU	EXP400 Storage Expansion Unit ⁸	Rack (3U)			
09N7296	EXP Rack-to-Tower Conversion Kit ⁹	-			
171010U	FAST EXP100 Storage Expansion Unit	Rack (3U)			
17401RU	FAST EXP700 Storage Expansion Unit	Rack (3U)			
172260U	FAST600 Storage Server (US line cord, English pubs)	Rack (3U)			
35601RU	FAST EXP500 Storage Expansion Unit	Rack (3U)			
35421RU	FAST200 Storage Server ¹⁰	Rack (3U)			
35422RU	FAST200 HA Storage Server	Rack (3U)			
19K1121	FAST200 Redundant RAID Controller	-			

1. xSeries 255 contains an Ultra320 hot-swap backplane which supports Ultra160 HDDs at Ultra160 bus speeds when connected to the standard integrated storage controller or Ultra320 speeds when connected to an Ultra320 PCI controller (future). Installation of Ultra320 HDDs and an Ultra320 controller are required to support Ultra320 bus speeds. If one or more Ultra160 HDDs are installed, the entire bus is limited to Ultra160 speeds.

2. Maximum quantity requires installation of 6-pack Ultra320 Hot-swap Expansion Kit (P/N 32P8163), which supports bays seven through 12.

3. xSeries 6-pack Ultra320 Hot-swap Expansion Kit is used to provide an additional hot-swap backplane supporting a single SCSI channel with up to six HDDs.

4. Required to enable a 0.8mm VHDCI external connector for external SCSI attachment to the second channel of the integrated controller. Refer to Appendix D: Cables - Storage Units - Controllers for additional information.

5. Either replace the standard CD-ROM or install in one of the media bays. A two-drop IDE cable is included with the optional optical drive. If installing as an additional device, connect the cable to each optical device and the IDE connector on the system board. Configure the optional device as a master using the preset configuration if replacing the standard device or as a slave if installed as an additional device.

6. Audio and video are not supported for DVD-ROM drives. The drive reads data signals only.

7. Not supported by the onboard external SCSI port. To configure an external SCSI storage devices, select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm that the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.

8. In order to attach EXP300 or EXP400 to the integrated controller when ServeRAID-5i is installed, External SCSI Interface Kit (P/N 32P8164) is required to enable a 0.8mm VHDCI external connector on the system chassis.

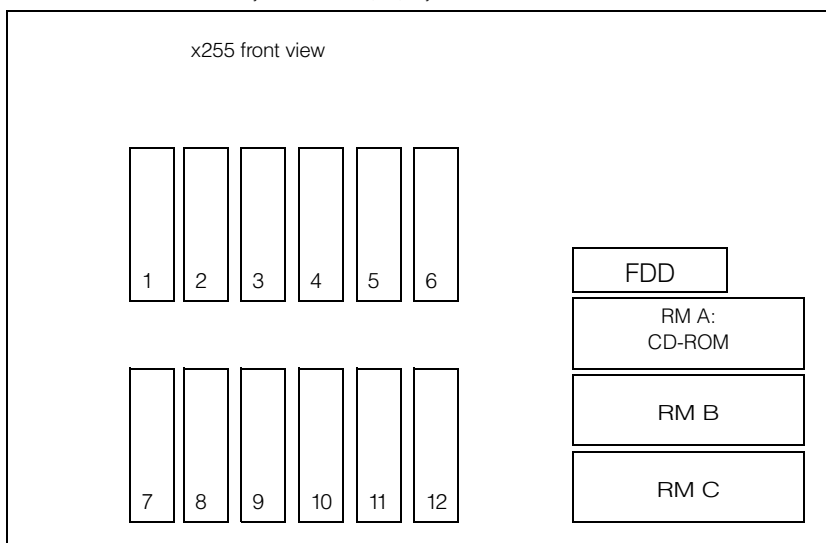
9. To convert an EXP Storage Unit to a tower form factor the EXP Rack-to-Tower Conversion Kit is required.

10. Can be upgraded to FAST200 HA Storage Server through the addition of a FAST200 Redundant RAID Controller (P/N 19K1121).

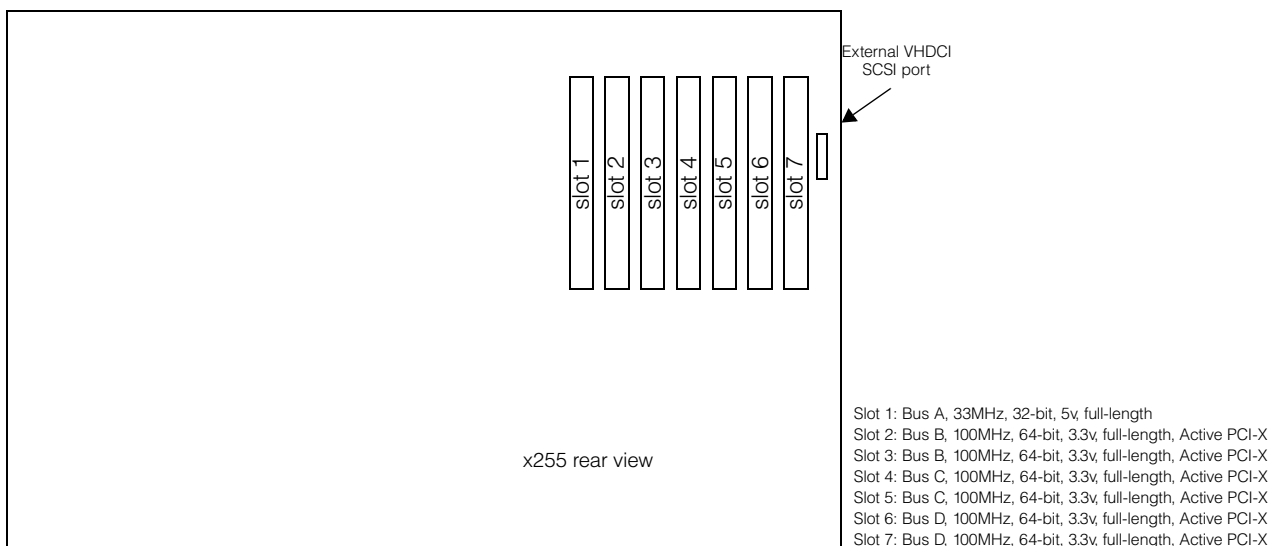
Bay	Form Factor	Height	Front Access	Usage
-	89mm (3.5in)	SL	Yes	FDD
RM A	133mm (5.25in)	HH	Yes	CD-ROM
RM B	133mm (5.25in)	HH ¹	Yes	Open
RM C	133mm (5.25in)	HH ¹	Yes	Open
(1 ... 12) ²	HS	SL	Yes	Open

- Two half-high (HH) bays can be combined to support a single full-high (FH) device
- Optional 6-pack Ultra320 Hot-swap Expansion Kit (P/N 32P8163) is required to support bays seven through 12.

Note: Install HDDs in the same order as bays are numbered, i.e., bays one to 12.



xSeries 255 I/O Options





Part Number	Description	Adapter Length	PCI Support ¹	Slots Supported ¹	Hot-Plug ²	PCI Voltage Key	MHz
Storage Controllers³							
02R0988	ServeRAID-6M Controller (256MB Cache) ⁴	Full	64-bit	1 ... 7	-	3.3	133
32P0033	ServeRAID-6M Controller (128MB Cache) ⁴	Full	64-bit	1 ... 7	-	3.3	133
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	Half	64-bit	3, 4 ⁵	X	Universal	66
19K4646	PCI Wide Ultra160 SCSI Adapter	Half	32-bit	1 ... 7	-	Universal	66
Internal RAID Cable							
02R2068	Ultra320 Internal Single-drop 24in LVD SCSI Cable ⁴	-	-	-	-	-	-
Fibre Storage Controllers and Options⁵							
00N6881	FAStT Host Adapter	Half	64-bit	1 ... 7	X	Universal	66
24P0960	FC2-133 Host Bus Adapter	Half	64-bit	1 ... 7	X	Universal	133
174290U	FAStT900 Storage Server (US line cord)	-	-	-	-	-	-
17421RU	FAStT700 Fibre Channel Storage Server	-	-	-	-	-	-
172260U	FAStT600 Storage Server (US line cord, English pubs)	-	-	-	-	-	-
35421RU	FAStT200 Storage Server	-	-	-	-	-	-
35422RU	FAStT200 HA Storage Server	-	-	-	-	-	-
3534F08	TotalStorage SAN Switch F08, 8-port	-	-	-	-	-	-
2109F16	SAN Fibre Channel Switch, 16-Port	-	-	-	-	-	-
Networking⁷							
Ethernet⁸							
06P3601	10/100 Ethernet Server Adapter ⁹	Half	32-bit	1 ... 7	X	Universal	33
31P9601	PRO/1000 MT Server Adapter by Intel	Half	64-bit	1 ... 7	X	Universal	133
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals ⁹	Half	64-bit	1 ... 7	X	Universal	133
22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter	Half	64-bit	1 ... 7	X	Universal	133
31P6301	NetXtreme 1000 T Ethernet Adapter (copper) ⁹	Half	64-bit	1 ... 7	X	Universal	133
31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper) ⁹	Half	64-bit	1 ... 7	X	Universal	133
Token Ring							
34L5001	16/4 Token-Ring PCI Management Adapter ⁹	Half	32-bit	1 ... 7	X	Universal	33
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter ⁹	Half	32-bit	1 ... 7	X	Universal	33
Communications¹⁰							
33L4618	V90 PCI Data/Fax Modem ¹¹	Half	32-bit	1	-	5	33
System Management							
09N7585	Remote Supervisor Adapter ¹²	Half	32-bit	1	-	Universal	33

Note: xSeries 255 supports the IXA Adapter (P/N 1519100) for connection to iSeries models for Windows 2000 Server and Advanced Server. Installation is restricted to slot two and Remote Supervisor (P/N 09N7585) must be installed.

- The 5v slots support universal or 5v adapters. The 3.3v slots support universal or 3.3v adapters. A higher frequency adapter plugged into a lower frequency slot will operate at the slot frequency. A lower frequency (e.g., 33MHz) adapter plugged into a higher frequency (e.g., 66MHz) slot limits other adapters installed on the same bus to the lower frequency. A 64-bit adapter installed into a 32-bit slot will transfer data at 32-bit rates. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.
- Slots two through seven are hot-pluggable. For Network Operating System support access www.pc.ibm.com/us/compat.
- All models include a dual-port, dual-channel, 64-bit Wide Ultra160 SCSI controller with one internal connector connected to the standard hot-swap backplane with a standard Ultra160 SCSI cable. The second connector supports one external port, which is enabled by installing an External SCSI Interface Kit (P/N 32P8164) with a 0.8mm VHDCI connector.
- Cable option 02R2068 is required in order to fully support U320 SCSI speeds when cabled to internal HDDs.
- If a second ServeRAID-4Lx is to be installed, it should be installed in slot 3 or 4.
- See Fibre Channel Solutions Overview section for additional configuration information.
- xSeries 255 includes an integrated copper Broadcom 10/100/1000Mbps Ethernet controller, which supports Wake on LAN.
- In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. Two of the optional adapters (P/N 22P7801, 31P6301) are Broadcom-based. Two of the optional PCI Ethernet adapters listed are copper and Intel-based (P/N 06P3601, 22P6801).
- The Wake on LAN function of this option is not supported by this server.
- xSeries 255 includes four USB ports, one external serial port and two integrated RS-485 system management interconnect ports located on the back of the system chassis. Connection of the standard service processor to other servers in an interconnect network requires a customer-supplied Cat5 cable.
- Due to homologation variances, modem availability may differ by country.
- When installed in xSeries 255, Remote Supervisor Adapter (RSA) shares functionality with the integrated service processor and serves as interface for both. RSA provides full system management functionality through a customer-supplied Ethernet cable or modem connection or as part of an interconnected system management bus (option includes all interconnect hardware). An external Cat5 connection between RSA and the integrated service processor using the pigtail cable and short Cat5 cable supplied with RSA is not required. The 20-pin ribbon cable connecting RSA to the planar meets all powering and signaling requirements. Connection of the external AC power supply provided with RSA is not required.

xSeries 255 Power, Monitors & Accessories

Part Number	Description
Power¹	
31P6133	370w Reversed Fan Hot-swap Redundant Power Supply
Tower Uninterruptible Power Supply (UPS)²	
21301TX	UPS750TLV
21302TX	UPS750THV
21303TX	UPS1000TLV
21304TX	UPS1000THV
94G3136	APC Smart-UPS 1400
21305TX	UPS1500TLV
21306TX	UPS1500THV
Rack-mount Uninterruptible Power Supply	
32P1020	APC 2U Smart-UPS 1400RMB
2130R30	UPS3000XLV ³
2130R31	UPS3000XHV ³
32P1692	UPS Extend Run Battery Pack ³
37L6861	APC Smart-UPS 5000RMB ⁴
Monitors⁵	
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black ⁶
63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black ⁷
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁸
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard) ⁸
32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁸
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard) ⁸

1. xSeries 255 includes two 370w hot-swap power supplies with the ability to accept two additional 370w Reversed Fan Hot-swap Redundant Power Supplies (P/N 31P6133). Each power supply bus in rack models includes an IEC 9ft rack power cable (P/N 36L8886) for attachment to NetBAY Rack PDUs and high voltage UPS units. The US country kit for rack models includes two NEMA 5-15P cords (P/N 6952300) for connection to a low voltage UPS, low voltage PDU or wall outlet. Tower models ship with two 1.8m NEMA 5-15P cords (P/N 6952301). Each of the two standard power supplies is installed on a separate bus. Installation of one optional power supply on each bus is required to achieve full power redundancy. Additional power cords are not used.

2. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.

3. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.

4. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.

5. xSeries 255 uses an SVGA controller (S3 Trio 3D chipset) with 4MB of video memory.

6. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).

7. Installation within a rack requires optional Netfinity Flat Panel Monitor Rack Mount Kit II (P/N 37L6888) and Netfinity Rack Keyboard Tray (P/N 28L4707). A space saver keyboard may coexist within the same 28L4707 keyboard tray.

8. Includes a 15in Flat Panel Monitor.



Part Number	Description
Conversion Kits	
32P1474	7Ux26D Tower-to-Rack Kit
Rack and NetBAY¹	
	Refer to the Rack Cabinets and Options section for information concerning IBM racks and rack-supported devices.
Console Connectivity²	
1735L04	NetBAY Local Console Manager
1735R16	NetBAY Remote Console Manager
32P1636	250mm KVM Conversion Option
32P1652	1.5m KVM Conversion Option
09N4290	NetBAY 1x4 Console Switch
09N4291	NetBAY 2x8 Console Switch
Keyboard and Mouse³	
28L3644	Space Saver II Keyboard ^{4, 6}
10K3849	106-key Preferred USB Keyboard with 2-port USB Hub (stealth black) ^{5, 7}
31P7415	Preferred Pro Full-size Keyboard - 104 Keys (stealth black)
28L3673	Sleek 2-Button Stealth Black Mouse

1. xSeries 255 rack models are housed in a 19in rack-mountable drawer and require one of the racks listed in the Rack Cabinets and Options section.
2. Refer to the Rack Console Options section for information regarding console connectivity using these options.
3. xSeries 255 rack models ship without a keyboard or mouse.
4. Installation within a rack requires optional keyboard tray (P/N 28L4707) which stows in ready-to-use position, or NetBAY 1U or 2U Flat Panel Monitor Console Kit (P/N 32P1032, 32P1702). Standard with 1U and 2U NetBAY console kits (P/N 32P1031, 32P1702).
5. Installation within a rack requires optional keyboard tray (P/N 28L4707). This keyboard cannot share a keyboard tray with a flat panel display.
6. Advanced TrackPoint IV features are not available on IBM xSeries systems.
7. USB accessories attach to a single USB-capable server. They are not compatible with the NetBAY console switches.

xSeries 255 Tape Options

Part Number	Tape Drives	Bays Supported	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures
00N7991	20/40GB DDS/4 4mm Internal Tape Drive ⁴	B, C	16 Ultra2 LVD	89mm (3.5in) HH or 133mm (5.25in) HH	Y ¹	-
00N8016	100/200GB LTO Tape Drive	B+C	16 Ultra2 LVD	133mm (5.25in) FH	Y ¹	3503B1X
24P2396	100/200GB LTO Half-High Tape Drive ⁵	B, C	16 Ultra2 LVD	133mm (5.25in) HH	Y ¹	-
24P2398	40/80GB Half-High DLTVS Internal SCSI Tape Drive	B, C	16 Ultra2 LVD	133mm (5.25in) HH	Y ¹	-
59P6736	160/320GB SDLT Tape Drive	B+C	16 Ultra2 LVD	133mm (5.25in) FH	Y ¹	3503B1X
59P6744	LTO FH Generation-2 Tape Drive Option	B+C	16 Ultra2 LVD	133mm (5.25in) FH	Y ¹	3503B1X
Tape Autoloaders						
00N7992	120/240GB DDS/4 Tape Autoloader	B+C	16 Ultra2 LVD	133mm (5.25in) FH	Y ¹	3503B1X
360716X	3607 Series 1760GB/3.5TB SDLTpro Tape Autoloader	-	16 Ultra2 LVD	2U Rack	Y	-
360726X	3607 Series 1.6TB/3.2TB LTO Tape Autoloader	-	16 Ultra2 LVD	2U Rack	Y	-
External Tape Enclosures						
3503B1X	Full-High SCSI Tape Enclosure ²	-	16 Ultra2 LVD	Desktop or 3U Rack	Y	-
Associated Options						
32P8164	External SCSI Interface Kit ³	-	16 Ultra2 LVD	-	N	-

Note: xSeries 255 includes an external 0.8mm VHDCI connector for support of external SCSI devices. External SCSI Interface Kit (P/N 32P8164) is required to enable the external port.

1. Termination requires installing the 34in single-drop, terminated LVD SCSI cable provided with the option.
2. Black desktop or 3U rack tape enclosure supports a single 133mm (5.25in) full-high LVD tape device including DLT tape drives. Requires a fixed shelf if installed in a rack (allow additional 1U for fixed shelf). Includes a 90w power supply, cooling fan, external terminator, power cord (country-specific), and 2m 68-pin to 0.8mm external cable.
3. External SCSI Interface Kit (P/N 32P8164) is an internal terminated LVD SCSI cable with two screws for fastening to the rear of the chassis providing an external 0.8mm VHDCI connector, connecting to the 68-pin channel A connector located on the planar near PCI slot six.
4. The standard internal media power cable is not long enough to connect to this tape drive in xSeries 255. An optional longer media power cable is available (FRU# 24P1054).
5. This tape drive must be shipped separately as an option and installed at a customer site. Factory or vendor installation prior to shipping is not supported.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

xSeries 255 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

High-availability, High-performance Seibel Application Server Solution

Part Number	Description	Quantity	Usage
8685-6RX	xSeries 255 2GHz/400MHz-2MB, 1GB ECC, open, 48x (7U rack)	1	-
59P6817	2GHz/400MHz-2MB L3 Cache Xeon Processor MP	3	Total of 4 SMP processors
33L3283	512MB PC1600 ECC DDR SDRAM RDIMM	6	4GB total memory (4-way interleaved)
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	1	RAID adapter
06P5754	18.2GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	2	18.2GB HDDs mirrored for NOS
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	8 ¹	218.4GB RAID 5 with hot-spare
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals	1	2 Ethernet ports total
09N7585	Remote Supervisor Adapter	1	system management adapter
32P8163	6-pack Ultra320 Hot-swap Expansion Kit	1	-
32P8164	External SCSI Interface Kit	1	enables external 0.8mm VHDCI connector
59P6736	160/320GB SDLT Tape Drive	1	-
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard)	1	-
31P6133	370w Reversed Fan Hot-swap Redundant Power Supply	2	Full power redundancy
32P1020	APC 2U Smart-UPS 1400RMB	1	-
External Storage			
35311RU	EXP300 Storage Expansion Unit	1	Includes 2m Ultra2 cable
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-Swap SL HDD	14	RAID 5 data storage with hot-spare
Rack			
9306250	NetBAY25 Standard Rack Cabinet	1	-
94G6670	Blank Filler Panel Kit	1	-

1. Eight HDDs are used for RAID 5 protection. One HDD is identified as a hot-spare. Effective capacity is six HDDs or 218.4GB.

High-availability Microsoft Exchange Server Solution

Part Number	Description	Quantity	Usage
8685-5RX	xSeries 255 1.9GHz/400MHz-1MB, 1GB ECC, open, 48x (7U rack)	1	-
59P6816	1.9GHz/400MHz-1MB L3 Cache Xeon Processor MP	3	Total of 4 SMP processors
33L3283	512MB PC1600 ECC DDR SDRAM RDIMM	2	2GB total system memory
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	1	RAID adapter
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals	1	2 Ethernet ports total
09N7585	Remote Supervisor Adapter	1	system management adapter
06P5754	18.2GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	2	18.2GB HDDs mirrored for NOS
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	8 ¹	218.4GB RAID 5 with hot-spare
32P8163	6-pack Ultra320 Hot-swap Expansion Kit	1	-
59P6736	160/320GB SDLT Tape Drive	1	-
32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard)	1	-
31P6133	370w Reversed Fan Hot-swap Redundant Power Supply	2	Full power redundancy
32P1020	APC 2U Smart-UPS 1400RMB	1	-
Rack			
9306250	NetBAY25 Standard Rack Cabinet	1	-
94G6670	Blank Filler Panel Kit	1	-

1. Eight HDDs are used for RAID 5 protection. One HDD is identified as a hot-spare. Effective capacity is six HDDs or 218.4GB.



File and Print Server (large user base)

Part Number	Description	Quantity	Usage
8685-41X	xSeries 255 1.5GHz/400MHz-1MB, 512MB ECC, open, 48x	1	-
59P6815	1.5GHz/400MHz-1MB L3 Cache Xeon Processor MP	1	2 processors
33L3281	256MB PC1600 ECC DDR SDRAM RDIMM	2	1GB total memory (4-way interleaved)
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals	1	2 Ethernet ports total
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	1	RAID adapter
06P5754	18.2GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	2	18.2GB HDDs mirrored for NOS
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	6 ¹	72.8GB RAID 5 with hot-spare
32P8163	6-pack Ultra320 Hot-swap Expansion Kit	1	-
00N7991	20/40GB DDS/4 4mm Internal Tape Drive	1	-
31P6133	370w Reversed Fan Hot-swap Redundant Power Supply	2	Full power redundancy
66274AN	G78 Color Monitor 17in (406.4mm, 16in viewable image), stealth black	1	-
94G3136	APC Smart-UPS 1400	1	-

1. Six HDDs per backplane are used for RAID 5 protection. One HDD is identified as a hot-spare. Effective capacity is four HDDs or 145.6GB per backplane.

xSeries 305

Part Number¹ Withdrawal Date⁹ Processor/FSB Speed (GHz/MHz)² Number of Processors (Std/Max)³ L2 ECC Cache (KB)⁴ Memory (Std/Max)⁵ Form Factor Power Supply Quantity (Std/Max)⁶ Hot-Swap (Power, Slots, HDD, Fans)⁷ Redundancy (Optional, Standard)⁸ Adv System Management Processor Onboard Ethernet (Mbps)⁴ Storage Controller (Dual, Ultra, RAID)⁴ Removable Media Bays (Total/Avail)⁴ Internal HDD Storage (Std/Max)⁴ CD-ROM (IDE)⁴ Bays (Total/Avail)⁴ Slots (Total/Avail)⁴

xSeries 305 At-A-Glance																		
8673-4AX ⁴	-	2.4/533 ²	1/1	512	256MB/4GB	Rack (1U)	1/1 ³	-	-	N	2x10/100/1000	U160 ⁵	2/0	36.4GB/293.6GB ⁷	24x-10x	4/1	2/1	
8673-62X	30-Dec	2.67/533 ²	1/1	512	256MB/4GB	Rack (1U)	1/1	-	-	N	2x10/100/1000	IDE	2/0	40GB/240GB ⁶	24x-10x	4/1	2/2	
8673-63X	30-Dec	2.67/533 ²	1/1	512	256MB/4GB	Rack (1U)	1/1	-	-	N	2x10/100/1000	U160 ⁵	2/0	18.2GB/293.6GB ⁷	24x-10x	4/1	2/1	
8673-72X	-	2.8/533 ²	1/1	512	256MB/4GB	Rack (1U)	1/1	-	-	N	2x10/100/1000	IDE	2/0	40GB/240GB ⁶	24x-10x	4/1	2/2	
8673-73X	-	2.8/533 ²	1/1	512	256MB/4GB	Rack (1U)	1/1	-	-	N	2x10/100/1000	U160 ⁵	2/0	18.2GB/293.6GB ⁷	24x-10x	4/1	2/1	
8673-82X	-	3.06/533 ²	1/1	512	256MB/4GB	Rack (1U)	1/1	-	-	N	2x10/100/1000	IDE	2/0	40GB/240GB ⁶	24x-10x	4/1	2/2	
8673-83X	-	3.06/533 ²	1/1	512	256MB/4GB	Rack (1U)	1/1	-	-	N	2x10/100/1000	U160 ⁵	2/0	36.4GB/293.6GB ⁷	24x-10x	4/1	2/1	

1. Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
2. Intel Pentium 4 processor with advanced transfer L2 cache and 533MHz (quad-pumped) FSB.
3. Includes a -48v to -60v 200w DC power supply designed for telecommunications applications.
4. Broadcom 5703 dual integrated gigabit Ethernet controllers.
5. Single channel Adaptec 29160 Ultra160 low-profile PCI SCSI storage controller installed in slot two.
6. Maximum capacity requires removing the standard IDE HDD and installing two 120GB IDE HDDs.
7. Maximum capacity requires removing the standard SCSI HDD and installing two 146.8GB SCSI HDDs.
8. SCSI models include a single-channel Ultra160 PCI SCSI adapter installed in slot two (low-profile slot).
9. Not available from IBM after this date. Business Partner inventory may be available.



xSeries 305 Memory

Part Number	Memory Description
33L5037	256MB DDR PC2100 ECC RDIMM
33L5038	512MB DDR PC2100 ECC RDIMM
33L5039	1GB DDR PC2100 ECC RDIMM

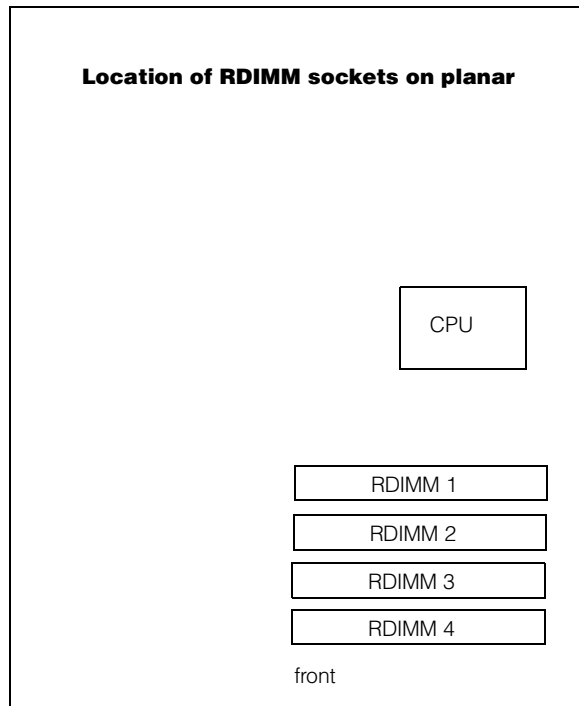
Note: xSeries 305 does not support memory interleaving. Compatible memory options of different densities may be installed. The order of installation id RDIMM 4, 3, 2, 1 as indicated in the planar diagram.

Total System Memory ¹	Quantity of RDIMMs Added			
	1x256MB standard	256MB (33L5037)	512MB (33L5038)	1GB (33L5039)
512MB		1	-	-
768MB		2	-	-
1GB		3	-	-
1.25GB		-	2	-
1.5GB		1	2	-
2GB		1	1	1
2.25GB		-	2	1
2.5GB		1	-	2
2.75GB		-	1	2
3GB ²		-	2	2
3.25GB		-	-	3
3.5GB ²		-	1	3
4GB ²		-	-	4

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs.

1. Select the desired total memory, then add the selection in that row to the standard memory.

2. Requires removal of standard RDIMM.



xSeries 305 Internal SCSI Cabling
EIDE Configurations

EIDE models include a standard CD-ROM drive attached to one connector of the IDE controller using a single-drop IDE cable and the standard IDE HDD is attached to the other IDE connector using a standard two-drop IDE cable. One additional IDE HDD may be installed in the one available HDD bay, attaching to the second drop of the standard two-drop IDE cable.

SCSI Configurations

SCSI models include a standard single-channel PCI SCSI storage controller with one internal connector installed in slot two that attaches to a standard nonhot-swap SCSI HDD using the standard 16-bit LVD terminated two-drop SCSI cable. External SCSI devices require a supported SCSI controller. The standard CD-ROM attaches to the IDE connector using a single-drop IDE cable. In RAID configurations using a ServeRAID-4Lx controller, the HDDs are attached to the RAID controller using the standard cable.

For additional information regarding internal cabling, refer to Appendix F: Internal Cabling Overview.

xSeries 305 Hard Disk Drive (HDD)

SCSI Models 43X, 63X, 73X			
Total Internal Storage^{1,2}	Quantity added to standard configuration		
	36.4GB	73.4GB	146.8GB
18.2GB ³	-	-	-
36.4GB	-	-	-
72.8GB ⁴	2	-	-
73.4GB ⁴	-	1	-
146.8GB ⁴	-	2	1
293.6GB ⁴	-	-	2

SCSI Models 4AX, 83X			
Total Internal Storage^{1, 2}	Quantity added to standard configuration		
	36.4GB	73.4GB	146.8GB
36.4GB ³	-	-	-
72.8GB	1	-	-
73.4GB ⁴	-	1	-
146.8GB ⁴	-	2	1
293.6GB ⁴	-	-	2

These tables do not represent all possible HDD configurations. Total internal storage listed is within +/- 0.2GB unless otherwise noted.

1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.
2. Ultra320 HDDs are supported either mixed with an Ultra160 HDD or alone, but performance is limited to the Ultra160 speed of the SCSI controller.
3. Models 43X, 63X, and 73X ship standard with one 18.2GB 10K rpm U160 HDD. Models 4AX and 83X ship standard with one 36.4GB 10K rpm U160 HDD.
4. Requires removing the standard HDD.

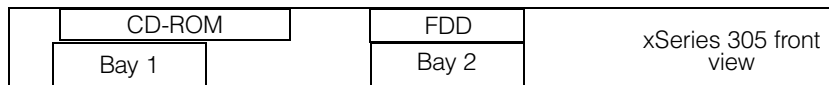
IDE Models			
Total Internal Storage ¹	Quantity added to standard configuration		
	40GB HDD	80GB HDD	120GB HDD
40GB ²	-	-	-
80GB	1	-	-
120GB	-	1	-
160GB ³	-	2	-
200GB ³	-	1	1
240GB ³	-	-	2

This table does not represent all possible HDD configurations. Total internal storage listed is within +/- 0.2GB unless otherwise noted.

1. Select a total storage row then add the quantity of HDDs from all columns to the standard HDD.
2. IDE models ship standard with one 40GB 7200 rpm IDE HDD.
3. Requires removal of the standard HDD.

Part Number	Description	RPM	Height	Bays Supported ³	Maximum Quantity
IDE HDDs¹					
22P7157	40GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	1, 2	2
09N4226	80GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	1, 2	2
09N4231	120GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	1, 2	2
Nonhot-swap Ultra320 HDDs^{1, 2}					
32P0723	36.4GB 10Krpm Ultra320 SCSI HDD	10000	SL	1, 2	2
32P0724	73.4GB 10Krpm Ultra320 SCSI HDD	10000	SL	1, 2	2
32P0725	146.8GB 10Krpm Ultra320 SCSI HDD	10000	SL	1, 2	2
32P0784	36.4GB 15Krpm Ultra320 SCSI HDD	15000	SL	1, 2	2
32P0785	73.4GB 15Krpm Ultra320 SCSI HDD	15000	SL	1, 2	2
Optical Devices			Bays Supported		
22P7047	8x Max Slimline DVD-ROM Drive ³		A		
External Storage Expansion Units⁴			Form Factor		
35311RU	EXP300 Storage Expansion Unit ⁵		Rack (3U)		

1. Mixing of IDE and SCSI hard disk drives is not supported.
2. Ultra320 HDDs are supported, but performance is limited to the Ultra160 speed of the SCSI controller.
3. Requires removing and replacing the standard optical drive.
4. xSeries 305 does not include an external SCSI connector. To configure a SCSI storage device, select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section.
5. EXP300 includes a single 2m Ultra2 SCSI cable and dual hot-swap 500w redundant power supplies, each with its own power cord.



Bay	Form Factor	Height	Front Access	Usage
1 ¹	89mm (3.5in)	SL	no	HDD
2	89mm (3.5in)	SL	no	open

1. Boot drive should be located in bay one.

xSeries 305 I/O Options

Part Number	Description	Adapter Length	PCI Support ²	Slots Supported	PCI Voltage Key	MHz
Storage Controllers¹						
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	Half	64-bit	1	Universal	66
71P8592	ATA133 RAID Controller	Half	32-bit	1	Universal	33
19K4646	PCI Wide Ultra160 SCSI Adapter ³	Half	32-bit	1, 2	Universal	33
71P8594	Single Channel Ultra320 SCSI Controller	Half	64-bit	1, 2	Universal	133
Fibre Storage Controllers and Options⁴						
24P0960	FC2-133 Host Bus Adapter	Half	64-bit	1, 2	Universal	133
Networking⁵						
Ethernet⁶						
06P3601	10/100 Ethernet Server Adapter ⁷	Half	32-bit	1		
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals ⁷	Half	64-bit	1		
22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter	Half	64-bit	1, 2		
31P6301	NetXtreme 1000 T Ethernet Adapter (copper) ⁷	Half	64-bit	1, 2		
31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper) ⁷	Half	64-bit	1, 2		
Token Ring						
34L5001	16/4 Token-ring PCI Management Adapter ⁷	Half	32-bit	1		
07P2701	16/4 Token-ring Low Profile PCI Management Adapter ⁷	Half	32-bit	2		
Communications⁸						
System Management						
09N7585	Remote Supervisor Adapter ⁹	Half	32-bit	1		

1. xSeries 305 has dual integrated EIDE (ATA-100) bus master controllers. SCSI models ship standard with a single-channel Ultra160 SCSI controller installed in slot two. The SCSI controller includes a two-drop cable for connection to two internal HDDs. External connection of a SCSI device requires a supported SCSI adapter.

2. A 64-bit adapter installed into a 32-bit slot will transfer data at 32-bit rates. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.

3. When installed in xSeries 305, support is for external SCSI connections only.

4. See the Fibre Channel Solutions Overview section for additional configuration information.

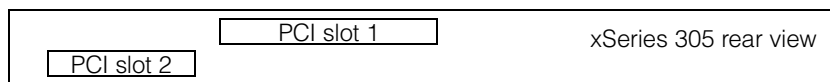
5. xSeries 305 includes dual full-duplex copper 10/100/1000Mbps Broadcom Ethernet controllers.

6. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. Two optional Ethernet adapters are copper and Intel-based (P/N 06P3601, 22P6801). Two adapters are Broadcom-based (P/N 22P7801, 31P6301).

7. Wake on LAN function provided with this networking adapter is supported by this server.

8. xSeries 305 includes two USB ports (front of chassis), a serial port, and video, keyboard and mouse ports.

9. The Remote Supervisor Adapter requires installation of the AC power adapter included with the option in order to operate in standby mode.



Slot 1: Bus 1, 64-bit, 66/100/133MHz PCI-X, full-size, half-length, 3.3v

Slot 2: Bus 2, 64-bit, 66/100/133MHz PCI-X, low-profile, half-length, 3.3v

Note: When two 133MHz adapters are installed, the bus will operate at a maximum frequency of 100MHz. If only one 133MHz adapter is installed, the bus will support the rated frequency of the adapter. If a lower frequency adapter is installed, the bus will be limited to the rated frequency of that adapter.



xSeries 305 Power, Monitors & Accessories

Part Number	Description
Power¹	
Uninterruptible Power Supply (UPS)²	
32P1020	APC 2U Smart-UPS 1400RMB
2130R30	UPS3000XLV ³
2130R31	UPS3000XH ³
32P1692	UPS Extend Run Battery Pack ³
37L6861	APC Smart-UPS 5000RMB ⁴
Monitors⁵	
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black ⁶
63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black ⁶
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁷
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard) ⁷
32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁷
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard) ⁷

1. xSeries 305 includes a worldwide, voltage-sensing 200w power supply with two 9ft line cords, one with an IEC 320 C14 connector for attachment to a PDU or high-voltage UPS and one with a 110v NEMA 5-15P connector for attachment to a low-voltage UPS or wall outlet.

2. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.

3. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.

4. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.

5. xSeries 305 includes an integrated ATI Rage XL video controller with 8MB of video memory.

6. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).

7. Includes a 15in Flat Panel Monitor.

Part Number	Description
Rack and NetBAY^{1, 2}	
	Refer to the Rack Cabinets and Options section for information concerning IBM racks and rack-supported devices.
Console Connectivity³	
1735L04	NetBAY Local Console Manager
1735R16	NetBAY Remote Console Manager
32P1636	250mm KVM Conversion Option
32P1652	1.5m KVM Conversion Option
09N4290	NetBAY 1x4 Console Switch
09N4291	NetBAY 2x8 Console Switch
Keyboard and Mouse⁴	
28L3644	Space Saver II Keyboard ^{5, 6}
10K3849	106-key Preferred USB Keyboard with 2-port USB Hub (stealth black) ^{7, 8}
28L3673	Sleek 2-button Stealth Black Mouse

1. xSeries 305 is housed in a 19in rack-mountable drawer and requires one of the racks listed in the Rack Cabinets and Options section.

2. Note limitations and restrictions for adequate cooling in the Rack Cabinets and Options section. If non-IBM racks are to be used, assure that both the front and rear doors offer a minimum of 48% open area uniformly distributed and in line with installed servers. A clearance of 51 to 64mm (2 to 2.5in) must be maintained between the front door and the system unit's front bezel. The rear door must maintain the same or greater clearance.

3. Refer to the Rack Console Options section for information regarding console connectivity using these options.

4. xSeries 305 supports rack configurations only and ships without a keyboard or mouse.

5. Installation within a rack requires optional keyboard tray (P/N 28L4707) which stows in ready-to-use position, or NetBAY 1U or 2U Flat Panel Monitor Console Kit (P/N 32P1032, 32P1702). Standard with 1U and 2U NetBAY console kits (P/N 32P1031, 32P1702).

6. Advanced TrackPoint IV features are not available on IBM xSeries systems.

7. Installation within a rack requires optional keyboard tray (P/N 28L4707). This keyboard cannot share a keyboard tray with a flat panel display.

8. USB accessories attach to a single USB-capable server. They are not compatible with the NetBAY console switches.

xSeries 305 Tape Options

Part Number	Tape Drives	Bays Supported	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures ¹
00N7991	20/40 GB DDS/4 4mm Internal Tape Drive	-	16 Ultra2 LVD	89mm (3.5in) HH or 133mm (5.25in) HH	Y ²	3510020 ³ 0034B0X
00N8016	100/200GB LTO Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X 0034B0X
59P6736	160/320GB SDLT Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X 0034B0X
59P6744	LTO FH Generation-2 Tape Drive Option	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X 0034B0X
59P6746	VXA-2 80/160GB Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) HH	Y ²	3510020 ³ 0034B0X
Tape Autoloaders						
00N7992	120/240GB DDS/4 Tape Autoloader	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X 0034B0X
360716X	3607 Series 1760GB/3.5TB SDLTpro Tape Autoloader	-	16 Ultra2 LVD	2U Rack	Y	-
360726X	3607 Series 1.6TB/3.2TB LTO Tape Autoloader	-	16 Ultra2 LVD	2U Rack	Y	-
External Tape Enclosures						
0034B0X	NetBAY Tape Enclosure (Rack Mount) ⁴	-	16 Ultra2 LVD	4U Rack	N	-
3510020	External Half High SCSI Storage Enclosure ⁵	-	16 LVD	Desktop	N	-
3503B1X	Full-High SCSI Tape Enclosure ⁶	-	16 Ultra2 LVD	Desktop or 3U Rack	Y	-
Associated Options						
00N7956	68-pin External Multimode LVD/SE SCSI Terminator	-	16 LVD/SE	Ext	Y	3510020

1. xSeries 305 does not support internal tape drives and does not include an external SCSI connector. An external tape library or internal tape drive with a tape enclosure, supported SCSI adapter and appropriate cable must be selected. All tape drives and enclosures are supported by PCI Wide Ultra160 SCSI Adapter (P/N 19K4646), which has an external 0.8mm VHDCI connector or Single Channel Ultra320 SCSI Controller (P/N 71P8594), which includes a four-drop multimode LVD SCSI cable. Select tape drive, enclosure and supported adapter then use Appendix D: Cables - Storage Units - Controllers to select an appropriate external cable.

2. Termination requires installing the 34in single-drop, terminated LVD SCSI cable provided with the option.

3. Requires 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956).

4. NetBAY Tape Enclosure (P/N 0034B0X) is a 4U rack-mounted enclosure that supports four full-high or six half-high tape drives. The backplate includes six 0.8mm VHDCI external connectors for attachment of up to six servers. Internal connection of tape drives requires the single-drop terminated LVD SCSI cable that ships with the tape drive, which also provides termination for the SCSI bus. A single 320w power supply with a low-voltage power cord is standard. An external SCSI storage cable is not provided. Refer to Appendix D: Cables - Storage Units - Controllers to select a supported cable.

5. Black desktop tape enclosure that supports a single 133mm (5.25in) half-high (HH) tape drive. Internal and external connectors are 68-pin high-density supporting LVD. Requires 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956). External cables are not included. Refer to Appendix D: Cables - Storage Units - Controllers to select a supported cable.

6. Black desktop or 3U rack tape enclosure supports a single 133mm (5.25in) full-high LVD tape device including DLT tape drives. Requires a fixed shelf if installed in a rack (allow additional 1U for fixed shelf). Includes a 90w power supply, cooling fan, external terminator, power cord (country-specific), and 2m 68-pin to 0.8mm external cable.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes



xSeries 305 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

Caching Server¹

Part Number	Description	Quantity
8673-63X	xSeries 305 2.67GHz/533MHz-512KB Pentium 4, 256MB ECC, 18.2GB, 24x (1U rack)	1
33L5039	1GB DDR PC2100 ECC RDIMM	2 ²
06P5751	36.4GB 10Krpm Ultra160 SCSI SL HDD	1 ³
32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard)	1
32P1020	APC 2U Smart-UPS 1400 RMB	1

1. Rack components are not included.

2. Total memory is 2GB. Removal of the standard 256MB RDIMM is required.

3. For a total of 54.6GB of internal storage.

Static Web Content Server¹

Part Number	Description	Quantity
8673-62X	xSeries 305 2.67GHz/533MHz-512KB Pentium 4, 256MB ECC, 40GB EIDE, 24x (1U rack)	1
33L5037	256MB DDR PC2100 ECC RDIMM	3 ²
09N4226	80GB 7200rpm ATA-100 (EIDE) HDD	2 ³
32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard)	1
32P1020	APC 2U Smart-UPS 1400 RMB	1

1. Rack components are not included.

2. For a total of 1GB of system memory.

3. For a total of 160GB of internal storage. Removal of the standard IDE HDD is required.

xSeries 335

Part Number ¹	Withdrawal Date ³	Processor/FSB Speed (GHz/MHz)	Number of Processors (Std/Max)	Cache	Memory (Std/Max) ⁵	Form Factor	Power Supply Quantity (Std/Max) ⁶	Hot-Swap (Power, Slots, HDD, Fans)	Redundancy (Optional, Standard)	System Management Processor	Onboard Ethernet (Mbps) ⁸	Storage Controller	Removable Media Bays (Total/Avail)	Internal HDD Storage (Total/Avail)	CD-ROM (IDE) ¹¹	Bays (Total/Avail)	Slots (Total/Avail)
xSeries 335 At-A-Glance																	
8676-61X	30-Dec	2.4/400 ²	1/2	512KB L2	512MB/8GB	Rack (1U)	1/1	H	-	Y	2x10/100/1000	U320 ⁹	2/0	0/293.6GB ¹⁰	24x-10x	4/2	2/2
8676-62X	30-Dec	2.4/400 ²	1/2	512KB L2	512MB/8GB	Rack (1U)	1/1	-	-	Y	2x10/100/1000	IDE	2/0	40GB/240GB ¹¹	24x-10x	4/1	2/2
8676-71X	-	2.6/400 ²	1/2	512KB L2	512MB/8GB	Rack (1U)	1/1	H	-	Y	2x10/100/1000	U320 ⁹	2/0	0/293.6GB ¹⁰	24x-10x	4/2	2/2
8676-72X	-	2.6/400 ²	1/2	512KB L2	512MB/8GB	Rack (1U)	1/1	-	-	Y	2x10/100/1000	IDE	2/0	40GB/240GB ¹¹	24x-10x	4/1	2/2
8676-11X	-	2.8/533 ³	1/2	512KB L2	512MB/8GB	Rack (1U)	1/1	H	-	Y	2x10/100/1000	U320 ⁹	2/0	0/293.6GB ¹⁰	24x-10x	4/2	2/2
8676-12X	-	2.8/533 ³	1/2	512KB L2	512MB/8GB	Rack (1U)	1/1	-	-	Y	2x10/100/1000	IDE	2/0	40GB/240GB ¹¹	24x-10x	4/1	2/2
8676-1AX ⁷	-	2.8/533 ³	1/2	512KB L2	512MB/8GB	Rack (1U)	1/1 ⁷	H	-	Y	2x10/100/1000	U320 ⁹	2/0	0/293.6GB ¹⁰	24x-10x	4/2	2/2
8676-21X	-	3.06/533 ³	1/2	512KB L2	512MB/8GB	Rack (1U)	1/1	H	-	Y	2x10/100/1000	U320 ⁹	2/0	0/293.6GB ¹⁰	24x-10x	4/2	2/2
8676-22X	-	3.06/533 ³	1/2	512KB L2	512MB/8GB	Rack (1U)	1/1	-	-	Y	2x10/100/1000	IDE	2/0	40GB/240GB ¹¹	24x-10x	4/1	2/2
8676-G1X	-	3.2/533 ⁴	1/2	1MB L3	1GB/8GB	Rack (1U)	1/1	H	-	Y	2x10/100/1000	U320 ⁹	2/0	0/293.6GB ¹⁰	24x-10x	4/2	2/2
8676-G2X	-	3.2/533 ⁴	1/2	1MB L3	1GB/8GB	Rack (1U)	1/1	-	-	Y	2x10/100/1000	IDE	2/0	80GB/240GB ¹¹	24x-10x	4/1	2/2
8830-11X ¹²	-	2.8/533 ³	1/2	512KB L2	512MB/8GB	Rack (1U)	1/1	H	-	Y	2x10/100/1000	U320 ⁹	2/0	0/293.6GB ¹⁰	24x-10x	4/2	2/2
8830-12X ¹²	-	2.8/533 ³	1/2	512KB L2	512MB/8GB	Rack (1U)	1/1	-	-	Y	2x10/100/1000	IDE	2/0	40GB/240GB ¹¹	24x-10x	4/1	2/2
8830-21X ¹²	-	3.06/533 ³	1/2	512KB L2	512MB/8GB	Rack (1U)	1/1	H	-	Y	2x10/100/1000	U320 ⁹	2/0	0/293.6GB ¹⁰	24x-10x	4/2	2/2
8830-22X ¹²	-	3.06/533 ³	1/2	512KB L2	512MB/8GB	Rack (1U)	1/1	-	-	Y	2x10/100/1000	IDE	2/0	40GB/240GB ¹¹	24x-10x	4/1	2/2

- Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
- Intel Xeon processor with advanced transfer L2 cache and 400MHz (quad-pumped) Front-side Bus (FSB). Not compatible with 533MHz FSB models.
- Intel Xeon processor with advanced transfer L2 cache and 533MHz (quad-pumped) FSB. Not compatible with 400MHz FSB models.
- Intel Xeon processor with advanced transfer L2 cache, an additional L3 cache and a 533MHz (quad-pumped) Front Side Bus (FSB).
- Two-way interleaved, high-speed PC2100 266MHz ECC DDR RDIMMs supporting Chipkill technology.
- A single 332w power supply is standard. Redundancy and hot-swap are not supported.
- Includes a -48v to -60v 332w DC power supply designed for telecommunications applications.
- Broadcom 5703 integrated dual gigabit Ethernet controllers.
- The single-channel, Ultra320 integrated controller supports both Ultra160 and Ultra320 HDDs, but the entire SCSI bus will default to the slower rate (MB/second) if HDDs of different technologies are mixed on the same bus. The LSI chipset allows for two HDDs to be allocated for mirroring if a RAID adapter is not used to support the internal HDDs. Mirrored HDDs must match.
- Maximum capacity requires installing two 146.8GB SCSI HDDs. Mixing of Ultra320 and Ultra160 HDDs is supported, but the bus will operate at the speed of the lowest rated HDD.
- Maximum capacity requires removing the standard IDE HDD and installing two 120GB IDE HDDs.
- This model includes a one-year parts and labor warranty rather than the standard three-year warranty.
- Not available from IBM after this date. Business Partner inventory may be available.

xSeries 335 Processors

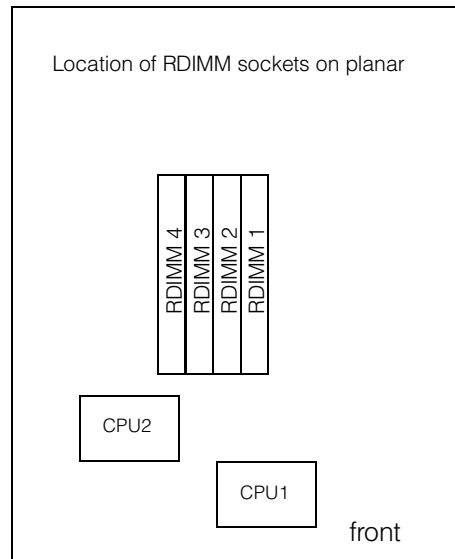
Part Number	Processor Upgrades	SMP Support ¹	Processor Speed Upgrade ²
59P5102	2.4GHz/400MHz-512KB L2 Cache Xeon Processor	6xX	-
02R8957	2.6GHz/400MHz-512KB L2 Cache Xeon Processor	7xX	6xX
02R8958	2.8GHz/400MHz-512KB L2 Cache Xeon Processor	8xX	7xX, 6xX
73P6382	2.8GHz/533MHz-512KB L2 Cache Xeon Processor	1xX	-
02R8959	3.06GHz/533MHz-512KB L2 Cache Xeon Processor	2xX	1xX
13N0661	3.2GHz/533MHz-1MB L3 Cache Xeon Processor	GxX	-

1. One additional processor may be installed, providing a maximum of two. All processors must be identical in type, speed and cache size.
 2. Requires removal of the standard processor. A maximum of two processors may be installed. All processors must be identical in type, speed and cache size. Upgrades may require a BIOS update.

xSeries 335 Memory

Part Number	Memory Description ¹
33L5037	256MB DDR PC2100 ECC RDIMM
33L5038	512MB DDR PC2100 ECC RDIMM
33L5039	1GB DDR PC2100 ECC RDIMM
33L5040	2GB DDR PC2100 ECC RDIMM

1. Due to two-way interleaving, installation of memory options in pairs is required. Standard RDIMMs are installed in sockets one and two. One RDIMM pair is not required to match the other. Provides Error Checking and Correcting (ECC) via 16-bit Checksum Chipkill (corrects 1, 2, 3, or 4-bit errors on the same chip and detects 2- through 8-bit errors contained in two chips).



Total System Memory ¹	Quantity of RDIMMs Added				
	512MB (2 X 256MB) models	256MB (33L5037)	512MB (33L5038)	1GB (33L5039)	2GB (33L5040)
1GB	2	-	-	-	-
1.5GB	-	2	-	-	-
2GB ²	-	-	2	-	-
2.5GB	-	-	2	-	-
3GB ²	-	2	2	-	-
4GB ²	-	-	4	-	-
5GB ²	-	2	-	2	-
6GB ²	-	-	2	2	-
8GB ²	-	-	-	4	-

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Requires removal of standard memory.

xSeries 335 Internal SCSI Cabling

EIDE Configurations

EIDE models include a standard CD-ROM drive attached to one connector of the IDE controller using a single-drop IDE cable and the standard IDE HDD is attached to the other IDE connector using a standard two-drop IDE cable. One additional IDE HDD may be installed in the one available HDD bay, attaching to the second drop of the standard two-drop IDE cable.

SCSI Configurations

xSeries 335 hot-swap SCSI models support two hot-swap SCSI HDDs on a DASD backplane. The backplane is connected to the integrated Ultra320 single-channel controller through a 16-bit nonterminated SCSI cable. Attachment of external SCSI devices require a supported optional SCSI PCI controller. The standard CD-ROM is attached to the IDE connector using a single-drop IDE cable.

RAID configurations are supported by the integrated LSI chipset, which provides onboard mirroring. Optional ServeRAID-4Lx or -4Mx controllers can be installed to support the internal HDDs, in which case the standard cable would be used to attach the backplane to the RAID controller.

For additional information regarding internal cabling, refer to Appendix F: Internal Cabling Overview.

xSeries 335 Hard Disk Drive (HDD)

Total Internal Storage ¹	SCSI Models		
	Quantity of HDDs added to standard configuration		
	36.4GB	73.4GB	146.8GB
0GB ²	-	-	-
18.2GB	-	-	-
36.4GB	1	-	-
72.8GB	2	-	-
73.4GB	-	1	-
146.8GB	-	2	-
293.6GB (max)	-	-	2

This table does not represent all possible HDD configurations. Total internal storage listed is within +/- 0.2GB unless otherwise noted.

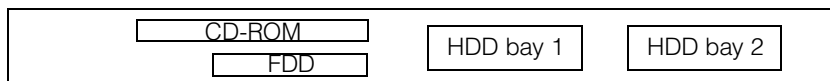
1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.
2. SCSI models ship open-bay.

IDE Models			
Total Internal Storage ¹	Quantity of HDDs added to standard configuration		
	40GB	80GB	120GB
40GB ²	-	-	-
80GB	1	-	-
120GB	-	1	-
160GB	-	-	1
200GB ³	-	1	1
240GB ³	-	-	2

1. Select a total storage row then add the HDDs from all columns to the standard HDD.
2. One 40GB IDE HDD is standard in IDE models.
3. Requires replacing the standard HDD.

Part Number	Description	RPM	Height	Bays Supported	Maximum Quantity
IDE HDD^{1, 2}					
22P7157	40GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	1, 2	2
09N4226	80GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	1, 2	2
09N4231	120GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	1, 2	2
Hot-swap Ultra160 HDDs^{1, 3}					
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-Swap HDD	10000	SL	1, 2	2
06P5756	73.4GB 10Krpm Ultra160 SCSI Hot-Swap HDD	10000	SL	1, 2	2
32P0750	146.8GB 10Krpm Ultra160 SCSI Hot-Swap HDD	10000	SL	1, 2	2
06P5768	36.4GB 15Krpm Ultra160 SCSI Hot-Swap HDD	15000	SL	1, 2	2
Hot-swap Ultra320 HDDs^{1, 3}					
32P0726	36.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	10000	SL	1, 2	2
32P0727	73.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	10000	SL	1, 2	2
32P0728	146.8GB 10Krpm Ultra320 SCSI Hot-swap HDD	10000	SL	1, 2	2
32P0734	36.4GB 15Krpm Ultra320 SCSI Hot-Swap HDD	15000	SL	1, 2	2
32P0735	73.4GB 15Krpm Ultra320 SCSI Hot-Swap HDD	15000	SL	1, 2	2
External USB Drives					
05K9276	USB Portable Diskette Drive	-	-	-	-
33L5151	USB Portable CD-ROM Drive	-	-	-	-
Optical Devices				Bays Supported	
22P7047	8x Max Slimline DVD-ROM Drive ⁴	-	-	A	
External Storage Expansion Units⁵				Form Factor	
35311RU	EXP300 Storage Expansion Unit	-	-	Rack (3U)	
17311RU	EXP400 Storage Expansion Unit	-	-	Rack (3U)	
171010U	FAST EXP100 Storage Expansion Unit	-	-	Rack (3U)	
17401RU	FAST EXP700 Storage Expansion Unit	-	-	Rack (3U)	
35601RU	FAST EXP500 Storage Expansion Unit	-	-	Rack (3U)	
35421RU	FAST200 Storage Server ⁶	-	-	Rack (3U)	
35422RU	FAST200 HA Storage Server	-	-	Rack (3U)	
19K1121	FAST200 Redundant RAID Controller	-	-	-	

1. Mixing of IDE and SCSI hard disk drives is not supported.
2. IDE HDDs are supported only in IDE models.
3. When Ultra320 and Ultra160 HDDs are installed in the same SCSI bus, performance is limited to Ultra160 speeds.
4. Requires removing and replacing the standard optical drive.
5. xSeries 335 does not include an external SCSI connector. To configure a SCSI storage device, select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.
6. Can be upgraded to FAST200 HA Storage Server through the addition of a FAST200 Redundant RAID Controller (P/N 19K1121).



xSeries 335 front view

Bay	Form Factor	Height	Front Access	Usage
1 ¹	HS or 89mm (3.5in) ²	SL	yes ³	open
2	HS or 89mm (3.5in) ²	SL	yes ³	open

1. Boot drive should be located in bay one.
2. x335 supports IDE and hot-swap models.
3. Bays one and two are not front-accessible in IDE models, which include one IDE HDD in bay one.

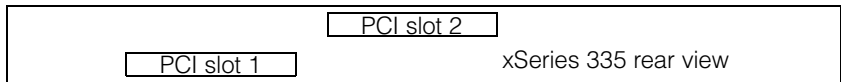
xSeries 335 I/O Options

Part Number	Description	Adapter Length	PCI Support ³	Slots Supported ³	Hot-Plug	PCI Voltage Key	MHz
Storage Controllers^{1, 2}							
02R0988	ServeRAID-6M Controller (256MB Cache) ⁴	Full	64-bit	2	-	3.3	133
32P0033	ServeRAID-6M Controller (128MB Cache) ⁴	Full	64-bit	2	-	3.3	133
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	Half	64-bit	2	-	Universal	66
71P8592	ATA133 RAID Controller	Half	32-bit	1, 2	-	Universal	33
19K4646	PCI Wide Ultra 160 SCSI Adapter ⁵	Half	32-bit	1, 2	-	Universal	33
71P8594	Single Channel Ultra320 SCSI Controller	Half	64-bit	1, 2	-	Universal	133
Internal RAID Cable							
02R2068	Ultra320 Internal Single-drop 24in LVD SCSI Cable ⁴	-	-	-	-	-	-
Fibre Storage Controllers and Options⁵							
00N6881	FASiT Host Adapter	Half	64-bit	1, 2	-	Universal	66
24P0960	FC2-133 Host Bus Adapter	Half	64-bit	1, 2	-	Universal	133
17421RU	FASiT700 Fibre Channel Storage Server	-	-	-	-	-	-
35421RU	FASiT200 Storage Server	-	-	-	-	-	-
35422RU	FASiT200 HA Storage Server	-	-	-	-	-	-
3534F08	TotalStorage SAN Switch F08, 8-port	-	-	-	-	-	-
2109F16	SAN Fibre Channel Switch, 16-Port	-	-	-	-	-	-
Networking⁷							
Ethernet⁸							
06P3601	10/100 Ethernet Server Adapter ⁹	Half	32-bit	1, 2	-	Universal	33
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals ⁹	Half	64-bit	1, 2	-	Universal	133
22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter	Half	64-bit	1, 2	-	Universal	133
31P6301	NetXtreme 1000 T Ethernet Adapter (copper) ⁹	Half	64-bit	1, 2	-	Universal	133
31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper) ⁹	Half	64-bit	1, 2	-	Universal	133
Token Ring							
34L5001	16/4 Token-Ring PCI Management Adapter ⁹	Half	32-bit	1, 2	-	Universal	33



34L5201	High-speed 100/16/4 Token-Ring PCI Management Adapter	Half	32-bit	1, 2	-	Universal	33
Communications¹⁰							
System Management¹¹							
09N7585	Remote Supervisor Adapter ¹²	Half	32-bit	1	-	Universal	33

1. xSeries 335 has a single-channel, Ultra320 integrated controller that supports both Ultra160 and Ultra320 HDDs. The entire SCSI bus will default to the slower rate (MB/second) if HDDs of different technologies are mixed on the same bus. The LSI chipset allows for two HDDs to be allocated for mirroring if a RAID adapter is not installed.
2. If a RAID controller is installed in either slot one or two, the boot media must be attached to it. If two RAID controllers are installed, the boot media must be attached to the controller in slot one. If two non-RAID storage controllers are installed, the BIOS for the integrated storage controller must be disabled, i.e., it cannot support either external or internal storage media.
3. A 64-bit adapter installed into a 32-bit slot will transfer data at 32-bit rates. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot. 33MHz adapters will reduce 66MHz buses to 33MHz. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.
4. Cable option 02R2068 is required in order to fully support U320 SCSI speeds when cabled to internal HDDs.
5. PCI Wide Ultra160 SCSI Adapter (P/N 19K4646) provides a five-drop terminated LVD SCSI cable which is not supported for use in this server.
6. See the Fibre Channel Solutions Overview section for additional configuration information.
7. xSeries 335 includes dual full-duplex copper 10/100/1000Mbps Broadcom 5703 Ethernet controllers.
8. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. Two optional Ethernet adapters are copper and Intel-based (P/N 06P3601, 22P6801). Two adapters are Broadcom-based (22P7801, 31P6301).
9. The Wake on LAN function of this option is supported.
10. xSeries 335 includes four USB ports (two each on both front and rear), a high-speed serial/asynchronous port (NS16550A compatible), one RS-485 port, and in/out C2T Interconnect connectors.
11. xSeries 335 has one integrated RS-485 system management interconnect port located on the back of the system chassis. Connection of the standard service processor to servers other than xSeries 335 in an interconnect network requires a customer-supplied Cat5 Ethernet cable. Connection to other xSeries 335 servers can also be achieved through the C2T Interconnect chaining cables, which transmits both console connectivity and system management functionality.
12. When installed in an xSeries 335, Remote Supervisor Adapter (RSA) shares functionality with the integrated service processor and serves as interface for both. An external Cat5 connection between RSA and the integrated service processor using the dongle (pigtail cable) and short Cat5 cable supplied with RSA is required in addition to connection of the 20-pin ribbon cable to the planar if the server is acting as focal point in a system management interconnect network, which indicates it is the first server in a chain of x335 systems. Connection of the external AC power supply provided with RSA is not required.



Slot 1: Bus 2, 100MHz, 64-bit, 3.3v, half-length, PCI-X
 Slot 2: Bus 1, 100MHz, 64-bit, 3.3v, full-length, PCI-X

xSeries 335 Power, Monitors & Accessories

Part Number	Description
Power¹	
Uninterruptible Power Supply (UPS)²	
32P1020	APC 2U Smart-UPS 1400RMB
2130R30	UPS3000XLV ³
2130R31	UPS3000XHV ³
32P1692	UPS Extend Run Battery Pack ³
37L6861	APC Smart-UPS 5000RMB ⁴
Monitors⁵	
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black ⁶
63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black ⁶
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁷
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard) ⁷
32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁷
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard) ⁷

1. xSeries 335 models include a worldwide, voltage-sensing 332w power supply with auto-restart and two 9ft line cords, one with an IEC 320 C14 connector for attachment to a PDU or high-voltage UPS and one with a 110v NEMA 5-15P connector for attachment to a low-voltage UPS or wall outlet.
2. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
3. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
4. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
5. xSeries 335 includes an integrated ATI Rage XL SVGA controller with 8MB of video memory.
6. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).
7. Includes a 15in Flat Panel Monitor.

Part Number	Description
Rack and NetBAY^{1, 2}	
	Refer to the Rack Cabinets and Options section for information concerning IBM racks and rack-supported devices.
Console Connectivity³	
06P4792	C2T Interconnect Cable Chain Technology Cable Kit ⁴
1735L04	NetBAY Local Console Manager
1735R16	NetBAY Remote Console Manager
32P1637	C2T Conversion Option
09N4290	NetBAY 1x4 Console Switch
09N4291	NetBAY 2x8 Console Switch
Keyboard and Mouse⁵	
28L3644	Space Saver II Keyboard ^{6, 7}
10K3849	106-key Preferred USB Keyboard with 2-port USB Hub (stealth black) ^{8, 9}
28L3673	Sleek 2-button Stealth Black Mouse

1. xSeries 335 is housed in a 19in rack-mountable drawer and requires one of the racks listed in the Rack Cabinets and Options section.
2. Note limitations and restrictions required for adequate cooling in the Rack Cabinets and Options section. If non-IBM racks are to be used, assure that both front and rear doors offer a minimum of 48% open area uniformly distributed and in line with installed servers. A clearance of 51 to 64mm (2 to 2.5in) must be maintained between the front door and the system unit's front bezel. The rear door must maintain the same or greater clearance.
3. Refer to the Rack Console Options section for information regarding console connectivity using these options.
4. A C2T Interconnect Cable Chain Technology Cable Kit (P/N 06P4792) may be used for the attachment of console devices to one or multiple chained xSeries 335s. The kit contains a 2m (6.5ft) breakout cable for attachment to a keyboard, mouse and monitor as well as a 2m (6.5ft) chaining cable for connecting two xSeries 335s together when the standard 260mm (10in) chaining cable is not long enough. A maximum of 42 xSeries 335s are supported in a single chain. No more than one Cable Chain Technology Cable Kit may be used. If the last server in the chain is connected to a console switch rather than directly to a monitor, a console cable (P/N 09N4293 or 94G7447) is required in addition to the cable kit. System management interconnect network functionality is transmitted between x335 systems through the C2T Interconnect cable.
5. xSeries 335 supports rack configurations only and ships without a keyboard or mouse.
6. Installation within a rack requires optional keyboard tray (P/N 28L4707) which stows in ready-to-use position, or NetBAY 1U or 2U Flat Panel Monitor Console Kit (P/N 32P1032, 32P1702). Standard with 1U and 2U NetBAY console kits (P/N 32P1031, 32P1702).
7. Advanced TrackPoint IV features are not available on IBM xSeries systems.
8. Installation within a rack requires optional keyboard tray (P/N 28L4707). This keyboard cannot share a keyboard tray with a flat panel display.
9. USB accessories attach to a single USB-capable server. They are not compatible with the NetBAY console switches.

xSeries 335 Tape Options

Part Number	Tape Drives	Bays Supported ¹	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures ¹
00N7991	20/40 GB DDS/4 4mm Internal Tape Drive	-	16 Ultra2 LVD	89mm (3.5in) HH or 133mm (5.25in) HH	Y ²	-
00N8016	100/200GB LTO Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X
24P2396	100/200GB LTO Half-High Tape Drive ⁵	-	16 Ultra2 LVD	133mm (5.25in) HH	Y ²	-
24P2398	40/80GB Half-High DLTVS Internal SCSI Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) HH	Y ²	-
59P6736	160/320GB SDLT Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X 0034B0X
59P6744	LTO FH Generation-2 Tape Drive Option	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X 0034B0X
59P6746	VXA-2 80/160GB Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) HH	Y ²	0034B0X
Tape Autoloaders						
00N7992	120/240GB DDS/4 Tape Autoloader	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X
360716X	3607 Series 1760GB/3.5TB SDLTpro Tape Autoloader	-	16 Ultra2 LVD	2U Rack	Y	-
360726X	3607 Series 1.6TB/3.2TB LTO Tape Autoloader	-	16 Ultra2 LVD	2U Rack	Y	-
External Tape Enclosures						
0034B0X	NetBAY Tape Enclosure (Rack Mount) ³	-	16 Ultra2 LVD	4U Rack	N	-
3503B1X	Full-High SCSI Tape Enclosure ⁴	-	16 Ultra2 LVD	Desktop or 3U Rack	Y	-



1. xSeries 335 does not support internal tape drives and does not include an external SCSI connector. An external tape library or internal tape drive with a tape enclosure, supported SCSI adapter and appropriate cable must be selected. All tape drives and enclosures are supported by PCI Wide Ultra160 SCSI Adapter (P/N 19K4646) or Single Channel Ultra320 SCSI Controller (P/N 71P8594) which have an external 0.8mm VHDCI connector. Select tape drive, enclosure and supported adapter then use Appendix D: Cables - Storage Units - Controllers to select an appropriate external cable.
2. Termination requires installing the 34in single-drop, terminated LVD SCSI cable provided with the option.
3. NetBAY Tape Enclosure (P/N 0034B0X) is a 4U rack-mounted enclosure that supports four full-high or six half-high tape drives. The backplate includes six 0.8mm VHDCI external connectors for attachment of up to six servers. Internal connection of tape drives requires the single-drop terminated LVD SCSI cable that ships with the tape drive, which also provides termination for the SCSI bus. A single 320w power supply with a low-voltage power cord is standard. An external SCSI storage cable is not provided. Refer to Appendix D: Cables - Storage Units - Controllers to select a supported cable.
4. Black desktop or 3U rack tape enclosure supports a single 133mm (5.25in) full-high LVD tape device including DLT tape drives. Requires a fixed shelf if installed in a rack (allow additional 1U for fixed shelf). Includes a 90w power supply, cooling fan, external terminator, power cord (country-specific), and 2m 68-pin to 0.8mm external cable.
5. This tape drive must be shipped separately as an option and installed at a customer site. Factory or vendor installation prior to shipping is not supported.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes

xSeries 335 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

Web Content Server¹

Part Number	Description	Quantity
8676-11X	xSeries 335 2.8GHz/533MHz-512KB Xeon, 512MB ECC, open hot-swap, 24x (1U rack)	1
73P6382	2.8GHz/533MHz-512KB L2 Cache Upgrade with Xeon Processor	1
33L5037	256MB DDR PC2100 ECC RDIMM	2 ²
32P0734	36.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	2 ³
09N7585	Remote Supervisor Adapter	1
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black	1
28L3644	Space Saver II Keyboard	1
32P1020	APC 2U Smart-UPS 1400RMB	1

1. Rack components are not included.
2. Total memory is 1GB.
3. Total Internal storage is 72.8GB.

Linux Cluster Node¹

Part Number	Description	Quantity
8676-61X	xSeries 335 2.4GHz/512KB Xeon, 512MB ECC, open hot-swap, 24x (1U rack)	1
59P5102	xSeries 2.4GHz 400MHz 512KB L2 Cache Xeon Processor	1
33L5039	1GB DDR PC2100 ECC RDIMM	4 ²
06P5756	73.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	1
09N7585	Remote Supervisor Adapter	1
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black	1
28L3644	Space Saver II Keyboard	1
32P1020	APC 2U Smart-UPS 1400RMB	1

1. Rack components are not included.
2. For a total of 4GB of system memory. Requires removal of the standard pair of RDIMMs.

xSeries 343 (NEBS-compliant)

Part Number
 Processor Speed (GHz)
 Number of Processors (Std/Max)
 L2 ECC Cache (KB)
 Memory (Std/Max)
 Form Factor
 Power Supply Quantity (Std/Max)
 Hot-Swap (Power, Slots, HDD, Fans)
 Redundancy (Optional, Standard)
 System Management Processor
 Onboard Ethernet (Mbps)
 SCSI Controller (Dual, Ultra, RAID)
 Removable Media Bays (Total/Avail)
 Internal HDD Storage (Std/Max)
 CD-ROM (IDE)⁷
 Bays (Total/Avail)
 Slots (Total/Avail)⁸

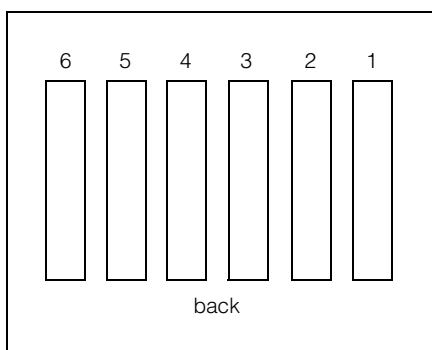
xSeries 343 At-A-Glance																	
8827-14X ^{1, 2}	1.26 ³	2/2	512	2GB/6GB	Rack (2U)	2/2 ⁴	P	S-Power	Y	2 x 10/100	D, U160 ⁵	-	36.4GB/72.8GB ⁶	24x-10x	4/1	6/6	

- This system is Network Equipment Building System (NEBS) Level 3 compliant and includes two 350w, -48v direct current (DC) power supplies requiring a direct current power source (-48v to -60v) for utilization in a telecommunications network infrastructure.
- Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. Requires two-post rack; not supported for installation in standard IBM racks.
- Intel Pentium III processor with 133MHz FSB and 512KB advanced transfer cache.
- Includes two standard 350w, -48v direct current (DC) hot-swap, redundant power supplies.
- Includes an integrated dual-channel Ultra160 SCSI controller supporting both internal and external SCSI attachment.
- One 10,000rpm 36.4GB Ultra160 HDD ships standard with this specific NEBS configuration. Please contact your IBM representative, Business Partner or the IBM Help Center with questions regarding different NEBS configurations. This system does not support hot-swap HDDs.
- Variable read rate. Actual playback speed will vary and is often less than the maximum possible.
- Optional third-party PCI networking adapters are supported on this system. Refer to ServerProven test results for supported third-party options at www.pc.ibm.com/us/compat. Select x343 from the Fast Access pull-down menu, click Go, then select the appropriate categories on the following screen. IBM makes no representations or warranties with respect to non-IBM products. These products are offered and warranted by third parties, not IBM.

xSeries 343 Memory

Part Number	Memory Description ¹
33L3324	512MB PC133 ECC SDRAM RDIMM
33L3326	1GB PC133 ECC SDRAM RDIMM

1. Due to two-way interleaving, installation of memory options in pairs beginning with sockets one and four is required. Add memory options in sockets two and five, then three and six.



Total System Memory ¹	Quantity of RDIMMs Added ²	
	512MB (33L3324)	1GB (33L3326)
2GB (2 x 1GB) Standard		
3GB	2	-
4GB	4	-
5GB	2	2
6GB	-	4

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs. RDIMMs must be added in pairs to support interleaving technology.

- Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
- Add options from both columns in each row to the standard memory.

IBM xSeries 343 (NEBS-compliant)



xSeries 343 Internal SCSI Cabling

The xSeries 343 contains four drive bays. The top bay on the left contains the standard CD-ROM drive and the bay beneath contains the standard 1.44MB, 3.5in slim-line diskette drive. Two 3.5in slim-line bays are located side-by-side, one beneath the CD-ROM and FDD at the bottom of the chassis and the other directly beside it on the right side of the server.

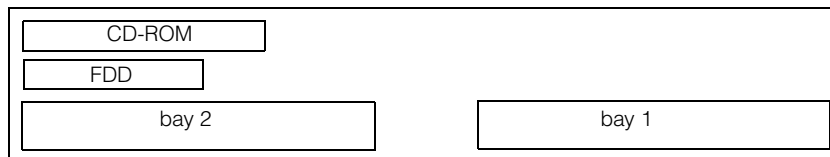
One bay contains the standard 10,000rpm, Ultra160 SCSI nonhot-swap HDD and the other is unpopulated. The 24x-10x IDE CD-ROM is connected to the IDE port. HDDs installed in the drive bays are connected to the internal connector of the integrated Ultra160 SCSI controller through a two-drop, 16-bit LVD SCSI cable. The xSeries 343 contains an external 0.8mm VHDCI connector to attach supported external SCSI devices to the second channel of the integrated SCSI controller.

For additional information regarding internal cabling, refer to Appendix F: Internal Cabling Overview.

xSeries 343 Hard Disk Drive (HDD) Storage

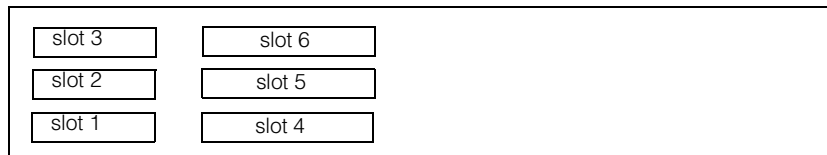
Bay	Form Factor	Height	Front Access	Usage	Part Number	Description	RPM	Height	Bays Supported	Max Qty
-	133mm (5.25in)	-	yes	IDE CD-ROM	Ultra160 Hard Disk Drives (HDD)					
-	89mm (3.5in)	-	yes	Diskette						
1	89mm (3.5in)	SL	No	std HDD	1. xSeries 343 ships with a 36.4GB 10,000rpm nonhot-swap HDD installed in bay one.					
2	89mm (3.5in)	SL	No	open						

front of chassis



xSeries 343 I/O Options

rear of chassis



- slot 1: bus 1, low profile, 64-bit, 66MHz, 3.3v, half-length
- slot 2: bus 1, low profile, 64-bit, 66MHz, 3.3v, half-length
- slot 3: bus 1, low profile, 64-bit, 66MHz, 3.3v, half-length
- slot 4: bus 2, full-size, 64-bit, 33MHz, 5v, full-length
- slot 5: bus 2, full-size, 64-bit, 33MHz, 5v, full-length
- slot 6: bus 2, full-size, 64-bit, 33MHz, 5v, full-length

Note: Optional third-party PCI networking adapters are supported on this system. Refer to ServerProven test results for supported third-party options at www.pc.ibm.com/us/compat. Select x343 from the Fast Access pull-down menu, click Go, then select the appropriate categories on the following screen. IBM makes no representations or warranties with respect to non-IBM products. These products are offered and warranted by third parties, not IBM.

xSeries 343 Power, Monitors & Accessories

Part Number	Description
Power¹	
Monitors²	
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black ³

1. xSeries 343 systems include two 350w, -48v direct current (DC) power supplies requiring a direct current power source (-48v to -60v). Power cord is customer-supplied.
2. xSeries 343 uses an ATA Rage XL SVGA controller with 8MB of video memory.
3. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).

Part Number	Description
Rack and NetBAY¹	
Keyboard and Mouse²	
28L3644	Space Saver II Keyboard ³
28L3673	Sleek 2-button Stealth Black Mouse

1. xSeries 343 is housed in a 19in rack-mountable drawer and requires a two-post rack. Not supported for installation in standard IBM racks.
2. xSeries 343 supports rack configurations only and ships without a mouse or keyboard.
3. Installation within a rack requires optional keyboard tray (P/N 28L4707), which stows in ready-to-use position.



xSeries 345

Part Number¹ Withdrawal Date¹¹ Processor/FSB Speed (GHz/MHz) Number of Processors (Std/Max)
 Cache Memory (Std/Max)⁵ Form Factor Power Supply Quantity (Std/Max) Hot-Swap (Power, Slots, HDD, Fans) Redundancy (Optional, Standard)⁶ System Management Processor Onboard Ethernet (Mbps) Storage Controller⁷ Removable Media Bays (Total/Avail)⁸ Internal HDD Storage (Total/Avail)⁸ CD-ROM (IDE) Bays (Total/Avail)⁹ Slots (Total/Avail)¹⁰

xSeries 345 At-A-Glance

8670-31X	30-Dec	2.4/400 ²	1/2	512KB L2	512MB/8GB	Rack (2U)	1/2	P, H, F	O - Power, O - Fans	Y	2 x 10/100/1000	Dual, U320	2/0	0/880.8GB	24x-10x	8/6	5/5
8670-51X	-	2.67/533 ³	1/2	512KB L2	512MB/8GB	Rack (2U)	1/2	P, H, F	O - Power, O - Fans	Y	2 x 10/100/1000	Dual, U320	2/0	0/880.8GB	24x-10x	8/6	5/5
8670-61X	-	2.8/533 ³	1/2	512KB L2	512MB/8GB	Rack (2U)	1/2	P, H, F	O - Power, O - Fans	Y	2 x 10/100/1000	Dual, U320	2/0	0/880.8GB	24x-10x	8/6	5/5
8670-71X	-	3.06/533 ³	1/2	512KB L2	512MB/8GB	Rack (2U)	1/2	P, H, F	O - Power, S - Fans	Y	2 x 10/100/1000	Dual, U320	2/0	0/880.8GB	24x-10x	8/6	5/5
8670-91X	-	3.06/533 ⁴	1/2	1MB L3	512MB/8GB	Rack (2U)	1/2	P, H, F	O - Power, S - Fans	Y	2 x 10/100/1000	Dual, U320	2/0	0/880.8GB	24x-10x	8/6	5/5
8670-G1X	-	3.2/533 ⁴	1/2	1MB L3	512MB/8GB	Rack (2U)	1/2	P, H, F	O - Power, S - Fans	Y	2 x 10/100/1000	Dual, U320	2/0	0/880.8GB	24x-10x	8/6	5/5

- Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
- Intel Xeon processor with advanced transfer L2 cache and a 400MHz (quad-pumped) Front Side Bus (FSB).
- Intel Xeon processor with advanced transfer L2 cache and a 533MHz (quad-pumped) Front Side Bus (FSB).
- Intel Xeon processor with advanced transfer L2 cache, an additional L3 cache and a 533MHz (quad-pumped) Front Side Bus (FSB).
- High-speed, two-way interleaved 133MHz DDR PC2100 RDIMM. Maximum amount comprises of four 2GB RDIMMs, which requires replacing the standard RDIMMs. Usage of the 2GB DIMM requires redundant power and cooling.
- Both power supply and cooling redundancy for 2.xx CPU models require installation of the 350w hot-swap redundant power option (P/N 59P4057), which also includes three hot-swap fans. Power redundancy for 3.xx CPU models require the installation of the 514w hot-swap power option (P/N 74P4965). Redundant cooling is standard on the 3.xx CPU models.
- The dual-channel, Ultra320 integrated controller supports both Ultra160 and Ultra320 HDDs, but the entire SCSI bus will default to the slower rate (MB/second) if HDDs of different technologies are mixed on the same bus. The LSI chipset allows for two HDDs to be allocated for mirroring if a RAID adapter is not installed. One additional HDD may be designated as a hot-spare for HDDs configured in the onboard mirror. Mirrored and hot-spare HDDs must be matched.
- xSeries 345 includes two slim-line media bays populated by a standard slim-line CD-ROM and a floppy disk drive.
- Total capacity includes installation of six 146.8GB slim-line (SL) hot-swap HDDs.
- Three slots are horizontal full-size slots (two full-length and one half-length) and two are vertical low-profile slots that are both full-length (see I/O Options section).
- Not available from IBM after this date. Business Partner inventory may be available.

xSeries 345 Processors

Part Number	Processor Upgrades	SMP Support ¹
37L3533	2.4GHz/400MHz-512KB L2 Cache Xeon Processor	31X
71P8966	2.67GHz/533MHz-512KB L2 Cache Xeon Processor	51X
71P8967	2.8GHz/533MHz-512KB L2 Cache Xeon Processor	61X
02R1988	3.06GHz/533MHz-512KB L2 Cache Xeon Processor	71X
88P9677	3.06GHz/533MHz-1MB L3 Cache Xeon Processor	91X
24K4523	3.2GHz/533MHz-1MB L3 Cache Xeon Processor	G1X

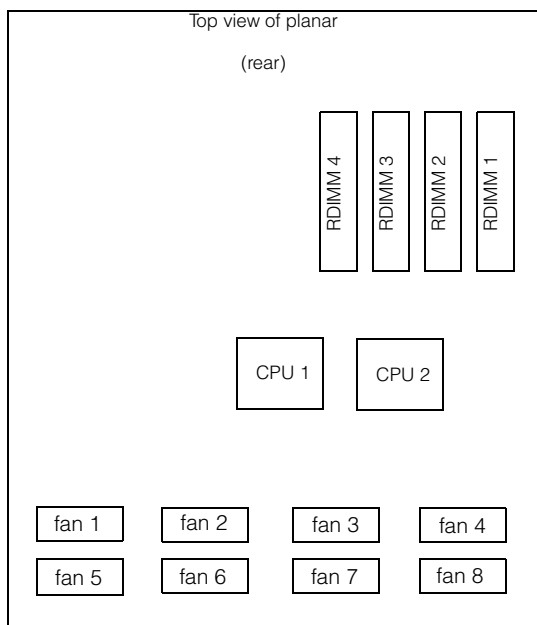
- One additional processor may be installed, providing a maximum of two. All processors must be identical in type, speed, and cache size.

xSeries 345 Memory

Part Number	Memory Description ¹
33L5037	256MB DDR PC2100 ECC RDIMM
33L5038	512MB DDR PC2100 ECC RDIMM
33L5039	1GB DDR PC2100 ECC RDIMM
33L5040	2GB DDR PC2100 ECC RDIMM ²

1. Due to two-way interleaving, installation of memory options in matched pairs is required. Install first two RDIMMs in sockets one and two and the second set in sockets three and four (refer to planar diagram).

2. Usage of the 2GB DIMM requires redundant power and cooling. Redundant power and redundant cooling for 2.xx CPU models require installation of the 350w hot-swap redundant power option (P/N 59P4057), which includes three hot-swap fans. Power redundancy for 3.xx CPU models require installation of the 514w hot-swap power option (P/N 74P4965). Redundant cooling is standard on the 3.xx CPU models.



Total System Memory ¹	Quantity of RDIMMs Added			
	256MB DIMM	512MB DIMM	1GB DIMM	2GB DIMM
512MB Models (2 x 256MB)				
1GB	2	-	-	-
1.5GB	-	2	-	-
2.5GB	-	-	2	-
3GB ²	-	2	2	-
4GB ²	-	-	4	-
5GB ²	-	2	-	2
6GB ²	-	-	2	2
8GB ²	-	-	-	4

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Requires replacing the standard RDIMMs.

xSeries 345 Internal SCSI Cabling

The xSeries 345 includes eight front-accessible bays. The top right slim-line bay contains a slim-line 3.5in diskette drive and the top left slim-line bay contains a slim-line CD-ROM. Six slim-line, hot-swap HDD bays are located in the center of the front of the chassis.

The system contains a DASD backplane supporting six hot-swap, SCA-2-compliant HDD bays. The backplane is connected to one of the connectors of the integrated Ultra320 SCSI controller through a 16-bit (nonterminated) LVD SCSI cable. In RAID configurations using ServeRAID-5i, no cable is required and both channels of the integrated controller are managed by ServeRAID-5i. Internal RAID configurations using ServeRAID-4Mx or -4Lx require optional 30in nonterminated Single-drop Internal LVD Ultra160 SCSI Cable (P/N 71P8995).

External SCSI device attachment is facilitated by a dedicated 0.8mm VHDCI port on the rear of the system chassis, which is connected to the second channel of the integrated controller. If ServeRAID-5i is installed, supported tape drives that can be installed in an external tape enclosure are limited (see Tape Options section). External tape enclosures are also supported by installing PCI Wide Ultra160 SCSI Adapter (P/N 19K4646).

The 24x-10x CD-ROM is connected to the IDE port through an interposer card.

For additional information regarding internal cabling, refer to Appendix F: Internal Cabling Overview.



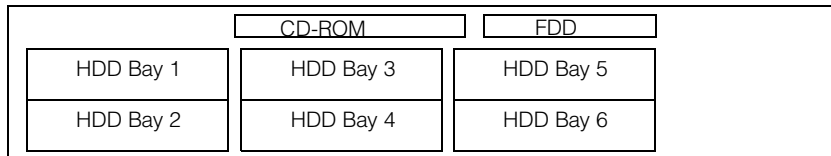
xSeries 345 Hard Disk Drive (HDD) Storage

Total Internal Storage ¹	Quantity of HDDs added to standard configuration		
	36.4GB	73.4GB	146.8GB
0GB ²			
18.2GB	-	-	-
36.4GB	1	-	-
54.6GB	-	-	-
72.8GB	2	-	-
91GB	-	-	-
109.2GB	3	-	-
145.6GB	4	-	-
182GB	5	-	-
218.4GB	6	-	-
220.2GB	-	3	-
293.6GB	-	4	2
367GB	-	5	-
440.4GB	-	6	3
587.2GB	-	-	4
734GB	-	-	5
880.8GB	-	-	6

This table does not represent all possible HDD configurations. Total internal storage listed is within +/-0.2GB unless otherwise noted.

1. Select a total storage row then select the quantity of HDDs from a column corresponding to the preferred HDD.
2. All models ship open-bay.

Bay	Form Factor	Height	Front Access	Usage
A	133mm (5.25in)	SL	Yes	CD-ROM
B	89mm (3.5in)	SL	Yes	FDD
1 ... 6	89mm (3.5in)	SL	Yes	Open

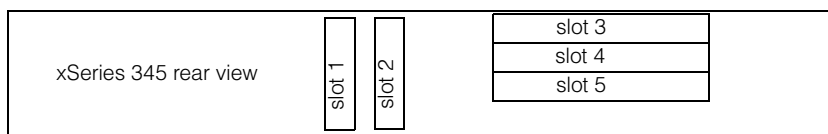


xSeries 345 front view

Part Number	Description	RPM	Height	Bays Supported	Maximum Quantity ⁵
Hot-swap Ultra160 HDDs¹					
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap HDD	10000	SL	1 ... 6	6
06P5756	73.4GB 10Krpm Ultra160 SCSI Hot-swap HDD	10000	SL	1 ... 6	6
32P0750	146.8GB 10Krpm Ultra160 SCSI Hot-swap HDD	10000	SL	1 ... 6	6
06P5768	36.4GB 15Krpm Ultra160 SCSI Hot-swap HDD	15000	SL	1 ... 6	6
Hot-swap Ultra320 HDDs¹					
32P0726	36.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	10000	SL	1 ... 6	6
32P0727	73.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	10000	SL	1 ... 6	6
32P0728	146.8GB 10Krpm Ultra320 SCSI Hot-swap HDD	10000	SL	1 ... 6	6
32P0734	36.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	15000	SL	1 ... 6	6
32P0735	73.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	15000	SL	1 ... 6	6
Optical Devices		Bays Supported			
22P7047	8x Max Slimline DVD-ROM Drive ²	A			
External Storage Expansion Units³		Form Factor			
35311RU	EXP300 Storage Expansion Unit	Rack (3U)			
17331RU	EXP400 Storage Expansion Unit	Rack (3U)			
17401RU	FAStT EXP700 Storage Expansion Unit	Rack (3U)			
172260U	FAStT600 Storage Server (US line cord, English pubs)	Rack (3U)			
35601RU	FAStT EXP500 Storage Expansion Unit	Rack (3U)			
35421RU	FAStT200 Storage Server ⁴	Rack (3U)			
35422RU	FAStT200 HA Storage Server	Rack (3U)			
19K1121	FAStT200 Redundant RAID Controller	-			

1. Mixing of Ultra160 and Ultra320 HDDs is supported, however, the entire bus will operate as Ultra160.
2. Requires removing and replacing the standard optical device.
3. To configure a SCSI storage device, select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.
4. Can be upgraded to FAStT200 HA Storage Server through the addition of a FAStT200 Redundant RAID Controller (P/N 19K1121).
5. When integrated mirroring is enabled, the maximum quantity of HDDs supported is three (two mirrored and one hot-spare).

xSeries 345 I/O Options



- Slot 1: Bus A, 64-bit, 100MHz, 3.3v, PCI-X, low-profile, full-length
- Slot 2: Bus A, 64-bit, 100MHz, 3.3v, PCI-X, low-profile, full-length extended (supports ServeRAID-5i)
- Slot 3: Bus B, 64-bit, 133MHz, 3.3v, PCI-X, full-length, installs horizontally on riser card
- Slot 4: Bus B, 64-bit, 133MHz, 3.3v, PCI-X, full-length, installs horizontally on riser card
- Slot 5: Bus C, 32-bit, 33MHz, 5v, half-length, installs horizontally on riser card



Part Number	Description	Adapter Length	PCI Support ¹	Slots Supported ^{1, 15}	Hot-Plug ²	PCI Voltage	MHz
Storage Controllers³							
02R0988	ServeRAID-6M Controller (256MB Cache)	Full	64-bit	3, 4	-	3.3	133
32P0033	ServeRAID-6M Controller (128MB Cache)	Full	64-bit	3, 4	-	3.3	133
71P8595	ServeRAID-6i Controller	Full	64-bit	2	-	3.3	133
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller ⁴	Half	64-bit	3, 4	-	Universal	66
19K4646	PCI Wide Ultra160 SCSI Adapter	Half	32-bit	1 ... 4	-	Universal	33
71P8594	Single Channel Ultra320 SCSI Controller	Half	64-bit	1 ... 4	-	Universal	133
25P3492	ServeRAID-5i Controller	Full	64-bit	2	-	Universal	66
Internal RAID Cable							
02R2068	Ultra320 Internal Single-drop 24in LVD SCSI Cable ⁴	-	-	-	-	-	-
Fibre Storage Controllers and Options⁵							
00N6881	FAST Host Adapter	Half	64-bit	3, 4	-	Universal	66
24P0960	FC2-133 Host Bus Adapter ⁶	Half	64-bit	1 ... 4	-	Universal	133
174290U	FAST900 Storage Server (US line cord)	-	-	-	-	-	-
17421RU	FAST700 Fibre Channel Storage Server	-	-	-	-	-	-
172260U	FAST600 Storage Server (US line cord, English pubs)	-	-	-	-	-	-
35421RU	FAST200 Storage Server	-	-	-	-	-	-
35422RU	FAST200 HA Storage Server	-	-	-	-	-	-
3534F08	TotalStorage SAN Switch F08, 8-port	-	-	-	-	-	-
2109F16	SAN Fibre Channel Switch, 16-Port	-	-	-	-	-	-
Networking⁷							
Ethernet⁸							
06P3601	10/100 Ethernet Server Adapter ⁹	Half	32-bit	3, 4	-	Universal	33
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals ⁹	Half	64-bit	3, 4	-	Universal	133
22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter ⁶	Half	64-bit	1 ... 4	-	Universal	133
31P6301	NetXtreme 1000 T Ethernet Adapter (copper) ^{6, 9}	Half	64-bit	1 ... 4	-	Universal	133
31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper) ^{6, 9}	Half	64-bit	1 ... 4	-	Universal	133
Token Ring							
34L5201	High-speed 100/16/4 Token-ring PCI Management Adapter	Half	32-bit	3, 4	-	Universal	33
34L5001	16/4 Token-ring PCI Management Adapter ⁹	Half	32-bit	3, 4	-	Universal	33
07P2701	16/4 Token-ring Low Profile PCI Management Adapter ⁹	Half	32-bit	1, 2	-	Universal	33
Communications¹⁰							
19K4162	V.90 PCI Data/Fax WinModem (Low Profile Enabled) ^{6, 11, 12}	Half	32-bit	1 ... 4	-	Universal	33
33L4618	V.90 PCI Data/Fax Modem ¹¹	Half	32-bit	5	-	5	33
System Management							
09N7585	Remote Supervisor Adapter ¹³	Half	32-bit	5	-	Universal	33
59P2984	Remote Supervisor Adapter II ¹⁴	Half	32-bit	5	-	Universal	33

1. A 64-bit adapter installed into a 32-bit slot will transfer data at 32-bit rates. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot. 33MHz adapters will reduce 66MHz buses to 33MHz. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.

2. This system does not support hot-plug PCI.

3. xSeries 345 includes a dual-channel Ultra320 SCSI controller. Channel A is connected to the hot-swap backplane and channel B to an external 0.8mm VHDCI connector.

4. Cable option 02R2068 is required when connecting internal HDDs to ServeRAID-6M and ServeRAID-4Lx.

5. See Fibre Channel Solutions Overview section for additional configuration information.

6. The option includes brackets for installation in both low-profile and full-size PCI slots.

7. xSeries 345 includes dual integrated copper Intel 10/100/1000Mbps Ethernet controllers, which support Wake on LAN.

8. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. Two optional adapters are copper and Intel-based (P/N 06P3601, 22P6801). Two adapters are Broadcom-based (P/N 22P7801, 31P6301).

9. The Wake on LAN (WoL) function provided by this Ethernet PCI adapter is supported in this system.

10. xSeries 345 provides three USB ports (two on the rear of the chassis and one on the front), one serial port and two RS-485 ports for system management.

11. Due to homologation variances, modem availability may differ by country. 19K4162 is supported only by Windows operating systems.

12. Optional modem 19K4162 has been withdrawn from marketing in North America (effective 08/26/03).

13. When installed in xSeries345, Remote Supervisor Adapter (RSA) shares functionality with the integrated service processor and serves as interface for both. RSA provides full system management functionality through a customer-supplied Ethernet cable or modem connection or as part of an interconnected system management bus (option includes all interconnect hardware). An external Cat5 connection between RSA and the integrated service processor using the pigtail cable and short Cat5 cable supplied with RSA is not required. The 20-pin ribbon cable connecting RSA to the planar meets all powering and signaling requirements. Connection of the external AC power supply provided with RSA is not required.

14. Remote Supervisor Adapter II (P/N 59P2984) includes an internal 20-pin ribbon cable for connection to the system planar, an interconnect cable, a 56w AC power adapter, an intrack power cable and a country-specific wall power cord. External connectors include an RS230 (9-pin) serial port, 10/100 base T Ethernet port (RJ-45), interconnect port (RJ-11) and power connector. The interconnect cable includes a single RJ-11 connector and dual RJ-48 ports. Supports an interconnect network of up to 24 RSAs or ISMPs with aggregate cable connection length of 300ft (91.4m) or less. No more than 12 ASMPs are supported in an interconnect network. RJ-45 bus is self-terminating, i.e., terminators are not required for the interconnect bus.

15. Model 31X with 400MHz FSB supports most full-size, half-length, universal-keyed PCI adapters also in slot five.

xSeries 345 Power, Monitors & Accessories

Part Number	Description
Power¹	
59P4057	350w Hot-swap Redundant Power Supply Upgrade ²
74P4965	514w Hot-swap Redundant Power Supply Upgrade (US) ³
74P4955	514w Hot-swap Redundant Power Supply Upgrade (International) ³
Uninterruptible Power Supply (UPS)⁴	
32P1020	APC 2U Smart-UPS 1400RMB
2130R30	UPS3000XLV ⁵
2130R31	UPS3000XHV ⁵
32P1692	UPS Extend Run Battery Pack ⁵
37L6861	APC Smart-UPS 5000RMB ⁶
Monitors⁷	
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black ⁸
63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black ⁸
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁹
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard) ⁹
32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁹
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard) ⁹

1. xSeries 345 ships with a single worldwide, voltage-sensing hot-swap power supply, a 9ft line cord and a 9ft rack power cable (IEC 320-C13 to IEC 320-C14). N+N power supply redundancy requires installation of a matching optional power supply upgrade.
2. The 350w Hot-swap Power Supply Upgrade option is available for 2.xx CPU models. This option includes a power supply, three hot-swap fans that provide redundant cooling, and one 9ft rack power cable. If a NEMA low voltage connection is required, use optional 14ft NEMA 5-15P power cord (P/N 94G6667).
3. The 514w Hot-swap Redundant Power Supply Upgrade Option is available for 3.xx CPU models and includes a power supply, a 9ft rack power cable and a 9ft line cord. Redundant cooling is standard on the 3.xx CPU models
4. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
5. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
6. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
7. xSeries 345 uses an integrated ATI Rage XL video controller with 8MB of memory.
8. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).
9. Includes a 15in Flat Panel Monitor.

Part Number	Description
Rack and NetBAY¹	
	Refer to the Rack Cabinets and Options section for information concerning IBM racks and rack-supported devices.
Console Connectivity²	
1735L04	NetBAY Local Console Manager
1735R16	NetBAY Remote Console Manager
32P1636	250mm KVM Conversion Option
32P1652	1.5m KVM Conversion Option
09N4290	NetBAY 1x4 Console Switch
09N4291	NetBAY 2x8 Console Switch
Keyboard and Mouse³	
28L3644	Space Saver II Keyboard ^{4, 6}
10K3849	106-key Preferred USB Keyboard with 2-port USB Hub (stealth black) ^{5, 7}
28L3673	Sleek 2-Button Stealth Black Mouse

1. xSeries 345 is housed in a 19in rack-mountable drawer and requires one of the racks listed in the Rack Cabinets and Options section. If installed in older IBM racks, the server should not be installed behind a glass door that blocks air flow. Remove the glass door or replace with an optional perforated door. To order a rack extension kit for withdrawn IBM racks, visit the Options Continuation Program Website at www.pc.ibm.com/ww/ocp.
2. Refer to the Rack Console Options section for information regarding console connectivity using these options.
3. xSeries 345 supports rack configurations only and ships without a mouse or keyboard.
4. Installation within a rack requires optional keyboard tray (P/N 28L4707) which stows in ready-to-use position, or NetBAY 1U or 2U Flat Panel Monitor Console Kit (P/N 32P1032, 32P1702). Standard with 1U and 2U NetBAY console kits (P/N 32P1031, 32P1702).
5. Installation within a rack requires optional keyboard tray (P/N 28L4707). This keyboard cannot share a keyboard tray with a flat panel display.
6. Advanced TrackPoint IV features are not available on IBM xSeries systems.
7. USB accessories attach to a single USB-capable server. They are not compatible with the NetBAY console switches.



xSeries 345 Tape Options

Part Number	Tape Drives	Bays Supported	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures
00N7991	20/40GB DDS/4 4mm Internal Tape Drive ¹	-	16 Ultra2 LVD	89mm (3.5in) HH or 133mm (5.25in) HH	Y ²	3510020 ³ 0034B0X
00N8016	100/200GB LTO Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X 0034B0X
24P2396	100/200GB LTO Half-High Tape Drive ^{1, 8, 9}	-	16 Ultra2 LVD	133mm (5.25in) HH	Y ²	3510020 ³ 0034B0X
24P2398	40/80GB Half-High DLTVS Internal SCSI Tape Drive ^{1, 9}	-	16 Ultra2 LVD	133mm (5.25in) HH	Y ²	3510020 ³ 0034B0X
59P6736	160/320GB SDLT Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X 0034B0X
59P6744	LTO FH Generation-2 Tape Drive Option	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X 0034B0X
59P6746	VXA-2 80/160GB Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) HH	Y ²	3510020 ³ 0034B0X
Tape Autoloaders						
00N7992	120/240GB DDS/4 Tape Autoloader	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X 0034B0X
360716X	3607 Series 1760GB/3.5TB SDLTpro Tape Autoloader	-	16 Ultra2 LVD	2U Rack	Y	-
360726X	3607 Series 1.6TB/3.2TB LTO Tape Autoloader	-	16 Ultra2 LVD	2U Rack	Y	-
External Tape Enclosures						
0034B0X	NetBAY Tape Enclosure (Rack Mount) ⁴	-	16 Ultra2 LVD	4U Rack	N	-
3510020	External Half-High SCSI Storage Enclosure ⁵	-	16 LVD	Desktop	N	-
3503B1X	Full-High SCSI Tape Enclosure ⁶	-	16 Ultra2 LVD	Desktop or 3U Rack	Y	-
External Tape Libraries⁷						
4560SLX	SDLT/LTO Modular Tape Library	-	16 Ultra2 LVD	5U Rack	Y	-
Associated Options						
00N7956	68-pin External Multimode LVD/SE SCSI Terminator	-	16 LVD/SE	Ext	Y	3510020

Note: ServeRAID-5i supports the HH tape drives in an external tape enclosure connected to the second channel of the integrated controller through the external 0.8mm VHDCI SCSI connector if the bus is designated to operate as SCSI during RAID set-up and Windows 2000 is installed. Optional PCI Wide Ultra160 SCSI Adapter (P/N 19K4646) or Single Channel Ultra320 SCSI Controller (P/N 71P8594) also support external tape enclosures.

- Supported by ServeRAID-5i when installed in an external tape enclosure when connected to the second channel of the integrated controller through the external 0.8mm VHDCI SCSI port. The bus must be designated as SCSI during set-up and Microsoft Windows 2000 must be installed.
- Termination requires installing the 34in single-drop, terminated LVD SCSI cable provided with the option.
- Requires 68-pin External Multimode LVD/SE SCSI terminator (P/N 00N7956).
- NetBAY Tape Enclosure (P/N 0034B0X) is a 4U rack-mounted enclosure that supports four full-high or six half-high tape drives. The backplate includes six 0.8mm VHDCI external connectors for attachment of up to six servers. Internal connection of tape drives requires the single-drop terminated LVD SCSI cable that ships with the tape drive, which also provides termination for the SCSI bus. A single 320w power supply with a low-voltage power cord is standard. An external SCSI storage cable is not provided. Refer to Appendix D: Cables - Storage Units - Controllers to select a supported cable.
- Black desktop tape enclosure that supports a single 133mm (5.25in) half-high (HH) tape drive. Internal and external connectors are 68-pin high-density supporting LVD. Requires 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956). External cables are not included. Refer to Appendix D: Cables - Storage Units - Controllers to select a supported cable.
- Black desktop or 3U rack tape enclosure supports a single 133mm (5.25in) full-high LVD tape device including DLT tape drives. Requires a fixed shelf if installed in a rack (allow additional 1U for fixed shelf). Includes a 90w power supply, cooling fan, external terminator, power cord (country-specific), and 2m 68-pin to 0.8mm external cable.
- Tape library attributes and prerequisites are located in Appendix B: Tape Library Attributes.
- This tape drive must be shipped separately as an option and installed at a customer site. Factory or vendor installation prior to shipping is not supported.
- Supported only in new builds of External Half-High SCSI Storage Enclosure (P/N 3510020), indicated by AI Header J1PJK on the outside box label of the tape enclosure.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

xSeries 345 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

eCommerce Server

Part Number	Description	Quantity
8670-61X	xSeries 345 2.8GHz/533MHz-512KB Xeon, 512MB ECC, open hot-swap, 24X (2U rack)	1
71P8967	Upgrade Xeon Processor 2.8BGHz/533MHz-512KB L2 Cache	1
33L5039	1GB DDR PC2100 ECC RDIMM	2 ¹
25P3492	ServeRAID-5i Controller	1
32P0734	36.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	6 ²
59P4057	350w Hot-swap Power Supply Upgrade	1
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard)	1
9306250	NetBAY25 Standard Rack Cabinet	1
94G6670	Blank Filler Panel Kit	1
32P1020	APC 2U Smart-UPS 1400RMB	1

1. For a total of 2.5GB of system memory.
2. Six HDDs are used for RAID 5 protection. Effective capacity is five HDDs or 182GB.

Collaboration/Messaging Server

Part Number	Description	Quantity
8670-31X	xSeries 345 2.4GHz/400MHz-512KB Xeon, 512MB ECC, open hot-swap, 24x (2U rack)	1
37L3533	2.4GHz/400MHz-512KB L2 Cache Upgrade Option with Xeon Processor	1
33L5037	256MB DDR PC2100 ECC RDIMM	2 ¹
25P3492	ServeRAID-5i Controller	1
32P0734	36.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	4 ²
59P4057	350w Hot-swap Power Supply Upgrade	1
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard)	1
9306250	NetBAY25 Standard Rack Cabinet	1
94G6670	Blank Filler Panel Kit	1
32P1020	APC 2U Smart-UPS 1400RMB	1

1. For a total of 1GB of system memory.
2. Four HDDs are used for RAID 5 protection. Effective capacity is three HDDs or 109.2GB.



xSeries 360

Part Number 1,2
 Processor Speed (GHz)³
 Number of Processors (Std/Max)
 L3 ECC Cache
 Memory (Std/Max)⁴
 Form Factor
 Power Supply Quantity (Std/Max)
 Hot-Swap (Power, Slots, HDD, Fans)
 Redundancy (Optional, Standby)⁵
 Adv System Management Adapter⁶
 Onboard Ethernet (Mbps)
 SCSI Controller (Dual, Ultra, RAID)
 Removable Media Bays (Total/Avail)
 Internal HDD Storage (Std/Max)
 CD-ROM (IDE)
 Bays (Total/Avail)
 Slots (Total/Avail)⁷

xSeries 360 At-A-Glance

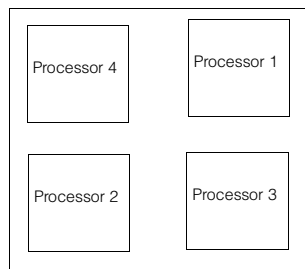
8686-1RQ	2	1/4	1MB	1GB/16GB	Rack (3U)	1/3	P, S, H, F	S - Power, S - Fans	Y	10/100	U160	-	0/220.2GB	24x-10x	5/3	6/6
8686-2RQ	2.5	2/4	1MB	2GB/16GB	Rack (3U)	2/3	P, S, H, F	S - Power, S - Fans	Y	10/100	U160	-	0/220.2GB	24x-10x	5/3	6/6
8686-3RQ	2.8	2/4	2MB	2GB/16GB	Rack (3U)	2/3	P, S, H, F	S - Power, S - Fans	Y	10/100	U160	-	0/220.2GB	24x-10x	5/3	6/6

- Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
- This xSeries 360 model supports the IXA Adapter (P/N 1519100) for connection to iSeries models for Microsoft Windows 2000 Server and Advanced Server. The adapter must be installed in PCI slot three only.
- Intel Xeon MP processor with integrated full-speed ECC L3 cache and 4x100MHz (quad-pumped) access to memory and I/O buses. Processors in models 7 ... 9X are not compatible with processors in models 1 ... 3RQ.
- Advanced Chipkill ECC memory corrects two-, three-, and four-bit memory errors. Maximum amount is based on eight 2GB RDIMMs. Installation of 2GB RDIMMs requires BIOS and diagnostic firmware version 1.08 or later. When more than 8GB of memory is installed, the integrated SCSI controller must be disabled.
- N+1 power supply redundancy is provided standard in models with two power supplies and is optional in models with one power supply. One optional 370w Hot-swap Redundant Power Supply (P/N 31P6108) is available for maximum configurations in models shipping with two power supplies or up to two optional power supplies can be added to models shipping with a single power supply. See "Power" under xSeries 360 Power Monitor & Accessories for additional information.
- Advanced system management is provided by a standard Remote Supervisor Adapter installed in a dedicated PCI slot, which allows six optional PCI adapters to be installed.
- Support for an additional 12 64-bit slots available through installation of the optional RXE-100 Remote Expansion Unit (one unit only supported by xSeries 360). Slot six is not available if the serial port cable assembly shipped with the system is installed, which provides a nine-pin D-shell serial connector on the rear of the system chassis at the position of slot six.

xSeries 360 Processors

Part Number	Processor Upgrades	SMP Support ¹	Processor Speed Upgrade ²
59P6815	1.5GHz/400MHz-1MB L3 Cache Xeon Processor MP	7RX	-
59P6816	1.9GHz/400MHz-1MB L3 Cache Xeon Processor MP	8RX	7RX
59P6817	2GHz/400MHz-2MB L3 Cache Xeon Processor MP	9RX	7RX, 8RX
73P8805	2GHz/400MHz-1MB L3 Cache Upgrade with Xeon Processor MP	1RQ	-
73P8806	2.5GHz/400MHz-1MB L3 Cache Upgrade with Xeon Processor MP	2RQ	1RQ
73P8807	2.8GHz/400MHz-2MB L3 Cache Upgrade with Xeon Processor MP	3RQ	2RQ, 3RQ

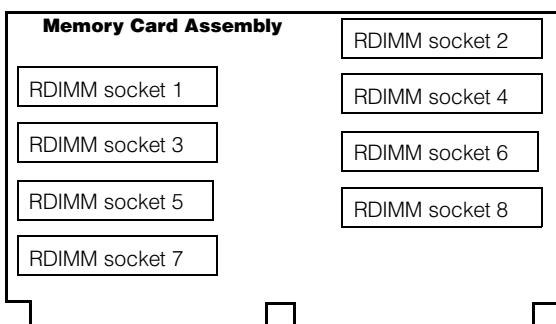
- A maximum of four processors can be installed. All processors must be identical in type, speed and cache size. Install processors in the order indicated in the diagram below.
- Requires removal of the standard processor. A maximum of four processors can be installed. All processors must be identical in type, speed and cache size. Upgrades may require a BIOS update. To obtain the latest Flash BIOS, access www.pc.ibm.com/support and enter machine "Type-Model" in Quick Path. Select "Downloadable files" then "BIOS."



xSeries 360 Memory

Part Number	Memory Description ¹
33L3281	256MB PC 1600 ECC DDR SDRAM RDIMM
33L3283	512MB PC1600 ECC DDR SDRAM RDIMM
33L3285	1GB PC1600 ECC DDR SDRAM RDIMM
33L3287	2GB PC1600 CL2 ECC DDR SDRAM RDIMM Memory Upgrade ²

1. Due to two-way interleaving, all RDIMMs must be installed in pairs in the order indicated by the diagram. Chipkill support is provided on the memory card. Only installation in pairs is supported. The order of installation in pairs is sockets one and two, three and four, five and six, and seven and eight.
 2. Installation of 2GB RDIMMs requires BIOS and diagnostic firmware version 1.08 or later. When more than 8GB of memory is installed, the integrated SCSI controller must be disabled..



Total Memory ¹		Quantity of RDIMMs Added ²			
1GB (2x512MB model)	2GB (4x512MB models)	256MB	512MB	1GB	2GB ⁴
2GB	3GB	4	-	-	-
2.5GB	3.5GB	2	2	-	-
3GB	4GB	-	4	-	-
3.5GB	4.5GB	2	-	2	-
4GB	5GB	-	2	2	-
5GB	6GB	-	-	4	-
6GB	-	-	2	4	-
7GB	-	-	-	6	-
8GB	8GB ³	-	-	8	-
9GB	10GB	-	-	-	4
13GB	13GB ³	-	-	-	6
16GB ³	16GB ³	-	-	-	8

This table does not represent all possible memory configurations.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. To obtain the quantity of memory identified in the "Total Memory" column, select the appropriate row and order the quantity of RDIMMs identified in all columns for that row.
3. Requires removal of standard RDIMMs.
4. Installation of 2GB RDIMMs requires BIOS and diagnostic firmware version 1.08 or later. When more than 8GB of memory is installed, the integrated SCSI controller must be disabled.

xSeries 360 Internal SCSI Cabling

xSeries 360 contains five front-accessible drive bays located on the right side of the server. The top two bays contain the standard slim-line CD-ROM and 1.44MB slim-line diskette drive. Three 3.5in slim-line, hot-swap drive bays are located beneath them. The IDE CD-ROM is docked to a media interposer card that is cabled to the lightpath card before terminating at the system planar. The three SCA2-compliant hot-swap bays attach to a hot-swap backplane that connects to the integrated single-channel Ultra160 controller through an integrated bus. For RAID configurations, a cable provided with the system is connected to one of the internal connectors of the RAID controller and the other end of the cable is attached to a connector that supports the hot-swap HDD backplane, located on the planar between slot one and the memory card, beneath the memory options.

For additional information regarding internal cabling, refer to Appendix F: Internal Cabling Overview.



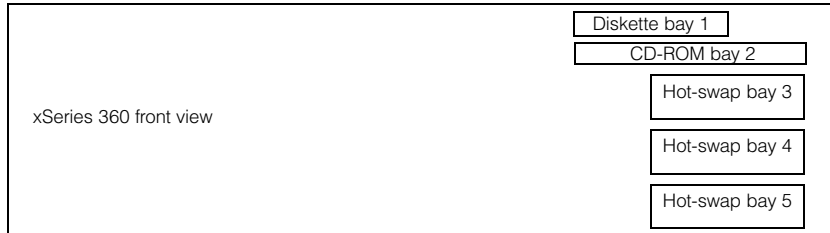
xSeries 360 Hard Disk Drive (HDD) Storage

Total Internal Storage ¹	Quantity added to standard configuration	
	36.4GB HDD	73.4GB HDD
0GB		
18.2GB	-	-
36.4GB	1	-
54.6GB	-	-
72.8GB ²	2 ²	-
109.2GB	3	-
146.8GB	-	2
220.2GB	-	3

This table does not represent all possible HDD configurations.
 1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.
 2. Models 2RX and 3RX include two standard 36.4GB 10,000rpm HDDs installed in bays four and five.

Bay	Form Factor	Height	Front Access	Usage
1	89mm (3.5in)	SL	Yes	Diskette
2	133mm (5.25in)	SL	Yes	IDE CD-ROM
3 ... 5	HS	SL	Yes	Open ¹

1. HDDs are installed in open bay models beginning with the bottom bay (5-4-3).



Part Number	Description	RPM	Height	Bays Supported ¹	Maximum Quantity
Hot-swap Ultra160 SCSI HDDs					
06P5756	73.4GB 10Krpm Ultra160 SCSI Hot-Swap SL HDD	10000	SL	3 ... 5	3
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-Swap SL HDD	10000	SL	3 ... 5	3
06P5768	36.4GB 15Krpm Ultra160 SCSI Hot-Swap SL HDD	15000	SL	3 ... 5	3
Optical Drives		Bays Supported			
22P7047	8x Max Slimline DVD-ROM Drive ¹	2			
External Storage Expansion Units²		Form Factor			
35311RU	EXP300 Storage Expansion Unit	Rack (3U)			
17331RU	EXP400 Storage Expansion Unit	Rack (3U)			
171010U	FAST EXP100 Storage Expansion Unit	Rack (3U)			
17401RU	FAST EXP700 Storage Expansion Unit	Rack (3U)			
172260U	FAST600 Storage Server (US line cord, English pubs)	Rack (3U)			
35601RU	FAST EXP500 Storage Expansion Unit	Rack (3U)			
35421RU	FAST200 Storage Server ³	Rack (3U)			
35422RU	FAST200 HA Storage Server	Rack (3U)			
19K1121	FAST200 Redundant RAID Controller	-			

1. Requires removing and replacing the standard optical drive.

2. To configure an external SCSI storage device, select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.

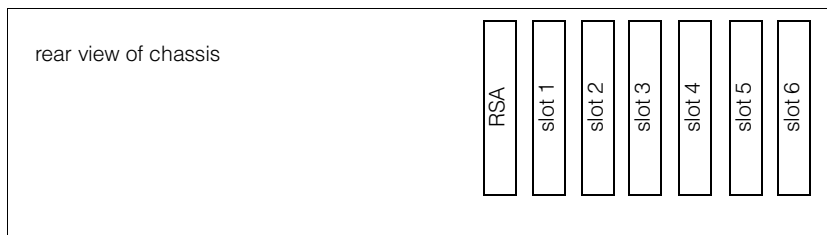
3. Can be upgraded to FAST200 HA Storage Server through the addition of a FAST200 Redundant RAID Controller (P/N 19K1121).



xSeries 360 I/O Options

Part Number	Description	Adapter Length	PCI Support ¹	Slots Supported ^{1, 15}	Hot-Plug ²	PCI Voltage Key	MHz ³
Storage Controllers⁴							
02R0988	ServeRAID-6M Controller (256MB Cache)	Full	64-bit	1 ... 6	-	3.3	133
32P0033	ServeRAID-6M Controller (128MB Cache)	Full	64-bit	1 ... 6	-	3.3	133
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	Half	64-bit	1 ... 6	X	Universal	66
19K4646	PCI Wide Ultra160 SCSI Adapter ⁵	Half	32-bit	1 ... 6	-	Universal	66
Fibre Storage Controllers and Options⁶							
00N6881	FAST Host Adapter	Half	64-bit	1 ... 6	X	Universal	66
24P0960	FC2-133 Host Bus Adapter	Half	64-bit	1 ... 6	X	Universal	133
174290U	FAST900 Storage Server (US line cord)	-	-	-	-	-	-
17421RU	FAST700 Fibre Channel Storage Server	-	-	-	-	-	-
172260U	FAST600 Storage Server (US line cord, English pubs)	-	-	-	-	-	-
35421RU	FAST200 Storage Server	-	-	-	-	-	-
35422RU	FAST200 HA Storage Server	-	-	-	-	-	-
3534F08	TotalStorage SAN Switch F08, 8-port	-	-	-	-	-	-
2109F16	SAN Fibre Channel Switch, 16-Port	-	-	-	-	-	-
Networking⁷							
Ethernet⁸							
06P3601	10/100 Ethernet Server Adapter ⁹	Half	32-bit	1 ... 6	X	Universal	33
22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter ¹⁴	Half	64-bit	1 ... 6	-	Universal	133
31P6301	NetXtreme 1000 T Ethernet Adapter (copper) ⁹	Half	64-bit	1 ... 6	X	Universal	133
31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper) ⁹	Half	64-bit	1 ... 6	X	Universal	133
Token Ring							
34L5001	16/4 Token-Ring PCI Management Adapter ⁹	Half	32-bit	1 ... 6	X	Universal	33
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter ⁹	Half	32-bit	1 ... 6	X	Universal	33
System Management¹⁰							
03K9309	Advanced System Management Interconnect Cable Kit ¹¹	-	-	-	-	-	-
Remote I/O Expansion							
8684-1RX	RXE-100 Remote Expansion Enclosure ¹²	-	-	-	-	-	-

1. Adapters rated at a lower frequency than the slots in which they are installed will reduce the bus to the frequency of the slowest adapter. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.
2. All six slots are full-length hot-plug capable. For Network Operating System support, access www.pc.ibm.com/us/compat.
3. Bus two (slots one and two) supports 133MHz operation of a single 133MHz adapter installed in slot one with slot two remaining empty. If 133MHz adapters are installed in both slots one and two, the bus speed for both slots becomes 100MHz.
4. xSeries 360 includes an integrated single-channel Ultra160 SCSI controller. See "Internal SCSI Cabling" for cabling alternatives. When a RAID controller is installed as a boot disk, it must be installed in a slot that is scanned before other RAID controllers in a configuration. Refer to the scan sequence provided in this section.
5. The PCI Wide Ultra160 SCSI Adapter is supported only for external HDD configurations due to cabling interference with the internal connectors.
6. See Fibre Channel Solutions Overview section for additional configuration information.
7. xSeries 360 has an integrated copper Intel-based 10/100 PCI Ethernet controller. Wake on LAN is supported only for the integrated controller.
8. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. One of the optional PCI Ethernet adapters listed is copper and Intel-based (P/N 06P3601). Two adapters are Broadcom-based (P/N 22P7801, 31P6301).
9. The Wake on LAN function of this option is not supported by this server.
10. xSeries 360 includes a Remote Supervisor Adapter installed in a dedicated PCI slot with an external connector, leaving six PCI slots available for optional adapters. Support for connection to other servers requires an optional Advanced System Management Interconnect Cable Kit (P/N 03K9309). Direct connection to the RXE drawer management controller in an RXE-100 Remote Expansion Enclosure is supported through a standard Interconnect Management Cable Kit with 3.5m cable connecting to an integrated RS-485 port on the rear of the system chassis. An 8m optional cable is available.
11. Required to connect the standard Remote Supervisor Adapter to an interconnect network with other servers for system management support through a single LAN or modem connection. Up to 24 Integrated System Management Processors or Remote Supervisor Adapters may be interconnected with an aggregate connection length of no more than 91.4m (300ft). This interconnect network of 24 devices may include a maximum of 12 Advanced System Management Processors or Advanced System Management PCI Adapters. A customer-supplied Cat5 cable is required for each interconnection.
12. RXE-100 Remote Expansion Enclosure supports up to 12 additional PCI-X slots. Cable required for connection included with expansion unit, which attaches to a standard external connector located on the back of the x360 chassis. An optional longer cable is available. See section on RXE-100.
13. Not supported in slot one if the RAID adapter is attached to the connector on the planar that controls the hot-swap backplane as a result of a cabling interference with the standard RAID cable, which must be routed under the adapter. External RAID attachment only is supported for full-length RAID adapters installed in slot one.
14. Slot six is not available if the serial port cable assembly shipped with the system is installed, which provides a nine-pin D-shell serial connector on the rear of the system chassis at the position of slot six.



RSA: standard Remote Supervisor Adapter
 Slot 1: Bus 2, 100MHz, 64-bit, full-length, Active PCI-X, 3.3v (Bus 2 also supports one 133MHz adapter installed in slot 1.)
 Slot 2: Bus 2, 100MHz, 64-bit, full-length, Active PCI-X, 3.3v (Slot 2 must be empty to support 133MHz bus 2 frequency.)
 Slot 3: Bus 1, 66MHz, 64-bit, full-length, Active PCI-X, 3.3v
 Slot 4: Bus 1, 66MHz, 64-bit, full-length, Active PCI-X, 3.3v
 Slot 5: Bus 1, 66MHz, 64-bit, full-length, Active PCI-X, 3.3v
 Slot 6: Bus 1, 66MHz, 64-bit, full-length, Active PCI-X, 3.3v

Scan sequence:
 Inside the server: slots 3, 4, 5, 6, 1, 2
 Continuing in an RXE-100: slots 11, 12, 9, 10, 7, 8, 17, 18, 15, 16, 13, 14.

xSeries 360 Power, Monitors & Accessories

Part Number	Description
Power¹	
31P6108	370W Hot-Swap Redundant Power Supply ²
Uninterruptible Power Supply (UPS)^{3, 4}	
32P1020	APC 2U Smart-UPS 1400RMB
2130R30	UPS3000XLV ⁵
2130R31	UPS3000XHV ⁵
32P1692	UPS Extend Run Battery Pack ⁵
37L6861	APC Smart-UPS 5000RMB ⁶
Monitors⁷	
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black ⁸
63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black ⁸
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁹
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard) ⁹
32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁹
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard) ⁹

- xSeries 360 models 8RX and 9RX include two 370w, hot-swap power supplies, each with two 9ft power cords—one high voltage IEC 320-C13 to IEC 320-C14 and one low voltage IEC 320-C13 to NEMA 5-15P. N+1 power supply redundancy is standard for these models. The addition of an optional 370w Hot-Swap Redundant Power Supply (P/N 31P6108) is supported for configurations of greater than 370w with power redundancy, i.e., a total of three 370w power supplies. Model 7RX includes one standard power supply and may be upgraded to two or three power supplies according to the same rules for redundancy as models 8RX and 9RX.
- 370w Hot-Swap Redundant Power Supply (P/N 31P6108) includes two 9ft power cords, one high voltage IEC 320-C13 to IEC 320-C14 and one low voltage IEC 320-C13 to NEMA 5-15P.
- For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
- UPS remote management can be provided using a USB to serial adapter such as the Belkin USB to Serial Adapter (P/N 10K3661—US only), which is available at www.pc.ibm.com/ww/eserver/xseries. Select Accessories, Upgrades & Monitors and the country, then click Go. Scroll to the bottom of the page, select Cables and Adapters, then open the Adapters pull-down menu. UPS3000XLV, HV (P/N2130R30, 1) support USB connections between the server and UPS. The system ships with a serial port cable assembly that provides a nine-pin D-shell external serial port connector at the location of slot six on the rear of the chassis.
- Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
- Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
- xSeries 360 uses an SVGA controller (S3 Savage4 LT chipset) with 8MB of video memory. Optional video adapters are not supported.
- Installation within a rack requires optional Monitor Compartment (P/N 94G7444).
- Includes a 15in Flat Panel Monitor.



The following table is provided as a reference. The table shows an example of a maximum configuration that can be supported by two 370W power supplies with power redundancy.

Number of power supplies	System configuration supported
2	Redundant
	Up to three processors
	Up to four PCI adapters
	Up to two HDDs
	Up to six memory RDIMMs

Part Number	Description
Rack and NetBAY¹	
	Refer to the Rack Cabinets and Options section for information concerning IBM racks and rack-supported devices.
Console Connectivity²	
1735L04	NetBAY Local Console Manager
1735R16	NetBAY Remote Console Manager
32P1636	250mm KVM Conversion Option
32P1652	1.5m KVM Conversion Option
09N4290	NetBAY 1x4 Console Switch
09N4291	NetBAY 2x8 Console Switch
Keyboard and Mouse³	
28L3644	Space Saver II Keyboard ^{4, 5}
10K3849	106-key Preferred USB Keyboard with 2-port USB Hub (stealth black) ^{6, 7}
28L3673	Sleek 2-Button Stealth Black Mouse

1. xSeries 360 is housed in a 19in rack-mountable drawer and requires one of the racks listed in the Rack Cabinets and Options section.

2. Refer to the Rack Console Options section for information regarding console connectivity using these options.

3. xSeries 360 supports rack configurations only and ships without a keyboard or mouse. The system includes three USB ports, SVGA video port, mouse port and keyboard port. A serial port cable assembly ships with the system, providing a nine-pin D-shell external serial connector at the location of slot six on the rear of the chassis if installed (FRU #59P6881).

4. Installation within a rack requires optional keyboard tray (P/N 28L4707) which stows in ready-to-use position, or NetBAY 1U or 2U Flat Panel Monitor Console Kit (P/N 32P1032, 32P1702). Standard with 1U and 2U NetBAY console kits (P/N 32P1031, 32P1702).

5. Advanced TrackPoint IV features are not available on IBM xSeries systems.

6. Installation within a rack requires optional keyboard tray (P/N 28L4707). This keyboard cannot share a keyboard tray with a flat panel display.

7. USB accessories attach to a single USB-capable server. They are not compatible with the NetBAY console switches.

xSeries 360 Tape Options

Part Number	Tape Drives	Bays Supported ¹	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures
00N8016	100/200GB LTO Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X
24P2396	100/200GB LTO Half-High Tape Drive ⁷	-	16 Ultra2 LVD	133mm (5.25in) HH	Y ²	-
59P6736	160/320GB SDLT Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X
59P6744	LTO FH Generation-2 Tape Drive Option	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X
Tape Autoloaders						
360726X	3607 Series 1.6TB/3.2TB LTO Tape Autoloader	-	16 Ultra2 LVD	2U Rack	Y	-
External Tape Enclosures						
3503B1X	Full-High SCSI Tape Enclosure ⁵	-	16 Ultra2 LVD	Desktop or 3U Rack	Y	-
External Tape Libraries⁵						
4560SLX	SDLT/LTO Modular Tape Library	-	16 Ultra2 LVD	5U Rack	Y	-

1. IBM xSeries 360 does not support internal tape drives. An external tape library or tape enclosure must be used. All tape drives and enclosures are supported by PCI Wide Ultra160 SCSI Adapter (P/N 19K4646) or Single Channel Ultra320 SCSI Controller (P/N 71P8594) which have an external 0.8mm VHDCI connector. Select tape drive, enclosure and controller then use Appendix D: Cables - Storage Units - Controllers to select an appropriate external cable.

2. Termination requires installing the 34in single-drop, terminated LVD SCSI cable provided with the option.

3. Black desktop or 3U rack tape enclosure supports a single 133mm (5.25in) full-high LVD tape device including DLT tape drives. Requires a fixed shelf if installed in a rack (allow additional 1U for fixed shelf). Includes a 90w power supply, cooling fan, external terminator, power cord (country-specific), and 2m 68-pin to 0.8mm external cable.

4. Tape library attributes and prerequisites are located in Appendix B: Tape Library Attributes.

5. This tape drive must be shipped separately as an option and installed at a customer site. Factory or vendor installation prior to shipping is not supported.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

xSeries 360 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

Microsoft Exchange SCSI Solution¹

Part Number	Description	Quantity
8686-8RX	xSeries 360 2x1.9GHz/400MHz-1MB L3 Cache Xeon MP, 2GB ECC, open, 24x (3U rack)	1
59P6816	1.9GHz/400MHz-1MB L3 Cache Xeon Processor MP	2 ²
31P6108	xSeries 370W Hot-swap Redundant Power Supply	1 ³
33L3283	512MB PC 1600 ECC DDR SDRAM RDIMM	2 ⁴
37L6889	ServeRAID-4H Ultra160 SCSI Controller	1 ⁵
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-Swap SL HDD	3 ⁶
06P3601	10/100 Ethernet Server Adapter	1
19K4646	PCI Wide Ultra160 SCSI Adapter	1
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black	1
37L6861	APC Smart-UPS 5000RMB	1
External Storage		
35311RU	EXP300 Storage Expansion Unit	2
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-Swap SL HDD	14 ⁷
3503B1X	Full-high SCSI Tape Enclosure	1
00N8016	100/200GB LTO Tape Drive	1
Rack Options		
9306250	NetBAY25 Standard Rack Cabinet	1
28L3644	Space Saver II Keyboard	1
94G6670	Blank Filler Panel Kit	1

1. This configuration supports 8,000 users.

2. Total of four processors.

3. Required to maintain N+1 power redundancy in this configuration--total of three 370W power supplies.

4. Total memory of 3GB.

5. External connectors only can be used due to an internal cabling restriction.

6. Total internal storage of 109.2GB.

7. Six HDDs are used for RAID-5E protection in each EXP300. One HDD is identified as a hot-spare. Effective capacity is five HDDs in each storage enclosure (total of 182GB).



Microsoft Exchange High-Availability Fibre Channel Solution¹

Part Number	Description	Quantity
8686-9RX	xSeries 360 2x2GHz/400MHz-2MB, L3 Cache Xeon MP, 2GB ECC, open, 24x (3U rack)	1
59P6817	2GHz/400MHz-2MB L3 Cache Xeon Processor MP	2 ²
31P6108	xSeries 370W Hot-swap Redundant Power Supply	1 ³
33L3283	512MB PC 1600 ECC DDR SDRAM RDIMM	2 ⁴
06P5736	ServeRAID-4MX Ultra 160 SCSI Controller	1
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-Swap SL HDD	3 ⁵
06P3601	10/100 Ethernet Server Adapter	1
24P0960	FC2-133 Host Bus Adapter	2
8684-1RX	RXE-100 Remote Expansion Enclosure	1
37L6861	APC Smart-UPS 5000RMB	1
2130R30	UPS3000XLV	1
External Storage		
17421RU	FAST700 Storage Server	1 ⁶
35601RU	FAST EXP500 Storage Expansion Unit	3
19K0653	Netfinity 36.4GB 10K-4 FC Hot-Swap HDD	18 ⁷
Rack Options		
9306420	NetBAY42 Standard Rack Cabinet	1
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (w/ US Space Saver Keyboard)	1
94G6670	Blank Filler Panel Kit	1

1. This configuration supports 8,000 users.

2. Total of four processors.

3. Required to maintain N+1 power redundancy in this configuration--total of three 370W power supplies.

4. Total memory of 3GB.

5. Total internal storage of 109.2GB.

6. Fibre Channel cable, SFP Modules and FAST700 Mini Hubs not included.

7. Six HDDs are used for RAID-5E protection in each FAST EXP500. One HDD is identified as a hot-spare. Effective capacity is five HDDs in each storage enclosure (total of 182GB).



xSeries 365

Part Number ^{1, 2} Processor Speed (GHz) ³ Number of Processors (Std/Max) Cache Memory (Std/Max) ^{4, 5} Form Factor Power Supply Quantity (Std/Max) ⁶ Hot-Swap (Power, Slots, HDD, Fans) Redundancy (Optional, Standard) System Management Adapter ⁷ Onboard Ethernet (Mbps) ⁸ Storage Controller ⁹ Removable Media ⁹ Internal HDD Storage (Total/Avail) CD-ROM (IDE) Bays (Total/Avail) Slots (Total/Avail) ⁷

xSeries 365 At-A-Glance

8861-1RX ¹¹	2/400	1/4	1MB L3	1GB/32GB	Rack (3U)	1/2	P, S, H, F	O - Power, S - Fans	Y	Dual 1GB	Dual U320	2/0	0/880.8GB	24x-10x	8/6	6/5
8862-1RX	2/400	1/4	1MB L3	2GB/32GB	Rack (3U)	1/2	P, S, H, F	O - Power, S - Fans	Y	Dual 1GB	Dual U320	2/0	0/880.8GB	24x-10x	8/6	6/5
8862-2RX	2.5/400	2/4	1MB L3	2GB/32GB	Rack (3U)	2/2	P, S, H, F	S - Power, S - Fans	Y	Dual 1GB	Dual U320	2/0	0/880.8GB	24x-10x	8/6	6/5
8862-3RX	2.5/400	2/4	2MB L3	2GB/32GB ¹²	Rack (3U)	2/2	P, S, H, F	S - Power, S - Fans	Y	Dual 1GB	Dual U320	2/0	0/880.8GB	24x-10x	8/6	6/5

- xSeries 365 also provides a FDD, three USB ports (one in front and two in rear), one serial port (RS-232), one RXE-100 expansion port (RS-485) and one RXE-100 management port (RS-485).
- Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
- Intel Xeon processor with advanced transfer L2 cache, an additional L3 cache and a 400MHz (quad-pumped) Front Side Bus (FSB).
- xSeries 365 uses DDR PC2100, Advanced Chipkill memory DIMMs and is capable of memory mirroring.
- Memory mirroring and the maximum supported amount of memory require the optional 16 DIMM memory card. 8GB of memory is supported in base system. See x365 Memory section for more information.
- Power is provided by either one or two 950w power supplies depending on model. N+1 power supply redundancy is provided standard in models with two power supplies and is optional in models with one power supply.
- Advanced system management is provided by a standard Remote Supervisor Adapter II installed in slot 1 allowing for five additional PCI adapters.
- Integrated dual-port Broadcom 5704 Gigabit Ethernet controller.
- The integrated dual-channel U320 SCSI controller (LSI 53C1030) supports HDD mirroring and provides one external port and one internal port.
- Maximum storage capacity is based on six 146.8GB hot-swap HDDs.
- The 8861 machine type carries a one year limited parts and labor warranty. 8862 carries a three year limited parts and labor warranty.
- x365 model 3RX ships with the 16-DIMM memory card standard.

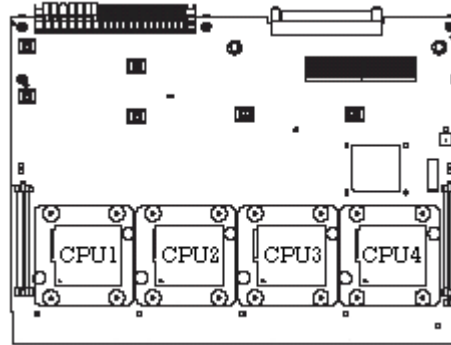
xSeries 365 Processors

SBB Number	Option Number	Processor Upgrades	SMP Support ¹
73P6953	73P7073	2GHz/400MHz-1MB L3 Cache Xeon Processor MP	1RX
73P6954	73P7074	2.5GHz/400MHz-1MB L3 Cache Xeon Processor MP	2RX
73P6955	73P7075	2.8GHz/400MHz-2MB L3 Cache Xeon Processor MP	3RX

- A maximum of four processors can be installed. All processors must be identical in type, speed and cache size. Install processors in the order indicated in the diagram below.



xSeries 365 Processor Board



xSeries 365 Memory

SBB Number	Option Number	Memory Description ^{1, 2}
37L3538	33L5038	512MB PC2100 ECC DDR RDIMM
73P2106	73P2031	1GBB PC2100 ECC DDR RDIMM
32P9223	33L5040	2GB PC2100 ECC DDR RDIMM
73P7026	73P9710	Memory Upgrade Card ^{3, 4}

1. x365 memory supports Chipkill, mirroring and memory ProteXion technologies.
2. Installation of memory DIMMs in matched pairs is required. DIMMs must be installed in sets of four in order to enable mirroring which requires installation of the optional memory upgrade card. 32GB of memory is supported via 16-DIMM slots when the optional memory upgrade card is installed. 16GB is supported via 8 DIMM slots in base systems that ship with the 8-DIMM memory card.
3. Optional 16-DIMM memory card that replaces the standard 8-DIMM memory card. This card is required in order to support maximum amount of memory and to enable memory mirroring. Partial memory mirroring is not supported. If configured with "N" capacity of memory in Port 1, and "N+z" memory in Port 2 and memory mirroring is enabled, then "N" amount of memory is available to the system, and "z" amount of memory is not usable.
4. Ships standard on 3RX models

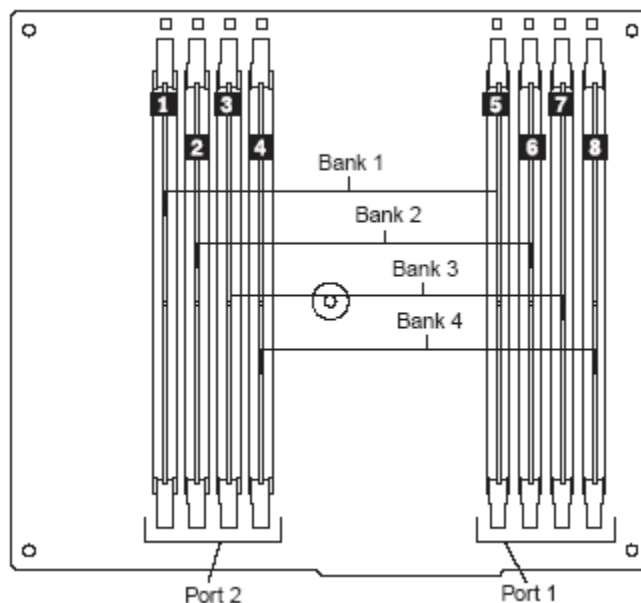
Total System Memory ^{1, 2}	Quantity of DIMMs Added		
	512MB	1GB	2GB
2GB (4x512MB models)³			
3GB	2	-	-
4GB	4	-	-
5GB	2	2	-
6GB	-	4	-
8GB ⁴	-	8	-
10GB	-	-	4
12GB ⁴	-	4	4
16GB ⁴	-	-	8
18GB ⁵	-	8	4
22GB ⁵	-	4	8
26GB ⁵	-	-	12
32GB ^{4, 5}	-	-	16
Mirrored Memory ^{1, 5}			
4GB	16	-	-
7GB	-	12	-
13GB	-	-	12
16GB ⁴	-	-	16

This table does not represent all possible memory configurations and may not represent the most cost-effective solution. Memory modules may vary in price per MB.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. These numbers are for non-mirrored memory mode.
3. This cable does not cover 8861-1RX. 2GB models of 8862 are: 1RX, 2RX, 3RX.
4. This configuration requires removal of standard memory.
5. Requires the 8-DIMM memory card to be replaced with the optional 16-DIMM memory card (standard on 3RX models).

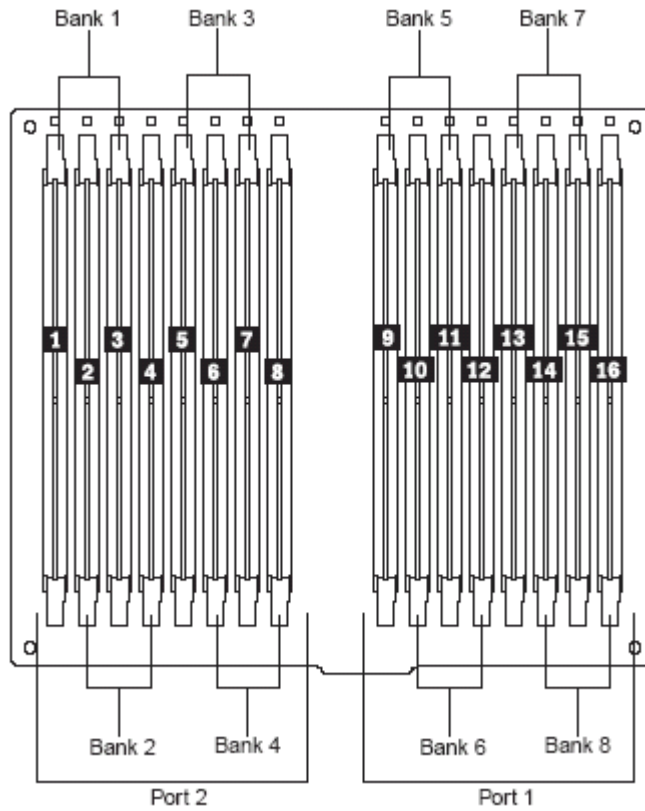
8-DIMM Memory Card Installation Order	
Pair #	Location
1st	DIMM1 and DIMM5
2nd	DIMM2 and DIMM6
3rd	DIMM3 and DIMM7
4th	DIMM4 and DIMM8
16-DIMM Memory Card Installation Order (non-mirrored)	
Pair #	Location
1st	DIMM1 & DIMM3
2nd	DIMM14 & DIMM16
3rd	DIMM2 & DIMM4
4th	DIMM13 & DIMM15
5th	DIMM5 & DIMM7
6th	DIMM10 & DIMM12
7th	DIMM6 & DIMM8
8th	DIMM9 & DIMM11
16-DIMM Memory Card Installation Order (mirrored mode)	
Quad #	Location
1st	DIMM1 & DIMM3, DIMM14 & DIMM16
2nd	DIMM2 & DIMM4, DIMM13 & DIMM15
3rd	DIMM5 & DIMM7, DIMM10 & DIMM12
4th	DIMM6 & DIMM8, DIMM9 & DIMM11

8-DIMM Memory Card





16-DIMM Memory Card



xSeries 365 Internal Cabling

The xSeries 365 mechanical contains six hot-swap HDD bays, one slim 3.5in and one slim 5.25in media bay. The integrated SCSI controller is connected to the hot-swap backplane via a 16-bit LVDS cable.

The standard optical drive and floppy connect directly to a media card which is cabled to the system board.

External SCSI device attachment is provided via a 0.8mm VHDCI port on the rear of the system chassis, which is cabled to the second channel of the integrated SCSI controller. For internal SCSI tape support, this cable will be disconnected from the SCSI channel and left clipped to the inside of the mechanical, leaving the external port in place, though not usable. The SCSI cable for the tape can now be connected to the integrated SCSI controller.

xSeries 365 Hard Disk Drive (HDD) Storage

Total Internal Storage ^{1, 2}	Quantity of HDDs added to standard configuration		
	36.4GB HDD	73.4GB HDD	146.8GB HDD
0GB ³			
36.4GB	1	-	-
72.8GB ²	2	-	-
109.2GB	3	-	-
145.6GB	4	2	-
146.8GB	-	-	1
182GB	5	-	-
218.4GB	6	-	-
293.6GB	-	4	2
440.4GB	-	6	-
587.2GB	-	-	4
880.8GB	-	-	6

This table does not represent all possible HDD configurations.

1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.
2. Total Storage numbers assume all HDDs are the same size. Mixing HDDs of different sizes is allowed but not shown.
3. All models ship open-bay.

SBB Number	Option Number	Description	Height	Bays Supported ¹	Maximum Quantity
Hot-swap Ultra320 HDDs					
32P0746	32P0726	36.4GB 10K rpm Ultra320 SCSI Hot-Swap HDD	SL	3 ... 3	6
32P0747	32P0727	73.4GB 10K rpm Ultra320 SCSI Hot-Swap HDD	SL	3 ... 8	6
32P0748	32P0728	146.8GB 10K rpm Ultra320 SCSI Hot-Swap HDD	SL	3 ... 8	6
32P0744	32P0734	36.4GB 15K rpm Ultra320 SCSI Hot-Swap HDD	SL	3 ... 8	6
32P0745	32P0735	73.4GB 15K rpm Ultra320 SCSI Hot-Swap HDD	SL	3 ... 8	6
Optical Devices					
59P5800	22P7047	8x Max Slimline DVD-ROM Drive ¹	SL	1	1
External Storage Expansion Units²					
			Form Factor		
-	35311RU	EXP300 Storage Expansion Unit	Rack (3U)		
-	17331RU	EXP400 Storage Expansion Unit	Rack (3U)		
-	35601RU	FAStT EXP500 Storage Expansion Unit	Rack (3U)		
-	17401RU	FAStT EXP700 Storage Expansion Unit	Rack (3U)		
-	172260U	FAStT600 Storage Server	Rack (3U)		
-	17421RU	FAStT700 Storage Server	Rack (4U)		
-	174290U	FAStT900 Storage Server	Rack (4U)		
-	35421RU	FAStT200 Storage Server	Rack (3U)		
-	35422RU	FAStT200 HA Storage Server	Rack (3U)		
-	19K1121	FAStT200 Redundant RAID Controller ³	-		

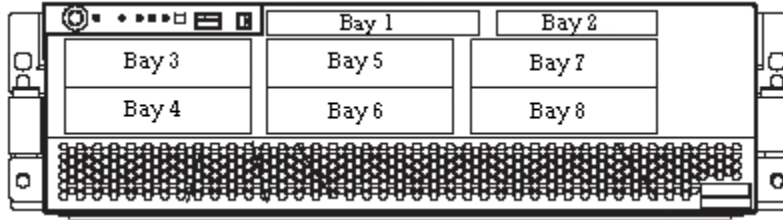
1. Requires removing and replacing the standard optical drive.

2. To configure an external SCSI storage device, select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.

3. Upgrades the FAStT200 Storage Server to FAStT200 HA Storage Server.



xSeries 365 Front View



Bay	Form Factor	Height	Front Access	Usage
1	133mm (5.25in)	SL	Yes	Std. Optical
2	89mm (3.5in)	SL	Yes	Std. FDD
3	89mm (3.5in) HS	SL	Yes	HDD
4	89mm (3.5in) HS	SL	Yes	HDD
5	89mm (3.5in) HS	SL	Yes	HDD
6	89mm (3.5in) HS	SL	Yes	HDD
7	89mm (3.5in) HS	SL	Yes	HDD
8	89mm (3.5in) HS	SL	Yes	HDD

xSeries 365 I/O Options

SBB Number	Part Number	Description	Adapter Length	PCI Support ¹	Slots Supported ²	Hot-Plug Capable
Storage Controllers³						
02R0996	02R0988	ServeRAID-6M Controller (256MB Cache)	Full	64-bit/133MHz	1 ... 6	X
02R0225	32P0033	ServeRAID-6M Controller (128MB Cache)	Full	64-bit/133MHz	1 ... 6	X
71P8634	71P8595	ServeRAID-6i Controller	Full	64-bit/133MHz	2	-
24P3472	06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	Half	64-bit/66MHz	1 ... 6	X
71P8614	71P8594	Single Channel Ultra320 SCSI Controller	Half	64-bit/133MHz	1 ... 6	-
Fibre Storage Controllers and Options⁴						
24P0963	24P0960	FC2-133 Host Bus Adapter	Half	64-bit/133MHz	1 ... 6	X
-	174290U	FAST900 Storage Server (US line cord)	-	-	-	-
-	17421RU	FAST700 Storage Server	-	-	-	-
-	172260U	FAST600 Storage Server (US line cord, English pubs)	-	-	-	-
-	35421RU	FAST200 Storage Server	-	-	-	-
-	35422RU	FAST200 HA Storage Server	-	-	-	-
-	3534F08	TotalStorage SAN Switch F08, 8-port	-	-	-	-
-	2109F16	SAN Fibre Channel Switch, 16-Port	-	-	-	-
Networking⁵						
25P2889	06P3601	10/100 Ethernet Server Adapter	Half	32-bit/33MHz	1 ... 6	X
32P9296	22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter	Half	64-bit/133MHz	1 ... 6	X
31P6305	31P6301	NetXtreme 1000 T Ethernet Adapter (copper)	Half	64-bit/133MHz	1 ... 6	X
32P9298	31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper)	Half	64-bit/133MHz	1 ... 6	X
33P2970	22P6901	Wireless LAN Adapter	Half	32-bit/33MHz	1 ... 6	-
24P2327	34L5201	High-speed 100/16/4 Token-ring PCI Management Adapter ⁶	Half	32-bit/33MHz	1 ... 6	-
02R2647	34L5001	16/4 Token-ring PCI Management Adapter ⁶	Half	32-bit/33MHz	1 ... 6	-
System Management²						
-	03K9309	Advanced System Management Interconnect Cable Kit ⁷	-	-	-	-
Other I/O Expansion						
-	8684-1RX	RXE-100 Remote Expansion Enclosure ⁸	-	-	-	-
-	1519100	Integrated xSeries Adapter for iSeries ⁹	Full	64-bit/66MHz	3 ¹⁰	-

1. Adapters rated at a lower frequency than the slots in which they are installed will reduce the bus to the frequency of the slowest adapter.

2. xSeries 365 includes the Remote Supervisor Adapter II (RSA II) installed in PCI slot 1. Connection to other servers requires the Advanced System Management Interconnect Cable Kit.

3. xSeries 365 includes an integrated dual channel Ultra320 SCSI controller and provides one internal and one external connector.

4. See Fibre Channel Solutions Overview section for additional configuration information.

5. xSeries 365 includes an integrated Broadcom 5704 10/100/1000 dual-port Ethernet controller (copper) with Wake on LAN support.

6. These adapters do not support WOL when installed in x365.

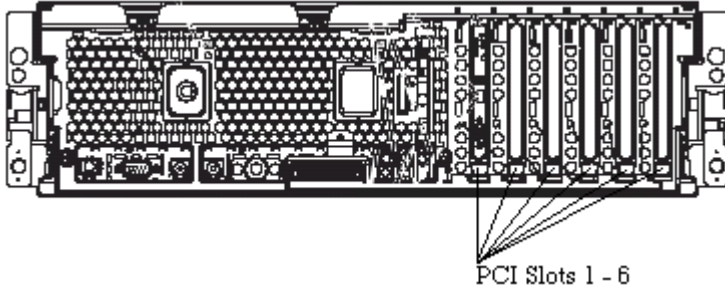
7. Required to connect the standard Remote Supervisor Adapter II to an interconnect network with other servers for system management support through a single LAN or modem connection.

8. xSeries 365 supports a maximum of one RXE-100 per server. One RXE-100 can be shared between two x365 systems providing fail-over support or capability to add up to six additional PCI slots per server.

9. The Integrated xSeries Adapter for iSeries allows interconnectivity with an IBM eServer iSeries server. This card occupies two slot positions.



xSeries 365 Rear View



- RSA: standard Remote Supervisor Adapter
- Slot 1: Bus 0, 33MHz, 64-bit, full-length, 3.3v, Active-PCI (contains pre-installed RSA II)
- Slot 2: Bus 3, 100MHz, 64-bit, full-length, 3.3v, Active PCI-X for 100MHz or higher adapters
- Slot 3: Bus 6, 133MHz, 64-bit, full-length, 3.3v, Active-PCI-X
- Slot 4: Bus 9, 133MHz, 64-bit, full-length, 3.3v, Active-PCI-X
- Slot 5: Bus C, 133MHz, 64-bit, full-length, 3.3v, Active-PCI-X
- Slot 6: Bus F, 133MHz, 64-bit, full-length, 3.3v, Active-PCI-X

Scan sequence: Slot 1, 2, 3, 4, 5, 6
Continuing in optional RXE-100: Slot 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18

xSeries 365 Power, Monitors & Accessories

SBB Number	Option Number	Description
Power¹		
-	73P7214	950w Hot-Swap Power Supply ²
Uninterruptible Power Supply (UPS)³		
-	2130R30	UPS3000XLV
-	2130R31	UPS3000XHV
-	32P1020	APC 2U Smart-UPS 1400RMB
-	32P1692	UPS Extend Run Battery Pack
Monitors⁴		
-	633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black ⁵
-	63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black ⁵
-	32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁶
-	32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard) ⁶
-	32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁶
-	32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard) ⁶
Rack and NetBAY⁷		
-		Refer to Rack Cabinets and Options section for information concerning IBM racks and rack-supported devices.
Console Connectivity⁸		
-	1735L04	NetBAY Local Console Manager
-	1735R16	NetBAY Remote Console Manager
-	73P5832	USB Conversion Option (four-pack) ⁹
Keyboard and Mouse¹⁰		
-	10K3849	106-key Preferred USB Keyboard with 2-port USB Hub (stealth black) ¹¹
32P8917	28L3644	Space Saver II Keyboard ^{12, 13}

1. xSeries 365 systems include either one or two 950w hot-swap power supplies depending on model. N+1 redundancy is standard on systems that ship with two power supplies. One 4.3m/14ft IEC 320-C19 to IEC 320-C14 power cable ships per installed power supply.
2. Available for models with one power supply installed. Provides N+1 redundancy.
3. For runtimes and UPS attributes see Appendix: UPS Runtime Estimate.
4. xSeries 365 video is provided by the installed RSA II via an ATI Radeon RV-100. The integrated ATI RageXL video is disabled when the RSA II adapter is installed.
5. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).
6. Includes a 15in Flat Panel Monitor.
7. xSeries 365 is housed in a 19in rack-mountable drawer and requires one of the racks listed in the Rack Cabinets and Options section.
8. Refer to the Rack Console Options section for information regarding console connectivity using these options.
9. Required to connect one of the USB ports on the server to either a Local or Remote Console Manager. This option kit contains four 1.5m KVM cables, four 14in lengths of Cat5 cable, four large curly-lock cable connectors, and an eight-pack of velcro strips.
10. xSeries 365 supports rack configurations only and ships without a keyboard or mouse.
11. Installation within a rack requires optional keyboard tray (P/N 28L4707).
12. Installation within a rack requires optional keyboard tray (P/N 28L4707), or a NetBAY 1U or 2U Flat Panel Monitor Console Kit.
13. Advanced TrackPoint IV features are not available on IBM xSeries systems.



xSeries 382

Part Number ^{1, 8, 9}
 Processor/FSB Speed (GHz/MHz)²
 Number of Processors (Std/Max)
 L3 ECC Cache
 Memory (Std/Max)³
 Form Factor
 Power Supply Quantity (Std/Max)⁵
 Hot-Swap (Power, Slots, HDD, Fans)
 Redundancy (Optional, Standard)
 System Management Processor
 Onboard Ethernet (Mbps)
 Storage Controller⁵
 Removable Media Bays (Total/Avail)
 Internal HDD Storage (Std/Max)⁶
 Optical Drive (IDE)
 Bays (Total/Avail)
 Slots (Total/Avail)⁷

xSeries 382 At-A-Glance

8834-21X	1.4/ 400	2/2	1.5MB	2GB/16GB	Rack (2U)	2/3 ⁴	H, P ⁴	S-F, O-P ⁴	Y	2x10/100/ 1000	Dual U320	1/0	73.4/ 293.6GB ⁶	8x DVD- CD/RW	3/1	3/3
8834-32X	1.5/ 400	2/2	6MB	4GB/16GB	Rack (2U)	2/3 ⁴	H, P ⁴	S-F, O-P ⁴	Y	2x10/100/ 1000	Dual U320	1/0	146.8/ 293.6GB ⁶	8x DVD- CD/RW	3/0	3/3

- xSeries 382 also provides four USB ports (two in front and two in rear), one serial port (RJ-45) and two video connectors (one in front and one in rear). It does not provide a floppy diskette drive. xSeries 382 installs into a 19in rack-mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
- Intel Itanium 2 processors with 6MB full-speed L3 cache.
- Four 512MB RDIMMs are standard on model 21X; Eight are standard on model 32X.
- Two 350w power supplies are standard. Redundancy and ability to hot-swap power supplies require a third power supply which is available via special bid.
- The dual-channel, Ultra320 integrated controller supports RAID-1 mirroring. Mirrored HDDs must match.
- One 73.4GB HDD is standard on model 21X; two are standard on model 32X. Maximum storage is based on two 146.8GB SCSI HDD and require replacing the standard HDDs.
- Three full-length, 64-bit, PCI-X slots (two 100MHz, one 133MHz).
- All models include a three-year parts and labor warranty.
- Differing configurations are available via Special Bid. Orders have an approximate lead time of 14 weeks.

xSeries 382 Memory

Part Number	Memory Description ^{1, 2}
33L5037	256MB PC 2100 ECC DDR SDRAM RDIMM
33L5038	512MB PC2100 ECC DDR SDRAM RDIMM
33L5039	1GB PC2100 ECC DDR SDRAM RDIMM
33L5040	2GB PC2100 ECC DDR SDRAM RDIMM

- DIMMs must be installed in matched sets of four with a total of eight DIMMs supported.
- Only an IBM Trained Servicer can install or configure internal options in this system.

Total Memory ¹	Quantity of RDIMMs Added to the standard configuration			
	256MB DIMMs	512MB DIMMs	1GB DIMMs	2GB DIMMs
4GB (8x512MB model)				
6GB ²	-	-	4	-
10GB ²	-	-	-	4
12GB ³	-	-	4	4
16GB ³	-	-	-	8

This table does not represent all possible memory configurations. Memory modules vary in price per MB.

- Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
- Requires removal of four of the standard 512MB DIMMs.
- Requires removal of all standard RDIMMs.

xSeries 382 Internal SCSI Cabling

xSeries 382 supports two hot-swap SCSI HDDs on a DASD backplane. The backplane is connected to the integrated U320 dual-channel SCSI controller through a 16-bit nonterminated SCSI cable. The standard optical drive is attached to the IDE connector using a single-drop IDE cable.

External SCSI device attachment, such as a tape enclosure, is facilitated by a dedicated 0.8mm VHDCI port on the rear of the system chassis, which is connected to the second channel of the integrated controller.

For additional information regarding internal cabling, refer to Appendix F: Internal Cabling Overview.

xSeries 382 Hard Disk Drive (HDD) Storage

Model 32X			
Total Int Storage¹	Quantity of SCSI HDDs added to standard configuration ²		
	36.4GB HDD	73.4GB HDD	146.8GB HDD
220.2GB ³	-	-	1
293.6GB ⁴	-	-	2

Model 21X			
Total Int Storage¹	Quantity of SCSI HDDs added to standard configuration ²		
	36.4GB HDD	73.4GB HDD	146.8GB HDD
146.8GB	-	1	-
220.2GB	-	-	1
293.6GB ⁴	-	-	2

These tables may not represent all possible HDD configurations.

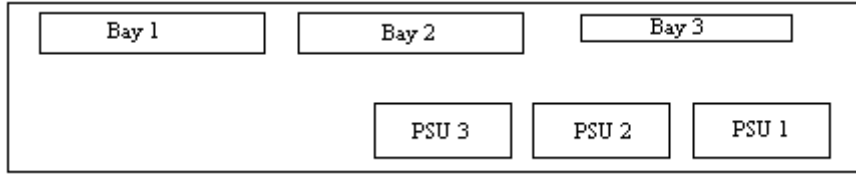
1. Select a total storage row then add the quantity of HDDs from the column of the preferred HDD
2. Model 32X ships standard with two 73.4GB HDDs; model 21X ships standard with one 73.4GB HDD.
3. Requires replacement of one of the standard 73.4GB HDDs.
4. Requires replacement of both standard 73.4GB HDDs.

Part Number	Description	Height	Bays Supported	Maximum Quantity
Hot-swap Ultra320 SCSI HDDs				
32P0726	36.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	SL	1, 2	2
32P0727	73.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	SL	1, 2	2
32P0728	146.8GB 10Krpm Ultra320 SCSI Hot-swap HDD	SL	1, 2	2
32P0734	36.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	SL	1, 2	2
32P0735	73.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	SL	1, 2	2
External Storage Expansion Units¹		Form Factor		
17401RU	FAST EXP700 Storage Expansion Unit	Rack (3U)		
35601RU	FAST EXP500 Storage Expansion Unit	Rack (3U)		
35421RU	FAST200 Storage Server	Rack (3U)		
35422RU	FAST200 HA Storage Server	Rack (3U)		

1. xSeries 382 includes one external SCSI connector. If necessary, select an optional SCSI controller, then refer to Appendix D: Cables - Storage Units - Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.

Bay	Form Factor	Height	Front Access	Usage
1	Hot-swap or fixed 89mm (3.5in)	SL	Yes	Standard HDD
2	Hot-swap or fixed 89mm (3.5in)	SL	Yes	Standard HDD/HDD ¹
3	89mm (3.5in)	Slim	Yes	Standard optical

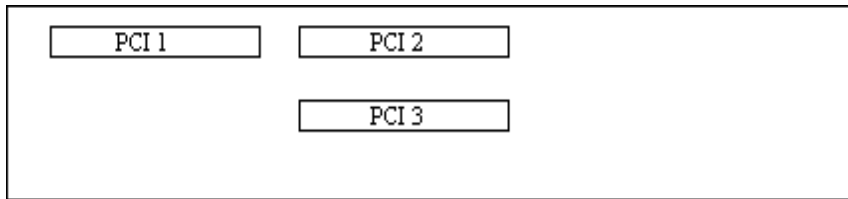
1. Bay 2 is used for the standard HDD on model 32X; it is open on model 21X.



xSeries 382 I/O Options

Part Number	Description	Adapter Length	PCI Support	Slots Supported ²	Hot-Plug	PCI Voltage Key	MHz
Storage Controllers¹							
71P8594	Single Channel Ultra320 SCSI Controller ³	Half	64-bit	1, 2, 3	-	Universal	133
Fibre Storage Controllers and Options⁴							
24P0960	FC2-133 Host Bus Adapter	Half	64-bit	1, 2, 3	-	Universal	133
174290U	FAST900 Storage Server	-	-	-	-	-	-
17421RU	FAST700 Storage Server	-	-	-	-	-	-
35421RU	FAST200 Storage Server	-	-	-	-	-	-
35422RU	FAST200 HA Storage Server	-	-	-	-	-	-
Networking							
Ethernet							
22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter	Half	64-bit	1, 2, 3	-	Universal	133
31P6301	NetXtreme 1000 T Ethernet Adapter (copper)	Half	64-bit	1, 2, 3	-	Universal	133
31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper)	Half	64-bit	1, 2, 3	-	Universal	133

1. xSeries 382 has a dual-channel, Ultra320 integrated controller which supports RAID-1 mirroring. Provided are one internal and one external SCSI connector.
 2. Five volt signaling adapters are not supported.
 3. Single channel Ultra320 SCSI Controller (P/N 71P8594) provides a single channel with one 68-pin internal connector, a four-drop multimode terminated LVD SCSI cable and one external 0.8mm VHDCI connector. Only one of the two connectors may be utilized. Hardware is included in the option to support either low-profile (2U) or full-size (3U) installations.
 4. See Fibre Channel Solutions Overview section for additional configuration information.



xSeries 382 Rear

PCI 1: Bus A, 133MHz, 64-bit, 3.3v, full-length, PCI-X
 PCI 2: Bus A, 100MHz, 64-bit, 3.3v, full-length, PCI-X
 PCI 3: Bus A, 100MHz, 64-bit, 3.3v, full-length, PCI-X

xSeries 382 Power, Monitors & Accessories

Part Number	Description
Monitors	
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black ¹
9512AB1	T541 Flat Panel Color Monitor 15in (381mm, 15in viewable image), stealth black
63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black ¹
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ²
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard) ²
32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ²
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard) ²
Rack and NetBAY^{3, 4}	
	Refer to the Rack Cabinets and Options section for information concerning IBM racks and rack-supported devices.
Console Connectivity⁵	
1735L04	NetBAY Local Console Manager
1735R16	NetBAY Remote Console Manager
Keyboard and Mouse	
10K3849	106-key Preferred USB Keyboard with 2-port USB Hub (stealth black) ^{6, 7}
22P5185	Rapid Access III USB Keyboard, stealth black
06P4069	USB Optical Wheel Mouse
31P7405	Optical 3-button ScrollPoint Mouse - 800dpi - PS/2 and USB
31P8700	Optical 3-button ScrollPoint Pro Mouse - 800dpi - PS/2 and USB
31P7410	Optical 3-button Travel Wheel Mouse - 800dpi - PS/2 and USB
USB Devices	
22P9025	256MB USB 2.0 Memory Key

1. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).
2. Includes a 15in Flat Panel Monitor.
3. xSeries 382 is housed in a 19in rack-mountable drawer and requires one of the racks listed in the Rack Cabinets and Options section.
4. Note limitations and restrictions required for adequate cooling in the Rack Cabinets and Options section. If non-IBM racks are to be used, assure that both front and rear doors offer a minimum of 48% open area uniformly distributed and in line with installed servers. A clearance of 51 to 64mm (2 to 2.5in) must be maintained between the front door and the system unit's front bezel. The rear door must maintain the same or greater clearance.
5. Refer to the Rack Console Options section for information regarding console connectivity using these options.
6. Installation within a rack requires optional keyboard tray (P/N 28L4707). This keyboard cannot share a keyboard tray with a flat panel display.
7. USB accessories attach to a single USB-capable server. They are not compatible with the NetBAY console switches.



xSeries 445

Part Number 1, 14
 Processor Speed (GHz)
 Number of Processors (Std/Max)⁴
 L3 ECC Cache
 Memory (Std/Max)⁵
 Form Factor
 Power Supply Quantity (Std/Max)⁶
 Hot-Swap (Power, Slots, HDD, Fans)
 Redundancy (Optional, Standard)
 System Management Adapter 7
 Onboard Ethernet (Mbps)⁸
 SCSI Controller (Dual, Ultra, RAID)⁹
 Removable Media Bays (Total/Avail)
 Internal HDD Storage (Std/Max)¹⁰
 Optical Drive (IDE)¹¹
 Bays (Total/Avail)
 Slots (Total/Avail)¹²

xSeries 445 At-A-Glance																
8870-1RX ¹³	2 ²	2/8	1MB	2GB/64GB	Rack (4U)	2/2	P, S, H, F	S-Fans, S-Power	Y	2 x 10/100/1000	D, U320	2/0	0/293.6GB	DVD-ROM	4/2	6/6
8870-2RX ¹³	2.5 ²	2/8	1MB	2GB/64GB	Rack (4U)	2/2	P, S, H, F	S-Fans, S-Power	Y	2 x 10/100/1000	D, U320	2/0	0/293.6GB	DVD-ROM	4/2	6/6
8870-4RX ¹³	2.8 ²	4/8	2MB	2GB/64GB	Rack (4U)	2/2	P, S, H, F	S-Fans, S-Power	Y	2 x 10/100/1000	D, U320	2/0	0/293.6GB	DVD-ROM	4/2	6/6
8870-3RY	3 ³	2/4	512KB	2GB/64GB	Rack (4U)	2/2	P, S, H, F	S-Fans, S-Power	Y	2 x 10/100/1000	D, U320	2/0	0/293.6GB	DVD-ROM	4/2	6/6
8870-4RY	3 ³	4/4	512KB	2GB/64GB	Rack (4U)	2/2	P, S, H, F	S-Fans, S-Power	Y	2 x 10/100/1000	D, U320	2/0	0/293.6GB	DVD-ROM	4/2	6/6

Note: Refer to the Datacenter Solutions section for additional xSeries 445 models configured with Microsoft Windows 2003 Datacenter Server (licensed for up to 16 processors).

- Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
- Intel Xeon MP processor with integrated full-speed ECC L3 cache and 400MHz (quad-pumped) access to memory and I/O buses.
- Intel Xeon DP processor with integrated full-speed ECC L2 cache and 400MHz (quad-pumped) access to memory and I/O buses. A maximum of two processors can be installed in each SMP Expansion Module (four total per system).
- Either two or six additional optional processors are supported in Xeon MP models, and are expandable to 16-way installations. SMP Expansion Module for Base Models (P/N 02R1870) is required for eight-way support. Entry models support a maximum of four Xeon DP processors. To upgrade model 3RY, SMP Expansion Module for Entry Models with two 3GHz/400MHz-512KB Xeon Processors (P/N 02R1871). x445 Two Chassis 16-way Configuration Kit (P/N 02R2013) is required to connect two eight-way enabled x445 chassis' for 16-way installations. The optional SMP Expansion Module requires four processors prepopulated and a minimum of four RDIMMs (eight if memory mirroring is enabled). Both models 3RY and 4RY can be upgraded by replacing the standard Xeon processors with Xeon MP processors, which then allows all functionality and compatibility of Xeon MP models.
- Advanced Chipkill ECC memory controller corrects single, two-, three and four-bit memory errors. Memory options are two-way interleaved supporting Memory ProteXion, memory mirroring and hot-swap installation if mirroring is enabled. Sixteen sockets are provided in standard models, four of which are populated with 512MB RDIMMs. An additional 16 sockets are supported with the installation of SMP Expansion Module (P/N 02R1870). Maximum memory configurations include 32 2GB RDIMMs.
- Two 1050w, voltage-sensing, hot-swap power supplies that support N+1 redundancy on full configurations are standard.
- Advanced system management is provided by a standard Remote Supervisor Adapter installed in a dedicated PCI slot, which allows six optional PCI adapters to be installed.
- Broadcom dual-port 5704 10/100/1000 Ethernet controller.
- The LSI chipset in the dual-channel, Ultra320 integrated controller allows for two HDDs to be allocated for mirroring if a RAID adapter is not installed. Mirrored HDDs must be matched.
- Maximum internal storage is based on two 146.8GB Ultra320 hot-swap HDDs.
- ThinkPad Ultralight 8x Max DVD-ROM Ultrabay 2000 Drive is standard, installed in bay four.
- Support for an additional 12 64-bit slots is available through installation of the optional RXE-100 Remote Expansion Unit. Refer to x445 I/O Options or the RXE-100 section for more information.
- Upgrading this system to enable 16-way configuration requires x445 Two Chassis 16-way Configuration Kit (P/N 02R2013), which includes four 2.5m and two 250mm scalability cables, and an Ethernet crossover cable for use if both chassis' are not connected to an enterprise network.
- Availability in the U.S. is limited to the Large Enterprise Direct (LED) program or through EXAct Business Partner program members.

xSeries 445 Processors

Part Number	Processor Upgrades ¹	SMP Support ²	Processor Speed/Cache Upgrade ³	SBB Number ⁶
02R2062	2GHz/400MHz-1MB L3 Cache Upgrade with Xeon Processor MP	1RX	-	02R1930
02R2063	2.5GHz/400MHz-1MB L3 Cache Upgrade with Xeon Processor MP	2RX	1RX	02R1931
02R2064	2.8GHz/400MHz-2MB L3 Cache Upgrade with Xeon Processor MP	4RX	1RX, 2RX	02R1932
02R1870	SMP Expansion Module for Base Models ⁴	1 ... 4RX	-	02R1935
02R1871	SMP Expansion Module for Entry Models with two 3GHz/400MHz-512KB Xeon Processors ⁵	3RY	-	-
02R2013	x445 Two Chassis 16-way Configuration Kit	1 ... 4RX	-	-

1. xSeries 445 architecture optimizes memory and bus performance using an XA-32 core chipset with up to two CPU/memory cards and two PCI-X host-bridge controllers. Up to eight Pentium Xeon MP processors are supported. The recommended order of processor installation is shown in the accompanying diagrams (not applicable for models 3RY and 4RY, which support two processors only in each SMP Expansion Module installed in the two sockets located adjacent to the memory ports). In models 1RX and 2RX, two processors are standard with additional support for either two optional processors (total of four) or six optional processors (total of eight). In model 4RX, four processors are standard and four additional processors and an SMP module are required when upgrading. Eight processors require an SMP Expansion Module. Models 2RY and 3RY are limited to two Xeon DP processors in each SMP Expansion Module, but can be upgraded by replacing the standard processors with Xeon MP processors.

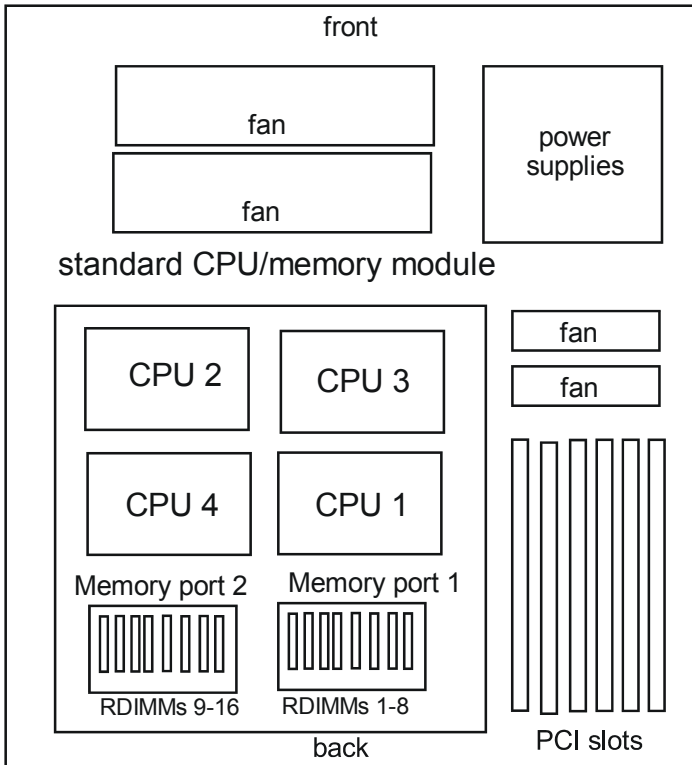
2. A maximum of eight processors may be installed. All processors must be identical in type, speed and cache size. The fifth through eighth processors require an SMP Expansion Module prepopulated with four processors (second SMP Expansion Module supported only when fully populated).

3. Requires removal of standard processors. A maximum of eight processors may be installed. Installation of greater than four processors requires the addition of an SMP Expansion Module. All processors must be identical in type, speed and cache size. Upgrades may require a BIOS update. To obtain the latest Flash BIOS, access www.pc.ibm.com/support and enter machine "Type-Model" in Quick Path. Select "Downloadable files" then "BIOS."

4. The fifth through eighth processors for models 1 ... 4RX require this option, which installs directly above the standard CPU/memory board. Two 250mm/10in scalability cables (P/N 24P1243) are included with the option. See SMP Expansion Module cabling diagrams below for scalability cabling configuration. Four CPUs are required with the optional SMP Expansion Module. A minimum of four RDIMMs installed in each SMP Expansion Module are required (not included). Memory mirroring requires a minimum of eight RDIMMs in each SMP Expansion Module.

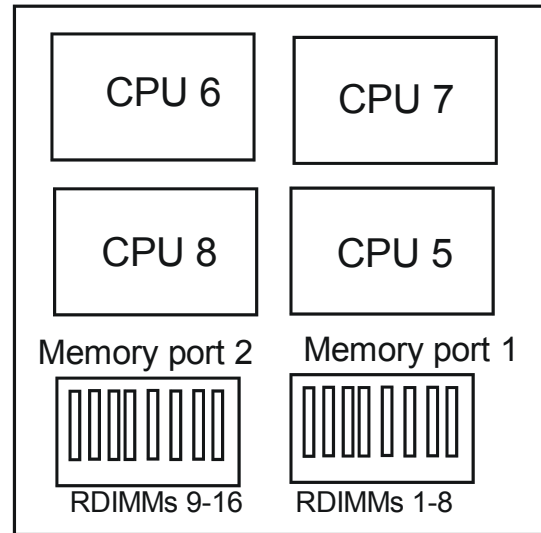
5. Required to upgrade 3RY from two to the maximum of four Xeon processors. Memory options are not included. Both models 3RY and 4RY can be upgraded by replacing the standard processors with Xeon MP processors. The same SMP Expansion Module is used, which supports up to four Xeon MP processors.

6. IBM offers configure-to-order (CTO) capability for selected products through Easy Access. Although similar to machine type models (MTM), CTO systems utilize different part numbers called Sales Building Blocks (SBB). The contents of an option may not entirely correspond to an SBB because only a certain component within an option package may be required to configure a specific system. Additional or different configuration rules or limitations may apply to the SBB. When a difference occurs, the rules will be documented in the tables, diagrams or footnotes.



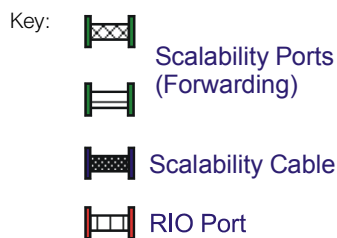
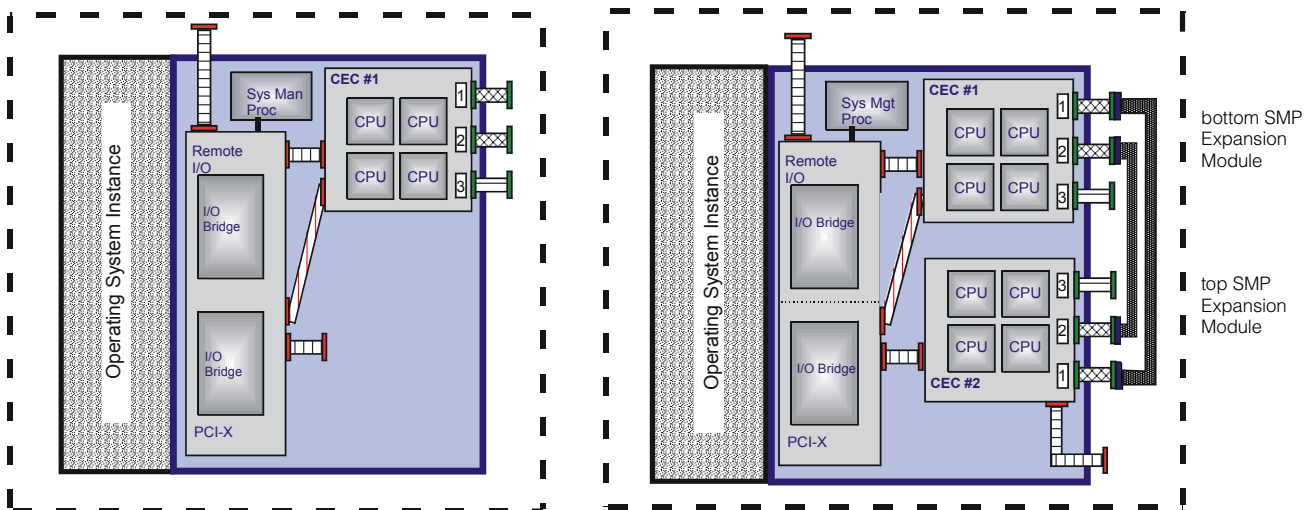
Optional SMP Expansion Module (P/N 02R1870)

Installs directly above standard CPU/memory board, requiring installation of four processors and a minimum of four RDIMMs. Standard with eight- and 16-way models.

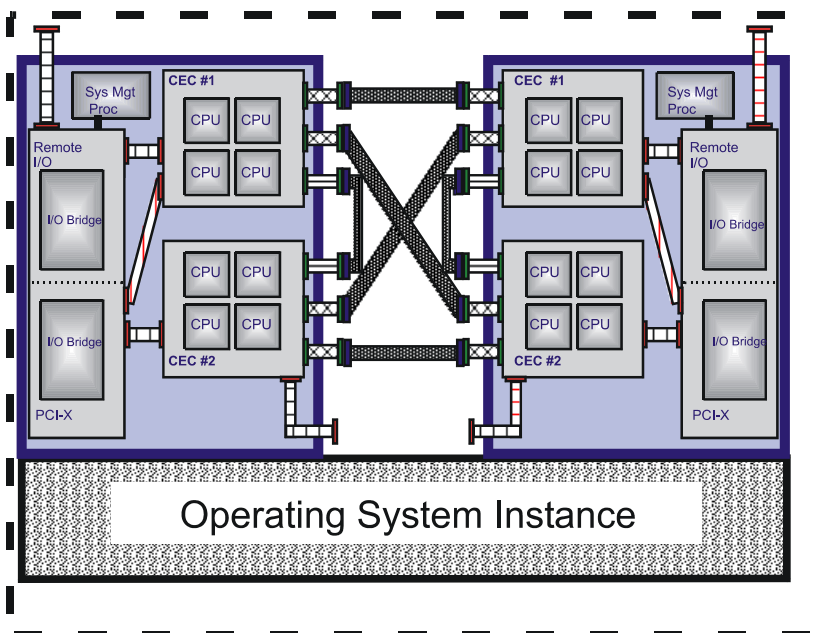


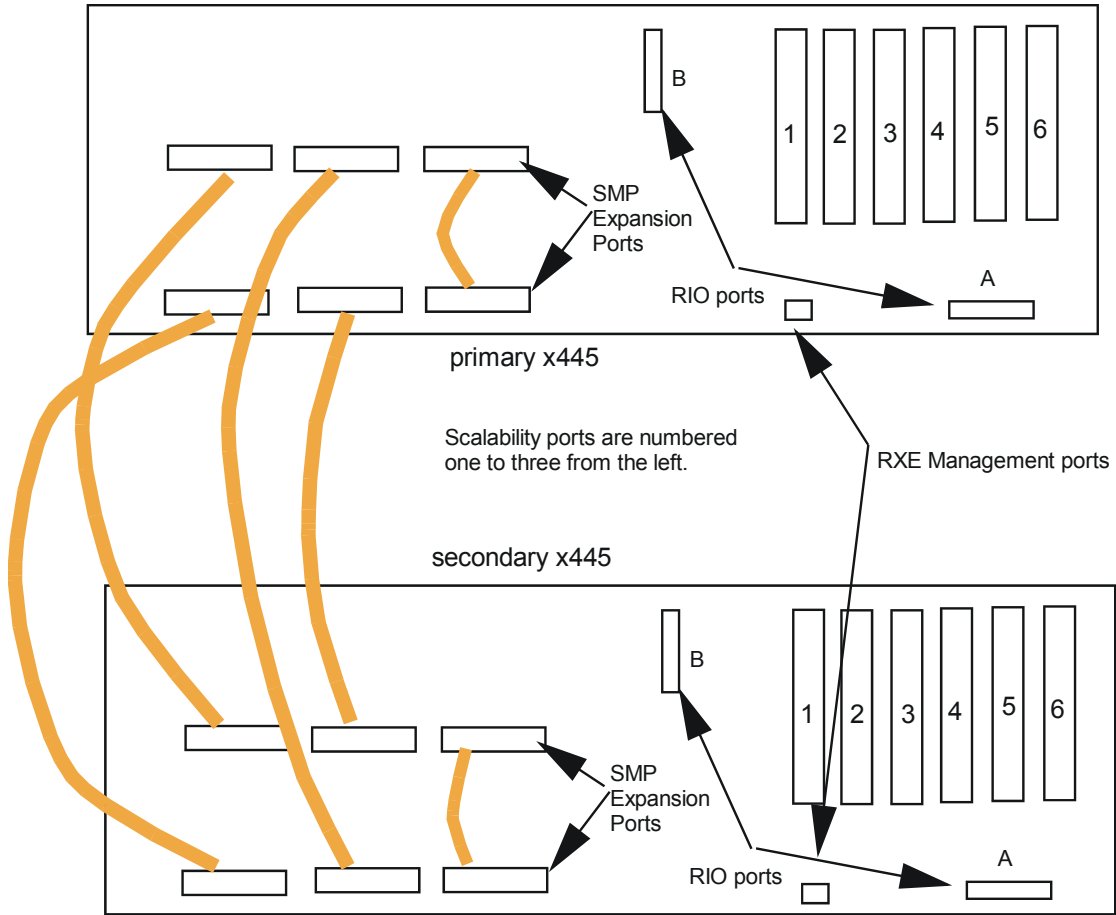
Logical diagram of SMP Expansion Module cabling for single node, four-way x445 running one operating system

Logical diagram of SMP Expansion Module cabling (including scalability cables) for single node, eight-way x445 running one operating system



Logical diagram of SMP Expansion Module cabling for 16-way x445 (two eight-way models) running one operating system. The top SMP Expansion Modules in each chassis are labeled CEC #1. Scalability ports are shown top to bottom one to three.





xSeries 445 Memory

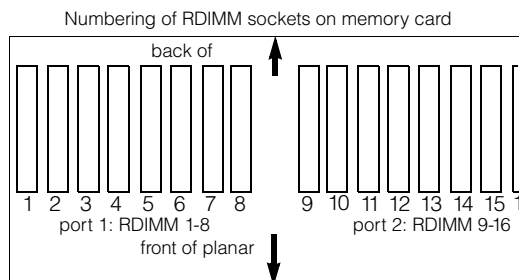
Part Number	Memory Description ¹	SBB Number ²
33L5038	512MB DDR PC2100 ECC RDIMM	37L3538
33L5039	1GB DDR PC2100 ECC RDIMM	33P3126
33L5040	2GB DDR PC2100 ECC RDIMM	32P9223

1. Due to two-way interleaving, installation of memory options in banks of two is required. Banks may be populated in any order. A minimum of two RDIMMs are required for each SMP Expansion Module (minimum of four required to enable memory mirroring).

2. IBM offers configure-to-order (CTO) capability for selected products through Easy Access. Although similar to machine type models (MTM), CTO systems utilize different part numbers called Sales Building Blocks (SBB). The contents of an option may not entirely correspond to an SBB because only a certain component within an option package may be required to configure a specific system. Additional or different configuration rules or limitations may apply to the SBB. When a difference occurs, the rules will be documented in the tables, diagrams or footnotes.

Notes:

- See numbering of RDIMM sockets on memory card for bank configuration.
- Performance is optimized by balancing the amount of memory between ports (and between SMP Expansion Modules).
- In order to enable memory mirroring during BIOS set-up, the same memory configuration must be installed in each port (memory mirroring reduces the amount of memory available to the operating system by half). Mirror banks 1, 3, 5, 7 with banks 2, 4, 6, 8 (see list of banks below memory card diagram).
- Memory mirroring is specific to each SMP Expansion Module, but enabling mirroring in both SMP Expansion modules for eight-way systems is required.



- Bank 1: sockets 1, 3
- Bank 2: sockets 9, 11
- Bank 3: sockets 5, 7
- Bank 4: sockets 13, 15
- Bank 5: sockets 2, 4
- Bank 6: sockets 10, 12
- Bank 7: sockets 6, 8
- Bank 8: sockets 14, 16

Total System Memory ¹	Quantity of RDIMMs Added ^{2, 3}			
	2GB (4x512MB) standard	512MB (33L5038)	1GB (33L5039)	2GB (33L5040)
3GB		2	-	-
4GB		4	-	-
5GB		6	-	-
6GB		8	-	-
7GB		10	-	-
8GB		12	-	-
9GB		14	-	-
10GB		16	-	-
11GB		18	-	-
12GB		20	-	-
13GB		22	-	-
14GB		24	-	-
15GB		26	-	-
16GB		28	-	-
18GB		24	4	-
20GB		20	8	-
22GB		16	12	-
24GB		12	16	-
26GB		8	20	-
28GB		4	24	-
32GB ⁴		-	32	-
36GB ⁴		-	28	4
40GB ⁴		-	24	8
44GB ⁴		-	20	12
48GB ⁴		-	16	16
52GB ⁴		-	12	20
56GB ⁴		-	8	24
60GB ⁴		-	4	28
64GB ⁴		-	-	32

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs. RDIMMs must be added in sets of two to support interleaving technology.

- Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
- To obtain the quantity of memory identified in the "Total System Memory" column, select the appropriate row and order the quantity of RDIMMs identified in all columns for that row, which will be added to the standard memory noted at the top of the left column.
- Optional SMP Expansion Module for Base Models (P/N 02R1870) in Xeon MP models is required if total RDIMMs exceed 16.
- Requires removal of standard RDIMMs.

xSeries 445 Internal SCSI Cabling

xSeries 445 server contains four drive bays on the lower left front of the chassis. The bottom two side-by-side bays contain the standard DVD-ROM and 1.44MB diskette drive. Two 3.5in, SCA-2-compliant, slim-line, hot-swap drive bays are located above these two bays.

The EIDE DVD-ROM is cabled directly to the IDE port. The two hot-swap bays are connected to the integrated Ultra320 SCSI controller through a 16-bit LVDS cable.

An optional ServeRAID controller is supported for internal RAID applications. A separate 16-bit LVDS SCSI cable is included with the system to attach the hot-swap backplane to the ServeRAID controller.

The integrated Ultra320 SCSI controller supports HDD mirroring if the internal HDDs are matched.

The Ultra320 SCSI controller contains a second channel that supports external SCSI devices. The controller is connected to an external, industry-standard, 0.8mm VHDCI connector through a 16-bit LVDS cable.

For additional information regarding internal cabling, refer to Appendix E: Internal Cabling Overview.



xSeries 445 Hard Disk Drive (HDD) Storage

Total Internal Storage ¹	Quantity added to standard configuration		
	36.4GB HDD	73.4GB HDD	146.8GB HDD
0GB ²			
36.4GB	1	-	-
72.8GB	2	-	-
73.4GB	-	1	-
146.8GB	-	2	1
293.6GB	-	-	2

This table does not represent all possible HDD configurations. Total internal storage listed is within +/-0.2GB unless otherwise noted.

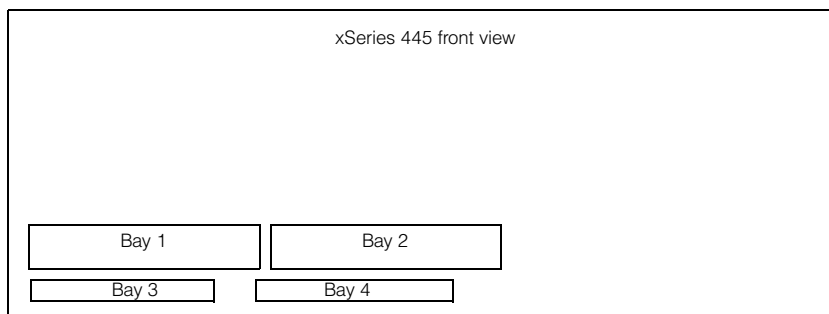
1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.
2. x445 ships open-bay.

Option Number	Description	SBB Number	RPM	Height	Bays Supported ¹	Maximum Quantity
Hot-swap Ultra320 SCSI HDDs¹						
32P0726	36.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	32P0746	10000	SL	1, 2	2
32P0727	73.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	32P0747	10000	SL	1, 2	2
32P0728	146.8GB 10Krpm Ultra320 SCSI Hot-swap HDD	32P0748	10000	SL	1, 2	2
32P0734	36.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	32P0744	15000	SL	1, 2	2
32P0735	73.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	32P0745	15000	SL	1, 2	2
Removable Media²				Bays Supported		
08K9603	ThinkPad Removable Diskette Drive ³	32P9070	3			
05K9233	ThinkPad 24x-10x CD-ROM Ultrabay 2000 Drive	32P9069	3, 4			
22P6991	ThinkPad CD-WR/DVD Combo IV Ultrabay 2000 Drive ⁴	02R3485	3, 4			
22P9102	ThinkPad Ultralight 8x Max DVD-ROM Ultrabay 2000 Drive ⁵	02R2032	3, 4			
External Storage Expansion Units⁶				Form Factor		
35311RU	EXP300 Storage Expansion Unit	-	Rack (3U)			
171010U	FASiT EXP100 Storage Expansion Unit	-	Rack (3U)			
17401RU	FASiT EXP700 Storage Expansion Unit	-	Rack (3U)			
35601RU	FASiT EXP500 Storage Expansion Unit	-	Rack (3U)			
35421RU	FASiT200 Storage Server ⁷	-	Rack (3U)			
35422RU	FASiT200 HA Storage Server	-	Rack (3U)			
19K1121	FASiT200 Redundant RAID Controller	-	-			

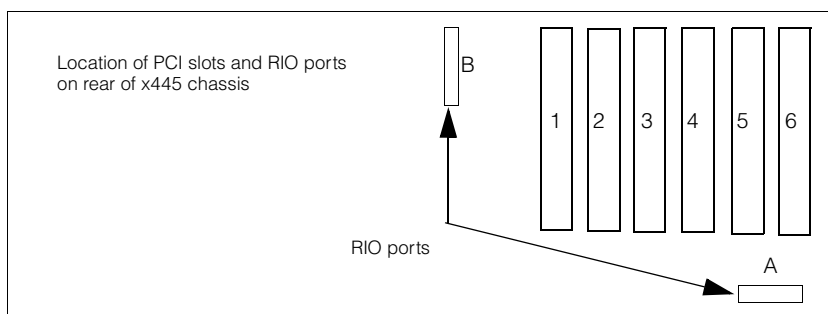
1. HDD bays in both the primary and secondary servers in 16-way configurations support boot disks.
2. Removable media bays in the secondary server in 16-way configurations are disabled.
3. Installed standard in bay three. Not compatible with bay four.
4. Install in either bay three or four, requiring removal of standard devices. If only one optical drive is installed, it must be installed in bay four. If a second optical drive is installed, use bay three configured as slave.
5. Installed standard in bay four.
6. Not supported by the onboard external SCSI port, which supports external tape enclosures only. External SCSI HDD storage requires a RAID controller. Fibre Channel HDD storage requires a Fibre Channel controller. For HDD expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.
7. Can be upgraded to FASiT200 HA Storage Server through the addition of a FASiT200 Redundant RAID Controller (P/N 19K1121)

Bay	Form Factor	Height	Front Access	Usage
1, 2	HS	SL	Yes	open
3	133mm (5.25in)	SL ¹	Yes	FDD
4	133mm (5.25in)	SL ²	Yes	DVD-ROM

1. Supports FDD, high-density FDD, CD-ROM, CD-RW or DVD-ROM. If IDE device (optical drive) is installed, must be configured as slave.
2. Supports CD-ROM, CD-RW or DVD-ROM. Must be configured as master if bay three contains an optical drive. If only one optical drive is installed, it must be installed in bay four. In 16-way configurations, bays three and four are disabled in the secondary chassis.



xSeries 445 I/O Options



- Slot 1: Bus A, 66MHz, 64-bit, full-length, 3.3v, Active PCI-X
- Slot 2: Bus A, 66MHz, 64-bit, full-length, 3.3v, Active PCI-X
- Slot 3: Bus B, 100MHz, 64-bit, full-length, 3.3v, Active PCI-X
- Slot 4: Bus B, 100MHz, 64-bit, full-length, 3.3v, Active PCI-X
- Slot 5: Bus C, 133MHz, 64-bit, full-length, 3.3v, Active PCI-X
- Slot 6: Bus D, 133MHz, 64-bit, full-length, 3.3v, Active PCI-X

Optimal order of installation (highest frequency adapters first): 6-5-4-2-3-1

Scan sequence ((both 8-way and 16-way):

Inside the primary server: slots 1, 2, 3, 4, 5, 6

Additional chassis (if present):

Standard 6-slot Expansion Kit in the RXE-100: slots 7, 8, 9, 10, 11, 12

Inside the secondary server: slots 13, 14, 15, 16, 17, 18

Second 6-slot Expansion Kit in the RXE-100: slots 19, 20, 21, 22, 23, 24



Part No.	Description	Adapter Length	PCI Support ¹	Slots Supported ^{1,2}	Hot-Plug ²	PCI Voltage Key	MHz	SBB Number
Storage Controllers³								
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	Half	64-bit	1 ... 6	X	Universal	66	24P3472
19K4646	PCI Wide Ultra160 SCSI Adapter ⁵	Half	32-bit	1 ... 6	X	Universal	66	24P2650
Fibre Storage Controllers and Options⁴								
00N6881	FAST Host Adapter	Half	64-bit	1 ... 6	X	Universal	66	24P2334
24P0960	FC2-133 Host Bus Adapter	Half	64-bit	1 ... 6	X	Universal	133	24P0963
174290U	FAST900 Storage Server (US line cord)	-	-	-	-	-	-	-
17421RU	FAST700 Storage Server	-	-	-	-	-	-	-
35421RU	FAST200 Storage Server	-	-	-	-	-	-	-
35422RU	FAST200 HA Storage Server	-	-	-	-	-	-	-
3534F08	TotalStorage SAN Switch F08, 8-port	-	-	-	-	-	-	-
2109F16	SAN Fibre Channel Switch, 16-Port	-	-	-	-	-	-	-
Networking⁶								
Ethernet⁷								
06P3601	10/100 Ethernet Server Adapter ⁸	Half	32-bit	1 ... 6	X	Universal	33	25P2889
22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter	Half	64-bit	1 ... 6	X	Universal	133	32P9296
31P6301	NetXtreme 1000 T Ethernet Adapter (copper) ⁹	Half	64-bit	1 ... 6	X	Universal	133	-
31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper) ⁹	Half	64-bit	1 ... 6	X	Universal	133	32P9298
Token Ring								
34L5001	16/4 Token-Ring PCI Management Adapter ³	Half	32-bit	1 ... 6	X	Universal	33	02R2647
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter ³	Half	32-bit	1 ... 6	X	Universal	33	24P2327
Communications⁹								
19K4162	V90 PCI Data/Fax WinModem (Low Profile Enabled) ^{10, 11}	Half	32-bit	3, 4	-	Universal	33	49P3881
System Management¹²								
13N0382	Remote Supervisor Adapter II-EXA for xSeries 445 Servers ¹³	Half	32-bit	reserved slot	-	Universal	33	-
03K9309	Advanced System Management Interconnect Cable Kit ¹⁴	-	-	-	-	-	-	-
Remote I/O Expansion								
8684-1RX	RXE-100 Remote Expansion Enclosure ^{15, 16}	-	-	-	-	-	-	-

1. Adapters rated at a lower frequency than the slots in which they are installed will reduce the bus to the frequency of the slowest adapter. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers. Slot six is not available if the serial port assembly cable shipped with the system is installed.

2. All six slots are full-length hot-plug capable. For network operating system support, access www.pc.ibm.com/us/compat.

3. xSeries 445 includes an integrated dual channel Ultra320 SCSI controller with one external and one internal connector. See Internal SCSI Cabling or Internal Cabling Overview for cabling alternatives. When a RAID controller is installed as a boot disk, it must be installed in a slot that is scanned before other RAID controllers in the configuration. Refer to the scan sequence provided in this section.

4. See Fibre Channel Solutions Overview section for additional configuration information.

5. PCI Wide Ultra160 SCSI Adapter (P/N 19K4646) is supported for external connections only.

6. xSeries 445 has an integrated dual-port Broadcom-based 10/100/1000 PCI Ethernet controller (copper), which supports Wake on LAN.

7. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. One of the optional PCI Ethernet adapters listed is copper and Intel-based (P/N 06P3601) and three are Broadcom-based (22P7801, 31P6301, 31P6401).

8. The Wake on LAN function of this option is supported by this server.

9. xSeries 445 provides three USB ports (two on the rear of the chassis and one on the front) and PS/2 connectors for monitor, keyboard and mouse. An external serial port can be enabled in the slot one bracket by installing the serial port assembly cable shipped with the system.

10. Due to homology variances, modem availability may differ by country. 19K4162 is supported only by Windows operating systems.

11. Optional modem 19K4162 has been withdrawn from marketing in North America (effective 08/26/03).

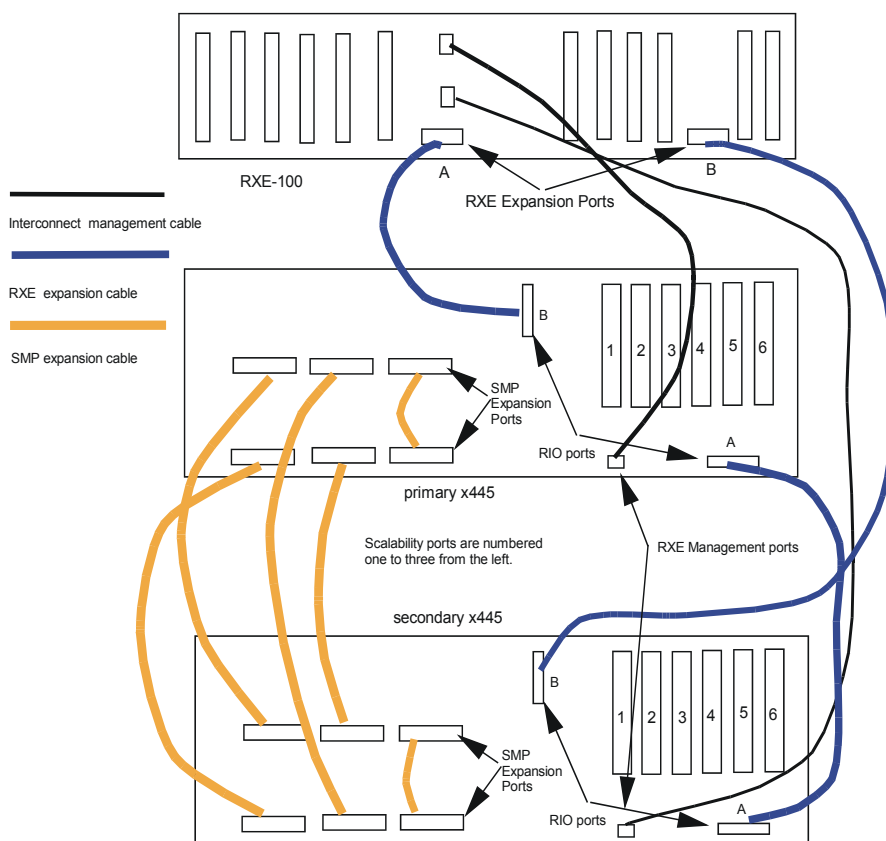
12. xSeries 445 includes a Remote Supervisor Adapter (RSA) installed in a dedicated PCI slot with an external connector, leaving six PCI slots available for optional adapters. Support for connection to other servers requires an optional Advanced System Management Interconnect Cable Kit (P/N 03K9309). Direct connection to the RXE drawer management controller in an RXE-100 Remote Expansion Enclosure is supported through a standard Interconnect Management Cable Kit with 3.5m cable. An 8m optional cable is available. 16-way configurations provide an Ethernet crossover cable to connect the Ethernet ports in the RSAs in each chassis if they are not connected to an Ethernet LAN. All system management functionality supported by the RSA is provided for both the primary and secondary servers through the Ethernet connection on the RSA. The RS485 port is only required when the 16-way x445 configuration is interconnected to support additional systems with the x440 standard RSA serving as a focal point for those systems.

13. This adapter is available as an upgrade to the Remote Supervisor Adapter that ships standard in xSeries 445. Installation must be done by an authorized IBM service technician. This service is provided at no additional cost.

14. Required to connect the standard Remote Supervisor Adapter to an interconnect network with other servers for system management support through a single LAN or modem connection. Up to 24 Integrated System Management Processors or Remote Supervisors Adapters may be interconnected with an aggregate connection length of no more than 91.4m (300ft). This interconnect network of 24 devices may also include a maximum of 12 Advanced System Management Processors or Advanced System Management PCI Adapters. A customer-supplied Cat5 cable is required for each interconnection. System management RS485 interconnect network connections for 16-way configurations are not required unless the RSA in the 16-way x445 configuration is a focal point for additional systems.

15. RXE-100 Remote Expansion Enclosure supports up to 12 additional PCI-X slots. Cable required for connection included with expansion unit, which attaches to a standard integrated RIO port located on the back of the x445 chassis. An optional longer cable is available. Refer to RXE-100 section for diagrams and supported options.

16. xSeries 445 supports only one RXE-100 for all server configurations. Two- and four-way systems use only RIO port A because port B is inactive unless a second SMP Expansion Module is installed. Sixteen-way systems require a connection from each server and an interconnection between the servers.





xSeries 445 Power, Monitors & Accessories

Part Number	Description
Power¹	
Uninterruptible Power Supply (UPS)²	
32P1020	APC 2U Smart-UPS 1400RMB
2130R30	UPS3000XLV ³
2130R31	UPS3000XHV ³
32P1692	UPS Extend Run Battery Pack ³
37L6861	APC Smart-UPS 5000RMB ⁴
Monitors⁵	
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black ⁶
63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black ⁶
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁷
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard) ⁷
32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁷
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard) ⁷

1. xSeries 445 includes two 1050W, hot-swap power supplies with two 2.8m/9ft IEC 320-C13 to IEC 320-C14 power cables for intrarack power distribution. Models shipped in the US also include two 2.8m/9ft IEC 320-C13 to NEMA 6-15P power cords for attachment to high voltage power sources. Power supply redundancy is standard for all configurations with a high voltage power source. If a low voltage source is used, power supplies operate at 550w and redundancy is supported only for configurations with two processors (low voltage is not supported for 16-way installations).
2. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
3. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
4. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
5. xSeries 445 uses an SVGA controller (ATI Rage XL) with 8MB of video memory. Optional video adapters are not supported. Sixteen-way configurations support console connections only through the primary chassis.
6. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).
7. Includes a 15in Flat Panel Monitor.

Part Number	Description
Rack and NetBAY^{1, 2}	
	Refer to the Rack Cabinets and Options section for information concerning IBM racks and rack-supported devices.
Console Connectivity^{2, 3}	
1735L04	NetBAY Local Console Manager
1735R16	NetBAY Remote Console Manager
32P1636	250mm KVM Conversion Option
32P1652	1.5m KVM Conversion Option
73P5832	USB Conversion Option (four-pack)
09N4290	NetBAY 1x4 Console Switch
09N4291	NetBAY 2x8 Console Switch
Keyboard and Mouse⁴	
28L3644	Space Saver II Keyboard ^{5, 6}
10K3849	106-key Preferred USB Keyboard with 2-port USB Hub (stealth black) ^{7, 8}
28L3673	Sleek 2-Button Stealth Black Mouse

1. xSeries 445 is housed in a 19in rack-mountable drawer and requires one of the racks listed in the Rack Cabinets and Options section.
2. Sixteen-way configurations support console connections only through the primary chassis.
3. Refer to the Rack Console Options section for information regarding console connectivity using these options.
4. xSeries 445 supports rack configurations only and ships without a keyboard or mouse. The system includes three USB ports (one on the front of the chassis), SVGA video port, mouse port and keyboard port. USB ports are not active on the secondary server in 16-way configurations.
5. Installation within a rack requires optional keyboard tray (P/N 28L4707) which stows in ready-to-use position, or NetBAY 1U or 2U Flat Panel Monitor Console Kit (P/N 32P1032, 32P1702). Standard with 1U and 2U NetBAY console kits (P/N 32P1031, 32P1702).
6. Advanced TrackPoint IV features are not available on IBM xSeries systems.
7. Installation within a rack requires optional keyboard tray (P/N 28L4707). This keyboard cannot share a keyboard tray with a flat panel display.
8. USB accessories attach to a single USB-capable server or to either the Local or Remote Console Manager using a USB Conversion Option (P/N 73P5832).

xSeries 445 Tape Options

Part Number	Tape Drives	Bays Supported¹	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures
00N8016	100/200GB LTO Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X 0034B1X
24P2396	100/200GB LTO Half-High Tape Drive ⁵	-	16 Ultra2 LVD	133mm (5.25in) HH	Y ²	0034B1X 3510020 ⁷
59P6736	160/320GB SDLT Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X 0034B1X
59P6744	LTO FH Generation-2 Tape Drive Option	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	0034B0X 3503B1X
Tape Autoloaders						
360716X	3607 Series 1760G/3.5TB SDLTpro Tape Autoloader	-	16 Ultra2 LVD	2U Rack	Y	-
360726X	3607 Series 1.6TB/3.2TB LTO Tape Autoloader	-	16 Ultra2 LVD	2U Rack	Y	-
External Tape Libraries³						
4560SLX	SDLT/LTO Modular Tape Library	-	16 Ultra2 LVD	5U Rack	Y	-
External Tape Enclosures						
0034B0X	NetBAY Tape Enclosure (Rack Mount) ⁴			4U Rack	N	-
3503B1X	Full-High SCSI Tape Enclosure ⁵	-	16 Ultra2 LVD	Desktop or 3U Rack	Y	-
3510020	External Half High SCSI Storage Enclosure ⁶		16 LVD	Desktop	N	-
Associated Options						
00N7956	68-pin External Multimode LVD/SE SCSI Terminator	-	16 LVD/SE	External	Y	3510020

1. xSeries 445 does not support internal tape drives. An external tape library or tape enclosure must be used. All tape drives and enclosures are supported by the integrated SCSI controller connected to the external 0.8mm VHDCI connector. Both PCI Wide Ultra160 SCSI Adapter (P/N 19K4646) and Single Channel Ultra320 SCSI Controller (P/N 71P8594) support external tape attachment for all compatible devices through the external 0.8mm VHDCI connector. Select tape drive, enclosure and controller then use Appendix D: Cables - Storage Units - Controllers to select an appropriate external cable.

2. Termination requires installing the 34in single-drop, terminated LVD SCSI cable provided with the option.

3. Tape library attributes and prerequisites are located in Appendix B: Tape Library Attributes.

4. NetBAY Tape Enclosure (P/N 0034B0X) is a 4U rack-mounted enclosure that supports four full-high or six half-high tape drives. The backplate includes six 0.8mm VHDCI external connectors for attachment of up to six servers. Internal connection of tape drives requires the single-drop terminated LVD SCSI cable that ships with the tape drive, which also provides termination for the SCSI bus. A single 320w power supply with a low-voltage power cord is standard. An external SCSI storage cable is not provided. Refer to Appendix D: Cables - Storage Units - Controllers to select a supported cable.

5. Black desktop or 3U rack tape enclosure supports a single 133mm (5.25in) full-high LVD tape device including DLT tape drives. Requires a fixed shelf if installed in a rack (allow additional 1U for fixed shelf). Includes a 90w power supply, cooling fan, external terminator, power cord (country-specific) and 2m 68-pin to 0.8mm external cable.

6. Black desktop tape enclosure that supports a single 133mm (5.25in) half-high (HH) tape drive. Internal and external connectors are 68-pin high-density supporting LVD. Requires 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956). External cables are not included. Refer to Appendix D: Cables - Storage Units - Controllers to select a supported cable.

7. Requires 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956).

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

xSeries 445 Sales Building Blocks

SBB Number	Option Part Number	SBB Description	Rules
02R1933	-	x445 Base System	
Selectable Hardware			
02R1928	-	3.0GHz/400MHz-512KB L2 Cache with Xeon Processor	Only quantity of 2 allowed.
02R1930	02R2062	2GHz/400MHz-1MB L3 Cache Upgrade with Xeon Processor MP	Only quantity of 2 allowed.
02R1931	02R2063	2.5GHz/400MHz-1MB L3 Cache Upgrade with Xeon Processor MP	Only quantity of 2 allowed.
02R1932	02R2064	2.8GHz/400MHz-2MB L3 Cache Upgrade with Xeon Processor MP	Only quantity of 2 allowed.
02R2033	-	Additional 3.0GHz/512KB L2 Cache, Xeon Processor	If SMP Expansion Module (02R1935) is selected, then only quantity of 2 allowed. If SMP Expansion Module is not selected, then 02R2033 is not allowed.
02R2034	02R2062	Additional 2.0GHz/1MB L3 Cache, Xeon Processor MP	If SMP Expansion Module (02R1935) is selected, then only quantity of 6 allowed. If SMP Expansion Module is not selected, then quantity of 0 or 2 allowed.
02R2035	02R2063	Additional 2.5GHz/1MB L3 Cache, Xeon Processor MP	If SMP Expansion Module (02R1935) is selected, then only quantity of 6 allowed. If SMP Expansion Module is not selected, then quantity of 0 or 2 allowed.
02R2036	02R2064	Additional 2.8GHz/2MB L3 Cache, Xeon Processor MP	If SMP Expansion Module (02R1935) is selected, then only quantity of 6 allowed. If SMP Expansion Module is not selected, then quantity of 0 or 2 allowed.
37L3538	33L5038	512MB PC2100 ECC DDR SDRAM RDIMM	Minimum total memory = 2GB(4x512 RDIMMs or 2x1GB RDIMMs).
33P3126	33L5039	1GB PC2100 ECC DDR SDRAM RDIMM	Sets of 2 required if mirroring is not selected. Sets of 4 required if mirroring is selected.
32P9223	33L5040	2GB PC2100 ECC DDR SDRAM RDIMM	Sets of 2 required if mirroring is not selected. Sets of 4 required if mirroring is selected.
32P0746	32P0726	36.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	Quantity of 2 allowed. Mirroring requires matched HDDs.
32P0747	32P0727	73.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	Quantity of 2 allowed. Mirroring requires matched HDDs.
32P0748	32P0728	146.8GB 10Krpm Ultra320 SCSI Hot-swap HDD	Quantity of 2 allowed. Mirroring requires matched HDDs.
32P0744	32P0734	36.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	Quantity of 2 allowed. Mirroring requires matched HDDs.
32P0745	32P0735	73.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	Quantity of 2 allowed. Mirroring requires matched HDDs.
02R2032	22P9102	ThinkPad Ultralight 8x Max DVD-ROM Ultrabay 2000 Drive	Optional in Ultrabay 2.
02R3485	22P6991	ThinkPad CD-RW/DVD Combo IV Ultrabay 2000 Drive	Optional in Ultrabay 2.
32P9070	08K9603	ThinkPad Removable Diskette Drive	Required in Ultrabay 1.
24P2334	00N6881	FASTt Host Adapter	The following rules apply to storage controllers and other PCI adapters as dependencies.
24P0963	24P0960	FASTt FC-3 Host Adapter	Only five slots can be populated if one or more PCI RAID controllers or a SCSI adapter is installed. The maximum number of Fibre Channel adapters that can be installed is three.
24P3471	06P5736	ServeRAID-4MX Ultra 160 SCSI Controller	If a SCSI adapter and one or more RAID controllers is installed, only one additional PCI adapter
24P3472	06P5740	ServeRAID-4LX Ultra 160 SCSI Controller	can be installed. Installation of two SCSI controllers and one or more RAID controllers or three SCSI is not supported. If two SCSI controllers are selected, then a maximum of one additional non-RAID device is allowed.
24P2650	19K4646	PCI Ultra 160 SCSI Adapter	External attachment only.
24P2333	37L6889	ServeRAID-4H Ultra 160 SCSI Controller	External attachment only.
71P8614	71P8594	Single Channel Ultra320 SCSI Controller	External attachment only.
32P9296	22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter	Supported in slots 1-6 unless serial port assembly cable installed in slot 1 or if storage controller limitations apply.
31P6305	31P6301	NetXtreme 1000 T Ethernet Adapter (copper)	Supported in slots 1-6 unless serial port assembly cable installed in slot 1 or if storage controller limitations apply.
32P9298	31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper)	Supported in slots 1-6 unless serial port assembly cable installed in slot 1 or if storage controller limitations apply.
02R2647	34L5001	16/4 Token-ring PCI Management Adapter	Supported in slots 1-6 unless serial port assembly cable installed in slot1 or if storage controller limitations apply.
24P2327	34L5201	High-speed 100/16/4 Token-ring PCI Management Adapter	Supported in slots 1-6 unless serial port assembly cable installed in slot 1 or if storage controller limitations apply.





25P2889	06P3601	10/100 Ethernet Server Adapter	Supported in slots 1-6 unless serial port assembly cable installed in slot 1 or if storage controller limitations apply.
24P2605	36L8886	Rack power cable-2.8m, 100-240v, C13 to IEC 320-C14 (WW)	2 identical line cords required.
32P9071	34G0253	Rack power cable-4.3m, 100-240v, C13 to IEC 320-C14 (WW)	2 identical line cords required.
32P9072	1838574	Line Cord-2.8m, 200-240, C13 to NEMA 6-15P (US)	2 identical line cords required.
32P9073	1838576	Line Cord-1.8m, 200-240, C13 to NEMA 6-15P (US)	2 identical line cords required.
21P 9459	02K0546	Line Cord-2.8m, 220-240, C13 to GB 2099.1 (China)	2 identical line cords required.
21P9452	13F9940	Line Cord-2.8m, 220-240, C13 to AS/NZ 3112 (Australia/NZ)	2 identical line cords required.
21P9454	13F9979	Line Cord-2.8m, 220-240, C13 to CEE7-VII (Europe)	2 identical line cords required.
21P9456	13F9997	Line Cord-2.8m, 220-240, C13 to DK2-5a (Denmark)	2 identical line cords required.
21P9461	14F0015	Line Cord-2.8m, 220-240, C13 to SABS 164 (South Africa/India)	2 identical line cords required.
21P9455	14F0033	Line Cord-2.8m, 220-240, C13 to BS 1363/A (UK)	2 identical line cords required.
21P9462	14F0051	Line Cord-2.8m, 220-240, C13 to SEV 1011-S24507 (Switzerland)	2 identical line cords required.
21P9457	14F0069	Line Cord-2.8m, 220-240, C13 to CEI 23-16 (Italy)	2 identical line cords required.
21P9460	14F0087	Line Cord-2.8m, 220-240, C13 to SI 32 (Israel)	2 identical line cords required.
21P9458	36L8880	Line Cord-2.8m, 220-240, C13 to IRAM 2073 (Argentina)	2 identical line cords required.
Derived Hardware			
02R1935	-	SMP Expansion Module	If CFC SBB 02R2445 is also selected, then qty=8 of Xeon MP Processors are required.
02R1935	-	SMP Expansion Module	If CFC SBB 02R2446 is also selected, then qty=4 of Xeon DP Processors are required.
02R1934	-	Single CEC Enabled	If CFC SBB 02R1935 is not selected, then derive this PN.
01R0860	-	Cooling Kit for 2-way System	Required for a 2-CP system with Xeon MP (02R2445). Not required for a 2-CPU system with Xeon DP (02R2446).
22P0113	-	3.5in SL Hot-swap Bezel Assembly (filler)	One is required for each open HDD bay.
59P3582	-	Blank Ultrabay Bezel	One is required for each open Ultrabay.
02R2008	-	8870 IBM Specific	Derived. Required with every system. Includes software (BIOS and diagnostics).
Software			
22P0160	-	Windows 2000 Server	
22P0159	-	Windows 2000 Advanced Server (Preloaded)	
02R1886	-	Windows 2003 Server, Enterprise Edition (Preloaded)	
02R1887	-	Windows 2003 Server, Standard Edition (Preloaded)	
24P3442	-	Windows 2000 Server (Customer provided and installed)	
24P3445	-	Windows 2000 Advanced Server (Customer provided and installed)	
02R1888	-	Windows 2003 Server, Enterprise Edition (Customer provided and installed)	
02R1889	-	Windows 2003 Server, Standard Edition (Customer provided and installed)	
25P2853	-	Unknown or not required	
32P9274	-	Windows 2000 Server US English	
32P9275	-	Windows 2000 Advanced Server US English	
25P2854	-	Customer provided and installed	
Manufacturing Instructions			
32P8863	-	RAID 0 - Primary Array - minimum of 1 HDD required	
32P8864	-	RAID 1 - Primary Array - 2 HDDs required	
32P8868	-	RAID 0 - Secondary Array - minimum of 1 HDD required	
32P8873	-	Internal RAID - Cabled and Setup	
32P8874	-	Internal RAID - Cabled only, Setup by Customer	
32P8875	-	No internal RAID	
59P5805	-	Integrated Mirroring - 2 identical HDDs required	No additional Storage pull-down menu.
01R0862	-	Enable Memory Mirroring	Must be selected in quantities of 4.



xSeries 445 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

Basic SCSI Configuration

Part Number	Description	Quantity
8870-3RY	xSeries 445 2x3GHz/400MHz-512KB Xeon, 2GB ECC, open, 24x-8x DVD-ROM	1
02R1871	SMP Expansion Module for Entry Models with two 3GHz/400MHz-512KB Xeon Processors	1 ¹
33L5038	512MB DDR PC2100 ECC RDIMM	4
32P0726	36.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	2
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	1
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black	1
37L6861	APC Smart-UPS 5000RMB	1
External Storage		
35311RU	EXP300 Storage Expansion Unit	1
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	6 ²
Rack Options		
9306110	NetBAY11 Standard Rack Cabinet	1
28L3644	Space Saver II Keyboard	1

1. Total of four processors (two per SMP Expansion Module).

2. Six HDDs are used for RAID-5E protection in EXP300. One HDD is identified as a hot-spare. Effective capacity is five HDDs in the storage enclosure (total of 182GB).

High-availability SCSI Storage Solution

Part Number	Description	Quantity
8870-2RX	xSeries 445 2x2.5GHz/400MHz-1MB Xeon MP, 2GB ECC, open, 24x-8x DVD-ROM	1
02R1870	SMP Expansion Module for Base Models	1
02R2063	2.5GHz/400MHz-1MB L3 Cache Upgrade with Xeon Processor MP	6 ¹
33L5038	512MB DDR PC2100 ECC RDIMM	12 ²
32P0726	36.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	2
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	2
31P6301	NetXtreme 1000 T Ethernet Adapter (copper)	1
37L6861	APC Smart-UPS 5000RMB	1
External Storage		
35311RU	EXP300 Storage Expansion Unit	4
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	52 ³
3503B1X	Full-high SCSI Tape Enclosure	1
00N8016	100/200GB LTO Tape Drive	2
Rack Options		
9306420	NetBAY42 Standard Rack Cabinet	1
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (w/ US Space Saver Keyboard)	1
94G6670	Blank Filler Panel Kit	1

1. Total of eight processors (four per SMP Expansion Module).

2. Total memory of 8GB.

3. Thirteen HDDs are used for RAID-5E protection in each EXP300 (bay six remains empty in twintail high-availability EXP300 configurations). One HDD is identified as a hot-spare. Effective capacity is 12 HDDs in each storage enclosure (total of 1.89TB).

High-availability Fibre Channel Solution

Part Number	Description	Quantity
8870-4RY	xSeries 445 4x3GHz/400MHz-512KB Xeon, 2GB ECC, open, 24X-8x DVD-ROM	1
33L5038	512MB DDR PC2100 ECC RDIMM	4 ¹
06P5767	36.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	2 ²
31P6301	NetXtreme 1000 T Ethernet Adapter (copper)	1
24P0960	FC2-133 Host Bus Adapter	2
37L6861	APC Smart-UPS 5000RMB	1
2130R31	UPS3000XHV	1
External Storage		
174290U	FASiT900 Storage Server (US line cord)	1 ³
17401RU	FASiT EXP700 Storage Expansion Unit	4
06P5761	2Gbps FC 36.4GB/10K Drive	56
Rack Options		
9306420	NetBAY42 Standard Rack Cabinet	1
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (w/ US Space Saver Keyboard)	1
94G6670	Blank Filler Panel Kit	1

1. Total memory of 4GB.
2. Total of two 36.4GB internal HDDs for NOS mirroring using the integrated mirroring function.
3. Fibre Channel cable, SFP Modules and FASiT700 Mini Hubs not included.

Microsoft Exchange High-availability Fibre Channel Solution

Part Number	Description	Quantity
8870-4RX	xSeries 445 4x2.8GHz/400MHz-2MB Xeon MP 2GB ECC, open, 24x-8x DVD-ROM	1
02R1870	SMP Expansion Module for Base Models	1
02R2064	2.8GHz/400MHz-2MB L3 Cache Upgrade with Xeon Processor MP	4 ¹
33L5038	512MB DDR PC2100 ECC RDIMM	28 ²
32P0726	36.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	2 ³
31P6301	NetXtreme 1000 T Ethernet Adapter (copper)	1
24P0960	FC2-133 Host Bus Adapter	2
37L6861	APC Smart-UPS 5000RMB	1
2130R31	UPS3000XHV	1
External Storage		
17429RU	FASiT900 Storage Server (US line cord)	1 ⁴
17401RU	FASiT EXP700 Storage Expansion Unit	4
06P5761	2Gbps FC 36.4GB/10K Drive	56
Rack Options		
9306420	NetBAY42 Standard Rack Cabinet	1
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (w/ US Space Saver Keyboard)	1
94G6670	Blank Filler Panel Kit	1

1. Total of eight processors (four per SMP Expansion Module).
2. Total memory of 16GB.
3. Total of two 36.4GB internal HDDs for NOS mirroring using the integrated mirroring function.
4. Fibre Channel cable, SFP Modules and FASiT700 Mini Hubs not included.



xSeries 450

Part Number^{1, 11}
 Withdrawal Date¹²
 Processor Speed²
 Number of Processors (Std/Max)
 L3 ECC Cache
 Memory (Std/Max)³
 Form Factor
 Power Supply Quantity (Std/Max)⁴
 Hot-Swap (Power, Slots, HDD, Fans)
 Redundancy (Optional, Standard)
 System Management Adapter⁵
 Onboard Ethernet (Mbps)⁶
 SCSI Controller (Dual, Ultra, RAID)⁷
 Removable Media Bays (Total/Avail)
 Internal HDD Storage (Std/Max)⁸
 Optical Drive (IDE)⁹
 Bays (Total/Avail)
 Slots (Total/Avail)¹⁰

xSeries 450 At-A-Glance

8688-4RX	30-Dec	1.3GHz	1/4	3MB	1GB/40GB	Rack (4U)	2/2	P, S, H, F	S-Fans, S-Power	Y	2x10/100/1000	D, U320	2/1	0/293.6GB	DVD-CD/RW	4/3	6/6
8688-5RX	30-Dec	1.4GHz	2/4	4MB	2GB/40GB	Rack (4U)	2/2	P, S, H, F	S-Fans, S-Power	Y	2x10/100/1000	D, U320	2/1	0/293.6GB	DVD-CD/RW	4/3	6/6
8688-6RX	30-Dec	1.5GHz	2/4	6MB	2GB/40GB	Rack (4U)	2/2	P, S, H, F	S-Fans, S-Power	Y	2x10/100/1000	D, U320	2/1	0/293.6GB	DVD-CD/RW	4/3	6/6

Note: This system requires an operating system and applications that are compatible with the IA-64 platform and Itanium 2 processors.

- Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. Only USB-capable accessories are supported. See Rack Cabinets and Options section for supported IBM racks.
- Itanium 2 processor with full-speed ECC L3 cache and 400MHz (double-pumped) access to memory and I/O buses, using Explicitly Parallel Instruction Computing (EPIC) technology.
- High-speed 133MHz DDR PC2100 RDIMM. Maximum amount includes 20 2GB RDIMMs, which requires replacing the standard RDIMMs. When one or more pairs of 2GB RDIMMs are installed, a maximum of 20 RDIMMs are supported. Advanced Chipkill ECC memory controller corrects single, two-, three-, and four-bit memory errors. Memory options are two-way interleaved, requiring installation of RDIMMs in matched pairs. Fourteen sockets are attached to each of two memory ports for a total of 28 sockets. Full memory mirroring capability is available.
- Two 1050w voltage-sensing, hot-swap power supplies are standard, supporting N+N redundancy in full configurations.
- Advanced system management is provided by a standard Remote Supervisor Adapter installed in a dedicated PCI slot, which allows six optional PCI adapters to be installed.
- A Broadcom BC5704 copper gigabit dual-port Ethernet controller is integrated into the planar.
- The dual-channel, Ultra320 integrated controller supports both Ultra160 and Ultra320 HDDs, but mixing of HDD technologies is not supported. The LSI-1030 chipset allows for the two internal HDDs to be mirrored if a RAID adapter is not installed. Mirrored HDDs must be matched.
- Maximum capacity requires installing two 146.8GB hot-swap SCSI HDDs.
- Variable read rate. Actual playback speed will vary and is often less than the maximum possible.
- Support for an additional 12 64-bit slots is available through installation of the optional RXE-100 Remote Expansion Unit. Refer to x450 I/O Options or the RXE-100 section for more information.
- Availability in the U.S. is limited to the Large Enterprise Direct (LED) program or through EXAct Business Partner program members.
- Not available from IBM after this date. Business Partner inventory may be available.

xSeries 450 Processors

Part Number	Processor Upgrades ¹	SMP Support ¹
73P7076	1.3GHz/400MHz-3MB L3 Cache Itanium 2 Processor	4RX
73P7077	1.4GHz/400MHz-4MB L3 Cache Itanium 2 Processor	5RX
73P7078	1.5GHz/400MHz-6MB L3 Cache Itanium 2 Processor	6RX

1. A maximum of four processors can be installed. Identical type, speed and cache size are recommended for processor options. Processors may be installed in any order, but the preferred order is sockets 1-2-3-4. Sockets one and three are located on the top side of the processor card, and sockets two and four are located on the bottom side.

xSeries 450 Memory

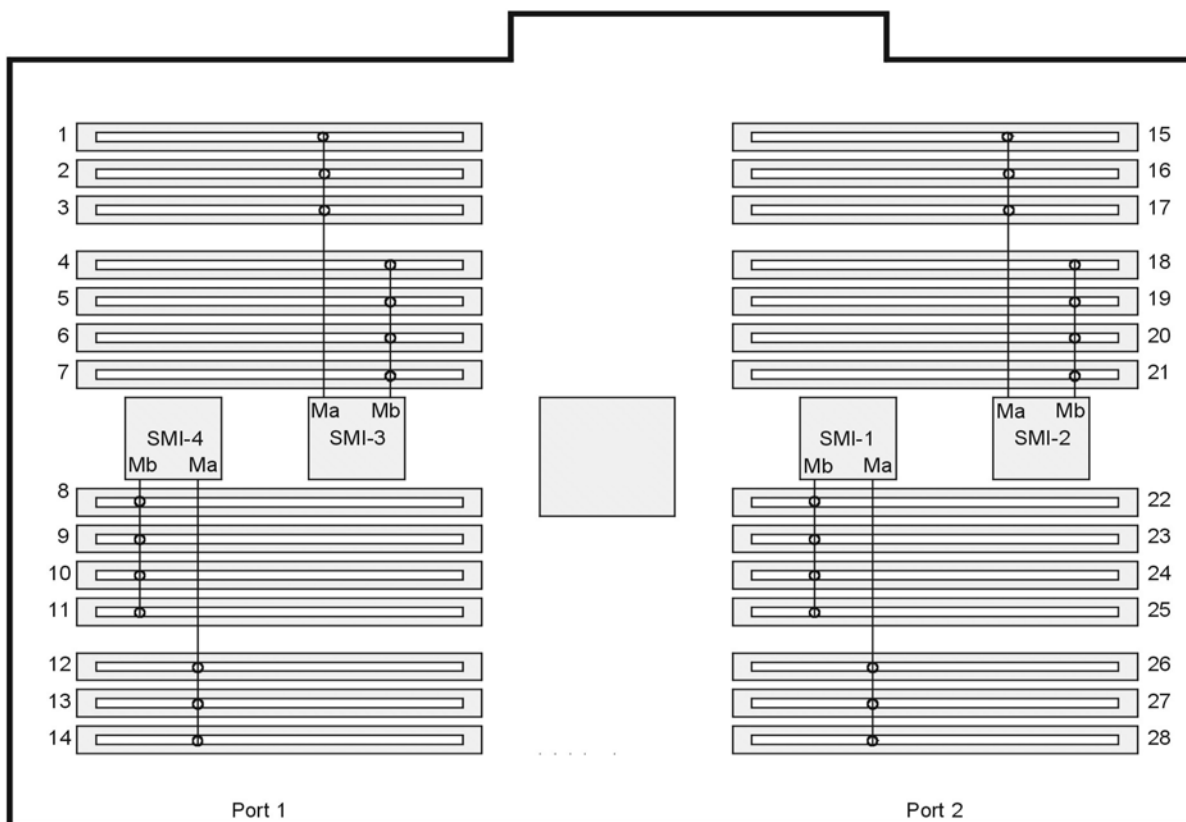
Part Number	Memory Description ¹
73P2027	EXA 512MB PC2100 CL2.5 ECC DDR SDRAM RDIMM
73P2028	EXA 1GB PC2100 CL2.5 ECC DDR SDRAM RDIMM
73P2030	EXA 2GB PC2100 CL2.5 ECC DDR SDRAM RDIMM ²

1. Due to two-way interleaving, installation of memory options in matched pairs is required. Populate RDIMMs in the order provided in the table, referring to the memory card diagram for location of sockets.
 2. When one or more pairs of 2GB RDIMMs are installed, the maximum number of RDIMMs supported is 20.

Notes:

- 1) Performance is optimized by balancing the amount of memory between ports.
- 2) In order to enable memory mirroring during BIOS set-up, the same memory configuration must be installed in each port (memory mirroring reduces the amount of memory available to the operating system by half).

Numbering of RDIMM sockets on memory card



Order of Installation			
	Port 1 RDIMM sockets		Port 2 RDIMM sockets
1	1, 14	2	15, 28
3	4, 11	4	18, 25
5	2, 13	6	16, 27
7	5, 10	8	19, 24
9	3, 12	10	17, 26
11	6, 9	12	20, 23
13	7, 8	14	21, 22



Total System Memory		Quantity of RDIMMs Added ¹		
1GB (2x512MB) models	2GB (4x512MB) models	512MB (73P2027)	1GB (73P2028)	2GB (73P2030)
2GB	-	2	-	-
3GB	4GB	4	-	-
4GB	5GB	6	-	-
5GB	6GB	8	-	-
6GB	7GB	10	-	-
7GB	8GB	12	-	-
8GB	9GB	14	-	-
9GB	10GB	16	-	-
10GB	11GB	18	-	-
11GB	12GB	20	-	-
12GB	13GB	22	-	-
13GB	14GB	24	-	-
14GB	-	26	-	-
15GB	-	24	2	-
16GB	-	22	4	-
17GB	-	20	6	-
18GB	-	18	8	-
19GB	-	16	10	-
20GB	-	14	12	-
21GB	-	12	14	-
22GB	-	10	16	-
23GB	-	8	18	-
24GB	-	6	20	-
26GB	-	2	8	8
28GB	-	2	6	10
32GB ²	32GB ²	-	8	12
34GB ²	34GB ²	-	6	14
36GB ²	36GB ²	-	4	16
38GB ²	38GB ²	-	2	18
40GB ²	40GB ²	-	-	20

This table does not represent all possible memory configurations. RDIMMs must be added in matched pairs to support interleaving technology.

1. To obtain the quantity of memory identified in the "Total Memory" column, select the appropriate row and order the quantity of RDIMMs identified in all columns for that row, which will be added to the standard memory noted at the top of the left column.
2. Requires removal of standard memory.

xSeries 450 Internal SCSI Cabling

The xSeries 450 mechanical contains four drive bays on the lower front side of the server. The bottom two side-by-side, 5.25in slim-line bays support removable media devices. One bay contains the standard DVD-CD/RW and the other bay is open. Two 3.5in, SCA-2 compliant, slim-line, hot-swap drive bays are located above these two bays. The IDE DVD-CD/RW device is cabled directly to the IDE port. The two hot-swap bays are connected to the integrated Ultra320 SCSI controller through a hot-swap backplane and 16-bit LVDS cable.

The Ultra320 SCSI controller contains a second channel that supports external SCSI devices. The controller is connected to an external, industry-standard, 0.8mm VHDCI connector through a 16-bit LVDS cable.

For additional information regarding internal cabling, refer to Appendix F: Internal Cabling Overview.

xSeries 450 Hard Disk Drive (HDD) Storage

Total Internal Storage ¹	10,000rpm HDDs			15,000rpm HDDs	
	36.4GB (06P5755, 32P0726) ²	73.4GB (06P5756, 32P0727) ²	146.8GB (32P0728)	36.4GB (06P5768, 32P0734) ²	73.4GB (32P0735)
0GB	Standard on base models				
36.4GB	1	-	-	1	-
72.8GB	2	-	-	2	-
73.4GB	-	1	-	-	1
146.8GB	-	2	1	-	2
293.6GB	-	-	2	-	-

This table does not represent all possible HDD configurations. Total internal storage listed is within +/- 0.2GB unless otherwise noted.

1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.
2. Mixing of Ultra320 and Ultra160 HDDs is not supported.

Part Number	Description	RPM	Height	Bays Supported ¹	Maximum Quantity
Hot-swap Ultra160 HDDs^{1, 2}					
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	10000	SL	1, 2	2
06P5756	73.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	10000	SL	1, 2	2
06P5768	36.4GB 15Krpm Ultra160 SCSI Hot-swap SL HDD	15000	SL	1, 2	2
Hot-swap Ultra320 HDDs¹					
32P0726	36.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	10000	SL	1, 2	2
32P0727	73.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	10000	SL	1, 2	2
32P0728	146.8GB 10Krpm Ultra320 SCSI Hot-swap HDD	10000	SL	1, 2	2
32P0734	36.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	15000	SL	1, 2	2
32P0735	73.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	15000	SL	1, 2	2
Removable Media			Bays Supported		
05K9233	ThinkPad 24x-10x CD-ROM Ultrabay 2000 Drive ³	3, 4			
22P6991	ThinkPad CD-RW/DVD Combo IV Ultrabay 2000 Drive ^{3, 4}	3, 4			
22P9102	ThinkPad Ultralight 8x Max DVD-ROM Ultrabay 2000 Drive ³	3, 4			
External Storage Expansion Units⁵			Form Factor		
35311RU	EXP300 Storage Expansion Unit ⁶	Rack (3U)			
17401RU	FASiT EXP700 Storage Expansion Unit ⁷	Rack (3U)			
35601RU	FASiT EXP500 Storage Expansion Unit ⁸	Rack (3U)			
35421RU	FASiT200 Storage Server ^{9, 10}	Rack (3U)			
35422RU	FASiT200 HA Storage Server ⁹	Rack (3U)			
19K1121	FASiT200 Redundant RAID Controller	-			

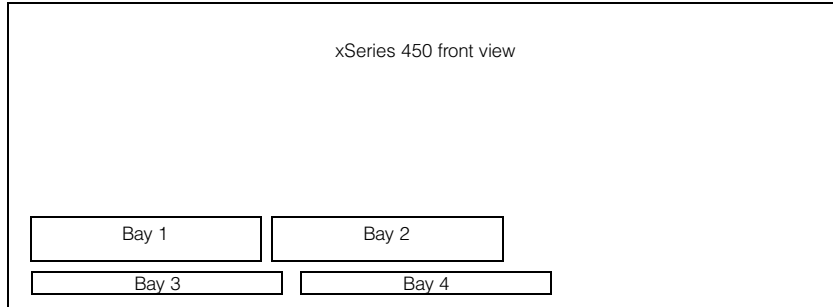
1. Mixing of Ultra320 and Ultra160 HDDs is not supported.
2. Ultra160 HDDs limit operation of the Ultra320 integrated controller to Ultra160 performance.
3. Install in either bay three or four, requiring removal of the standard device. If only one optical drive is installed, it must be installed in bay four. If a second optical drive is installed, configure bay three as slave.
4. Installed standard in bay four.
5. Not supported by the onboard external SCSI port, which supports external tape enclosures only. External SCSI HDD storage requires a RAID controller. Fibre Channel HDD storage requires a Fibre Channel controller. For HDD expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.
6. EXP300 includes a single 2m Ultra2 SCSI cable and dual hot-swap 500w redundant power supplies, each with its own power cord.
7. FASiT EXP700 Storage Expansion Unit (P/N 17401RU) includes dual hot-swap 400w power supplies, each with its own power cord.
8. FASiT EXP500 Storage Expansion Unit (P/N 35601RU) includes dual hot-swap 350w power supplies, each with its own power cord.
9. The FASiT200 includes two hot-swap, 350w auto-ranging redundant power supplies, each with its own power cord.
10. Can be upgraded to FASiT200 HA Storage Server through the addition of a FASiT200 Redundant RAID Controller (P/N 19K1121).



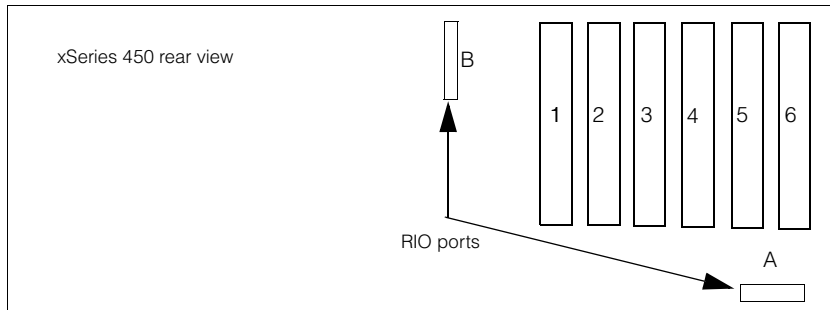
Bay	Form Factor	Height	Front Access	Usage
1, 2	HS	SL	Yes	open
3	133mm (5.25in)	SL ¹	Yes	FDD or optical
4	133mm (5.25in)	SL ²	Yes	optical

1. Supports FDD, high-density FDD, CD-ROM, CD-RW or DVD-ROM. If an IDE device (optical drive) is installed, it must be configured as slave.

2. Supports CD-ROM, CD-RW or DVD-ROM. Must be configured as master if bay three contains an optical drive. If only one optical drive is installed, it must be installed in bay four.



xSeries 450 I/O Options



- Slot 1: Bus A, 66MHz, 64-bit, full-length, 3.3v, Active PCI-X
- Slot 2: Bus A, 66MHz, 64-bit, full-length, 3.3v, Active PCI-X
- Slot 3: Bus B, 100MHz, 64-bit, full-length, 3.3v, Active PCI-X
- Slot 4: Bus B, 100MHz, 64-bit, full-length, 3.3v, Active PCI-X
- Slot 5: Bus C, 133MHz, 64-bit, full-length, 3.3v, Active PCI-X
- Slot 6: Bus D, 133MHz, 64-bit, full-length, 3.3v, Active PCI-X

Optimal order of installation (highest frequency adapters first): 6-5-4-2-3-1

Scan sequence:

Inside the server: slots 1, 2, 6, 5, 3, 4

Continuing in an RXE-100: slots 11, 12, 9, 10, 7, 8, 17, 18, 15, 16, 13, 14

Part Number	Description	Adapter Length	PCI Support ¹	Slots Supported ¹	Hot-Plug ²	PCI Voltage Key	MHz
Storage Controllers³							
02R0988	ServeRAID-6M Controller (256MB Cache) ⁴	Full	64-bit	1 ... 6	X	3.3	133
32P0033	ServeRAID-6M Controller (128MB Cache) ⁴	Full	64-bit	1 ... 6	X	3.3	133
19K4646	PCI Wide Ultra160 SCSI Adapter ⁴	Half	32-bit	1 ... 6	-	Universal	66
Fibre Storage Controllers and Options⁵							
24P0960	FC2-133 Host Bus Adapter	Half	64-bit	1 ... 6	X	Universal	133
17421RU	FAStT700 Fibre Channel Storage Server	-	-	-	-	-	-
35421RU	FAStT200 Storage Server	-	-	-	-	-	-
35422RU	FAStT200 HA Storage Server	-	-	-	-	-	-
3534F08	TotalStorage SAN Switch F08, 8-port	-	-	-	-	-	-
2109F16	SAN Fibre Channel Switch, 16-Port	-	-	-	-	-	-
Networking⁶							
Ethernet⁷							
06P3601	10/100 Ethernet Server Adapter ⁸	Half	32-bit	1 ... 6	X	Universal	33
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals ⁸	Half	64-bit	1 ... 6	X	Universal	133
22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter	Half	64-bit	1 ... 6	X	Universal	133
31P6301	NetXtreme 1000 T Ethernet Adapter (copper) ⁸	Half	64-bit	1 ... 6	X	Universal	133
31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper) ⁸	Half	64-bit	1 ... 6	X	Universal	133
Communications⁹							
System Management¹⁰							
03K9309	Advanced System Management Interconnect Cable Kit ¹¹	-	-	-	-	-	-
Remote I/O Expansion							
8684-1RX	RXE-100 Remote Expansion Enclosure ^{12, 13}	-	-	-	-	-	-

- Adapters rated at a lower frequency than the slots in which they are installed will reduce the bus to the frequency of the slowest adapter. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.
- All six slots are full-length hot-plug capable. For network operating system support, access www.pc.ibm.com/us/compat.
- xSeries 450 includes an integrated dual channel Ultra320 SCSI controller with one external and one internal connector. See Internal SCSI Cabling or Internal Cabling Overview for cabling alternatives.
- ServeRAID-6M and PCI Wide Ultra160 SCSI Adapter are supported for external HDD configurations only due to cabling interference with internal connectors.
- See Fibre Channel Solutions Overview section for additional configuration information.
- xSeries 450 includes an integrated Broadcom (BC5704) 10/100/1000 dual-port Ethernet controller (copper). Wake on LAN is supported for the integrated Ethernet.
- In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. Two of the optional PCI Ethernet adapters listed are copper and Intel-based (P/N 06P3601, 22P6801) and two are Broadcom-based (22P7801, 31P6301).
- The Wake on LAN function of this option is supported by this server.
- xSeries 450 provides three USB ports (two on the rear of the chassis and one on the front), one serial port and one video port.
- xSeries 450 includes a Remote Supervisor Adapter (RSA) installed in a dedicated PCI slot with an external connector, leaving six PCI slots available for optional adapters. Support for connection to other servers requires an optional Advanced System Management Interconnect Cable Kit (P/N 03K9309). Direct connection to the RXE drawer management controller in an RXE-100 Remote Expansion Enclosure is supported through a standard Interconnect Management Cable Kit with a 3.5m cable. An 8m optional cable is available.
- Required to connect the standard Remote Supervisor Adapter to an interconnect network with other servers for system management support through a single LAN or modem connection. Up to 24 Integrated System Management Processors (ISMP) or Remote Supervisors Adapters (RSA) may be interconnected with an aggregate connection length of no more than 91.4m (300ft). This interconnect network of 24 devices may include a maximum of 12 Advanced System Management Processors or Advanced System Management PCI Adapters with 12 RSAs and ISMPs. A customer-supplied Cat5 cable is required for each interconnection.
- RXE-100 Remote Expansion Enclosure supports up to 12 additional PCI-X slots. The cable required for this connection is included with the expansion unit, which attaches to a standard integrated RIO port located on the back of the x450 chassis. An optional longer cable is available. Refer to RXE-100 section for diagrams and supported options.
- xSeries 450 supports only one RXE-100 for all server configurations.

xSeries 450 Power, Monitors & Accessories

Part Number	Description
Power¹	
Monitors²	
633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black ³
63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black ³
32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁴
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard) ⁴
32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ⁴
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard) ⁴

1. xSeries 450 systems include two 1050w hot-swap power supplies with two 2.8m/9ft IEC 320-C13 to IEC 320-C14 power cables for intrarack power distribution. Models shipped in the US also include two 2.8m/9ft IEC 320-C13 to NEMA 6-15P power cords for attachment to high voltage power sources. Power supply redundancy is standard for all configurations with a high voltage power source.

2. xSeries 450 uses an integrated ATI RageXL video controller with 8MB of video memory. Optional video adapters are not supported.

3. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).

4. Includes a 15in Flat Panel Monitor.

Part Number	Description
Rack and NetBAY¹	
	Refer to the Rack Cabinets and Options section for information concerning IBM racks and rack-supported devices.
Console Connectivity²	
1735L04	NetBAY Local Console Manager
1735R16	NetBAY Remote Console Manager
73P5832	USB Conversion Option (four-pack) ³
Keyboard and Mouse⁴	
10K3849	106-key Preferred USB Keyboard with 2-port USB Hub (stealth black) ^{6, 7}

1. xSeries 450 is housed in a 19in rack-mountable drawer and requires one of the racks listed in the Rack Cabinets and Options section.

2. Refer to the Rack Console Options section for information regarding console connectivity using these options.

3. Required to connect one of the USB ports on the server chassis to either a Local or Remote Console Manager (P/N 1735L04 or 1735R16). The option kit contains four 1.5m KVM cables, four 14in lengths of Cat5 cable, four large curly-lock cable connectors, and an eight-pack of velcro strips.

4. xSeries 450 supports rack configurations only and ships without a keyboard or mouse. Only USB-capable keyboards and mice are supported. The system includes three USB ports (one on front of chassis), a serial port and SVGA video port.

5. Advanced TrackPoint IV features are not available on IBM xSeries systems.

6. Installation within a rack requires optional keyboard tray (P/N 28L4707). This keyboard cannot share a keyboard tray with a flat panel display.

7. USB accessories attach to a single USB-capable server or to either the Local or Remote Console Manager using a USB Conversion Option (P/N 73P5832).

xSeries 455

Part Number 1, 2, 14
 Processor/FSB Speed (GHz/MHz)³
 Number of Processors (Std/Max)⁴
 Cache⁵
 Memory (Std/Max)⁶
 Form Factor
 Power Supply Quantity (Std/Max)⁷
 Hot-Swap (Power, Slots, HDD, Fans)
 Redundancy (Optional, Standard)
 System Management Adapter⁸
 Onboard Ethernet (Mbps)⁹
 Storage Controller¹⁰
 Removable Media Bays (Total/Avail)
 Internal HDD Storage (Total/Avail)
 Optical Drive (IDE)¹¹
 Bays (Total/Avail)
 Slots (Total/Avail)¹³

xSeries 455 At-A-Glance																
8855-1RX	1.3/400	1/4	3MB L3	1GB/56GB	Rack (4U)	2/2	P, S, H, F	S-Fans, S-Power	Y	1Gb	Dual U320	2/1	0/293.6GB	CD-RW/DVD	4/3	6/6
8855-2RX	1.4/400	2/4	4MB L3	2GB/56GB	Rack (4U)	2/2	P, S, H, F	S-Fans, S-Power	Y	1Gb	Dual U320	2/1	0/293.6GB	CD-RW/DVD	4/3	6/6
8855-3RX	1.5/400	2/4	6MB L3	2GB/56GB	Rack (4U)	2/2	P, S, H, F	S-Fans, S-Power	Y	1Gb	Dual U320	2/1	0/293.6GB	CD-RW/DVD	4/3	6/6

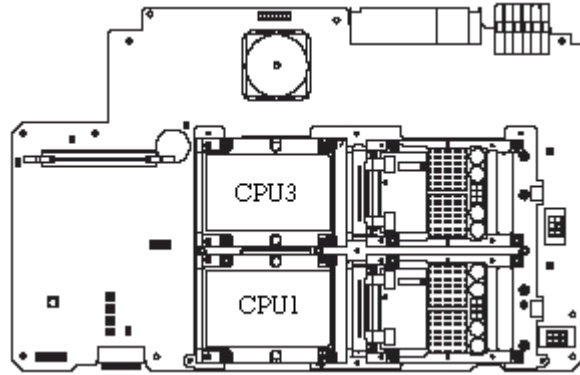
- Note: Refer to the Datacenter Solutions section for xSeries 455 DataCenter models.
- xSeries 455 also provides three USB ports (one in front and two in rear), one serial port (RS-232), and two RXE-100 expansion ports (RS-485) and one RXE-100 management port (RS-485). This system does not provide a floppy diskette drive.
 - Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
 - 64-bit Itanium 2 processor with full-speed L3 cache, a 400MHz (double-pumped) Front-side Bus (FSB) and Explicitly Parallel Instruction Computing (EPIC) architecture.
 - Multinode upgrade kits are available which provide 16-way scalability. Refer to x455 Processor section for more information.
 - In addition to the L3 cache, these models also have 64MB of Xcel4 Server Accelerator Cache that propels performance by reducing waits for main memory.
 - Advanced Chipkill ECC memory options are two-way interleaved supporting Memory ProTeXion, memory mirroring and hot-swap installation if mirroring is enabled.
 - Two 1050w, voltage-sensing, hot-swap power supplies are standard, supporting N+1 redundancy on all 220v configurations and some 110v configurations. For this reason x455 servers should be connected to a 220v power source.
 - Advanced system management is provided by a standard Remote Supervisor Adapter installed in a reserved slot.
 - Broadcom dual-port 5704 10/100/1000 Ethernet controller supporting Wake-On-Lan.
 - The LSI 1030 Ultra320 dual-channel integrated controller allows for two HDDs to be allocated for mirroring if a RAID adapter is not installed. Mirrored HDDs must be matched.
 - Maximum internal storage is based on two 146.8GB Ultra320 hot-swap HDDs.
 - ThinkPad Ultrabay 2000 16x/10x/24x/8x CD-RW/DVD drive is standard, installed in bay four.
 - Support for an additional 12 64-bit slots available through installation of the optional RXE-100 Remote Expansion Unit. Refer to x455 I/O Options for more information.
 - Availability in the U.S. is limited to the Large Enterprise Direct (LED) program or through EXAct Business Partner program members.

xSeries 455 Processors

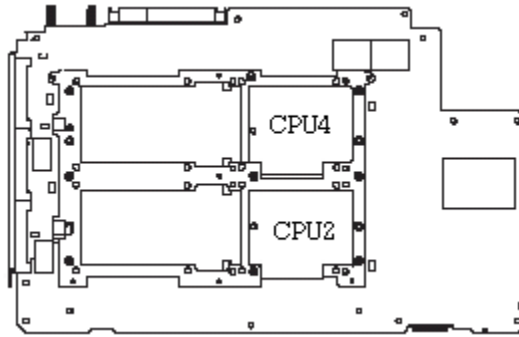
SBB Number	Option Number	Processor Upgrades ¹	SMP Support ²
73P6989	73P7076	1.3GHz/400MHz-3MB L3 Cache Itanium 2 Processor	1RX
73P6990	73P7077	1.4GHz/400MHz-3MB L3 Cache Itanium 2 Processor	2RX
73P6991	73P7078	1.5GHz/400MHz-3MB L3 Cache Itanium 2 Processor	3RX
Multi-node Upgrade Kits ³			
-	73P9715	4-way to 8-way Scalability Option ⁴	-
-	73P9711	8-way to 16-way Supplemental option ⁵	-

- xSeries 455 architecture optimizes memory and bus performance using an XA-64 core chipset supporting up to four 64-bit Itanium 2 processors in each model. x455 models include three SMP expansion ports, allowing up to four x455 systems to be interconnected creating up to a 16-way multi-node system. Note: All nodes in a multi-node system must be installed in the same rack.
- All processors must be identical in type, speed and cache size. The nodes of a multi-node system must be the same base model with identical processors.
- x455 models include three SMP expansion ports, allowing up to four x455 systems to be interconnected creating up to a 16-way multi-node system. Note: All nodes in a multi-node system must be installed in the same rack.
- Allows two nodes to be connected together providing an 8-way capable configuration. Includes two 2.5m cables.
- Allows two 8-way nodes to be connected together providing a 16-way capable configuration. Includes one 3.5m cable and three 2.5m cables. Note: 16-way capable configurations require both multi-node upgrade kits.

xSeries 455 Processor board (front)



xSeries 455 Processor board (back)



xSeries 455 Memory

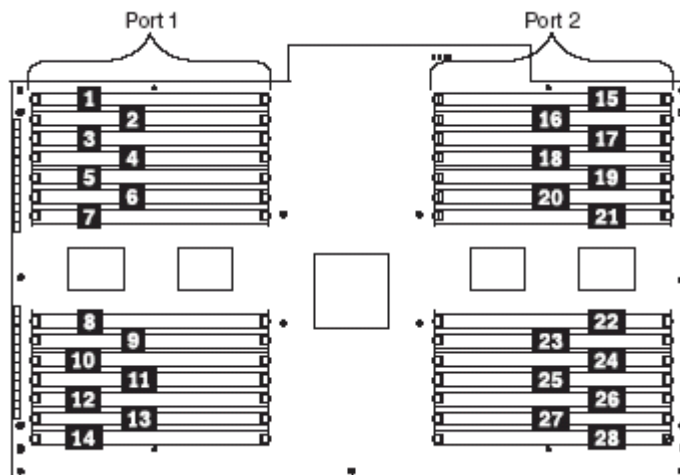
SBB Number	Option Number	Memory Description^{1, 2}
37L3538	33L5038	512MB PC2100 ECC DDR RDIMM
33P3126	33L5039	1GBB PC2100 ECC DDR RDIMM
32P9223	33L5040	2GBB PC2100 ECC DDR RDIMM

1. .x455 memory supports Chipkill, mirroring, hot-swap and memory ProteXion technologies.
 2. Installation of memory DIMMs in matched pairs is required. 56GB is supported via 28 DIMM sockets. Removal of standard memory is required to achieve the maximum supported amount.

Notes:

- a) Performance is optimized by balancing the amount of memory between ports.
- b) DIMM pairs must be matched between ports if memory mirroring is enabled.
- c) Partial memory mirroring is not supported. If configured with "N" capacity of memory in Port 1, and "N+z" memory in Port 2 and memory mirroring is enabled, then "N" amount of memory is available to the system, and "z" amount of memory is not usable.

xSeries 455 Memory Card



Pair #	Location
1st	DIMM1 & DIMM14
2nd	DIMM15 & DIMM28
3rd	DIMM2 & DIMM13
4th	DIMM16 & DIMM27
5th	DIMM3 & DIMM12
6th	DIMM17 & DIMM26
7th	DIMM6 & DIMM8

Pair #	Location
8th	DIMM18 & DIMM25
9th	DIMM5 & DIMM10
10th	DIMM19 & DIMM24
11th	DIMM6 & DIMM9
12th	DIMM20 & DIMM23
13th	DIMM7 & DIMM8
14th	DIMM21 & DIMM22



System Memory ¹	Quantity of RDIMMs Added		
	512MB	1GB	2GB
1GB Models (4 x 512MB)			
2GB	2	-	-
4GB	6	-	-
8GB	14	-	-
10GB	18	-	-
12GB	22	-	-
16GB	22	4	-
20GB	14	12	-
24GB	6	20	-
30GB	2	20	4
34GB ²	-	22	6
38GB ²	-	18	10
42GB ²	-	14	14
46GB ²	-	10	18
50GB ²	-	6	22
54GB ²	-	2	26
56GB ²	-	-	28
2GB Models (4 x 512MB)			
4GB	4	-	-
8GB	12	-	-
10GB	16	-	-
12GB	20	-	-
16GB	20	4	-
20GB	12	12	-
24GB	4	20	-
30GB	-	20	4
34GB ²	-	22	6
38GB ²	-	18	10
42GB ²	-	14	14
46GB ²	-	10	18
50GB ²	-	6	22
54GB ²	-	2	26
56GB ²	-	-	28

This table does not represent all possible memory configurations and may not represent the most cost-effective solution. Memory modules may vary in price per MB.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. This configuration requires removal of standard memory.

xSeries 455 Internal Cabling

The xSeries 455 server mechanical contains two hot-swap HDD bays and two 5.25in Ultrabay 2000 bays. The integrated SCSI controller is connected to the hot-swap backplane via a 16-bit LVDS cable. A 24in LVDS cable is also provided inside the mechanical (unconnected), for use when a ServeRAID controller is installed for internal HDD configurations.

The standard optical drive is connected to the IDE controller via a two-drop IDE cable.

External SCSI device attachment, such as a tape enclosure, is facilitated by a dedicated 0.8mm VHDCI port on the rear of the system chassis, which is connected to the second channel of the integrated SCSI controller.

xSeries 455 Hard Disk Drive (HDD) Storage

Total Internal Storage ¹	Quantity of HDDs added to standard configuration		
	36.4GB HDD	73.4GB HDD	146.8GB HDD
0GB ²			
36.4GB	1	-	-
72.8GB	2	-	-
73.4GB	-	1	-
146.8GB	-	2	1
293.6GB	-	-	2

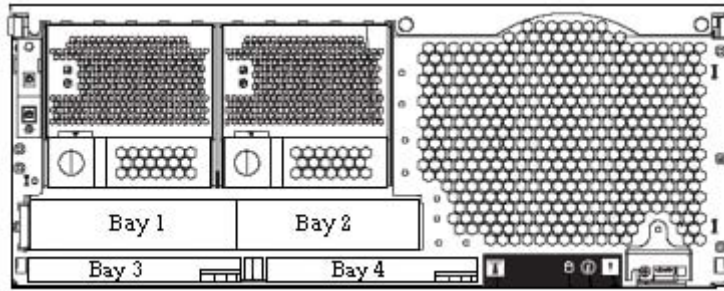
This table does not represent all possible HDD configurations. Total internal storage listed is within +/- 0.2GB unless otherwise noted.

1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.
2. xSeries 455 ships open-bay.

SBB Number	Option Number	Description	Height	Bays Supported ¹	Maximum Quantity
Hot-swap Ultra160 HDDs^{1, 2}					
32P9018	06P5755	36.4GB 10K rpm Ultra160 SCSI Hot-swap SL HDD	SL	1, 2	2
32P9011	06P5756	73.4GB 10K rpm Ultra160 SCSI Hot-swap SL HDD	SL	1, 2	2
32P9025	06P5768	36.4GB 15K rpm Ultra160 SCSI Hot-swap SL HDD	SL	1, 2	2
Hot-swap Ultra320 HDDs¹					
32P0746	32P0726	36.4GB 10K rpm Ultra320 SCSI Hot-swap HDD	SL	1, 2	2
32P0747	32P0727	73.4GB 10K rpm Ultra320 SCSI Hot-swap HDD	SL	1, 2	2
32P0748	32P0728	146.8GB 10K rpm Ultra320 SCSI Hot-swap HDD	SL	1, 2	2
32P0744	32P0734	36.4GB 15K rpm Ultra320 SCSI Hot-swap HDD	SL	1, 2	2
32P0745	32P0735	73.4GB 15K rpm Ultra320 SCSI Hot-swap HDD	SL	1, 2	2
Removable Media³			Bays Supported		
48P8072	05K9233	ThinkPad 24x-10x CD-ROM Ultrabay 2000 Drive	3, 4		
02R3485	22P6991	ThinkPad CD-RW/DVD Combo IV Ultrabay 2000 Drive	3, 4		
48P8073	22P9102	ThinkPad Ultralight 8x Max DVD-ROM Ultrabay 2000 Drive	3, 4		
External Storage Expansion Units⁴			Form Factor		
-	35311RU	EXP300 Storage Expansion Unit	Rack (3U)		
-	17331RU	EXP400 Storage Expansion Unit	Rack (3U)		
-	35601RU	FASiT EXP500 Storage Expansion Unit	Rack (3U)		
-	17401RU	FASiT EXP700 Storage Expansion Unit	Rack (3U)		
-	172260U	FASiT600 Storage Server	Rack (3U)		
-	17421RU	FASiT700 Storage Server	Rack (4U)		
-	174290U	FASiT900 Storage Server	Rack (4U)		

1. Mixing of Ultra320 and Ultra160 HDDs is not supported.
2. Ultra160 HDDs limit operation of the Ultra320 integrated controller to Ultra160 performance.
3. If only one optical drive is installed, it must be installed in bay four. Standard optical is installed in bay four.
3. Install in either bay three or four, requiring removal of the standard device. If only one optical drive is installed, it must be installed in bay four. If a second optical drive is installed, configure bay three as slave.
4. Not supported by the onboard external SCSI port, which supports external tape enclosures only. External SCSI HDD storage requires a RAID controller. Fibre Channel HDD storage requires a Fibre Channel controller. For HDD expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Quickview section.

xSeries 455 Front View



Bay	Form Factor	Height	Front Access	Usage
1, 2	HS	SL	Yes	open
3	133mm (5.25in)	SL ¹	Yes	FDD
4	133mm (5.25in)	SL ²	Yes	DVD-ROM

1. Supports FDD, high-density FDD, CD-ROM, CD-RW or DVD-ROM. If IDE device (optical drive) is installed, must be configured as slave.
2. Supports CD-ROM, CD-RW or DVD-ROM. Must be configured as master if bay three contains an optical drive. If only one optical drive is installed, it must be installed in bay four. In 16-way configurations, bays three and four are disabled in the secondary chassis.

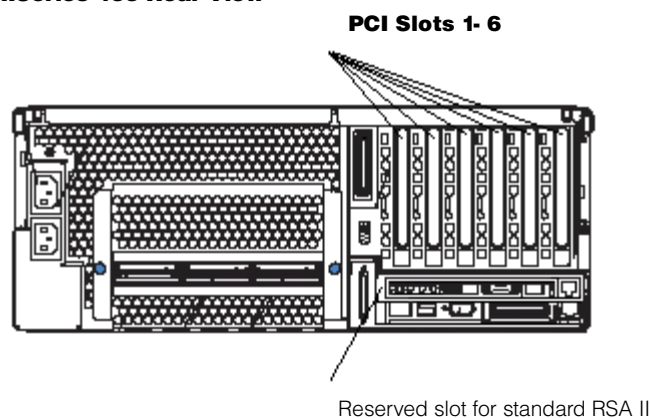
xSeries 455 I/O Options

SBB Number	Option Number	Description	Adapter Length	PCI Support ¹	Slots Supported ¹	Hot-Plug Capable
Storage Controllers						
02R0996	02R0988	ServeRAID-6M Controller (256MB Cache)	Full	64-bit/133MHz	1 ... 6 ³	X
02R0225	32P0033	ServeRAID-6M Controller (128MB Cache)	Full	64-bit/133MHz	1 ... 6 ³	X
Fibre Storage Controllers and Options⁴						
24P0963	24P0960	FC2-133 Host Bus Adapter	Half	64-bit/133MHz	1 ... 6	X
-	172260U	FAStT600 Storage Server (US line cord, English Pubs)	-	-	-	-
-	17421RU	FAStT700 Storage Server	-	-	-	-
-	174290U	FAStT900 Storage Server (US line cord)	-	-	-	-
Networking⁵						
Ethernet						
25P2889	06P3601	10/100 Ethernet Server Adapter	Half	32-bit/133MHz	1 ... 6	X
31P9605	31P9601	PRO/1000 MT Server Adapter by Intel	Half	64-bit/133MHz	1 ... 6	X
09N8049	22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals	Half	64-bit/133MHz	1 ... 6	X
32P9296	22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter	Half	64-bit/133MHz	1 ... 6	X
31P6305	31P6301	NetXtreme 1000 T Ethernet Adapter (copper)	Half	64-bit/133MHz	1 ... 6	X
32P9298	31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper)	Half	64-bit/133MHz	1 ... 6	X

System Management ⁶						
-	03K9309	Advanced System Management Interconnect Cable Kit ⁷	-	-	-	-
Remote I/O Expansion						
-	8684-1RX	RXE-100 Remote Expansion Enclosure ⁸	-	-	-	-

1. Adapters rated at a lower frequency than the slots in which they are installed will reduce the bus to the frequency of the slowest adapter.
2. xSeries 455 includes an integrated dual channel Ultra320 SCSI controller with one internal and one external connector.
3. Internal HDD configurations require the ServeRAID adapters to be installed in slot 6 and connected to the backplane using a separate 24in cable provided inside the mechanical.
4. See Fibre Channel Solutions Overview section for additional configuration information.
5. xSeries 455 includes an integrated Broadcom (BC5704) 10/100/1000 dual-port Ethernet controller (copper) with Wake on LAN support.
6. xSeries 455 includes a Remote Supervisor Adapter II (RSA II) installed in a seventh reserved slot. Connection to other servers requires the Advanced System Management Interconnect Cable Kit.
7. Required to connect the standard Remote Supervisor Adapter II to an interconnect network with other servers for system management support through a single LAN or modem connection.
8. xSeries 455 supports a maximum of one RXE-100 per server. One RXE-100 can be shared between two x455 systems providing fail-over support or adding up to six additional PCI slots per server.

xSeries 455 Rear View



- Slot 1: Bus A, 66MHz, 64-bit, full-length, 3.3v, Active PCI-X
- Slot 2: Bus A, 66MHz, 64-bit, full-length, 3.3v, Active PCI-X
- Slot 3: Bus B, 100MHz, 64-bit, full-length, 3.3v, Active PCI-X
- Slot 4: Bus B, 100MHz, 64-bit, full-length, 3.3v, Active PCI-X
- Slot 5: BusC, 133MHz, 64-bit, full-length, 3.3v, Active PCI-X
- Slot 6: Bus D, 133MHz, 64-bit, full-length, 3.3v, Active PCI-X

PCI slot scan sequence: slot 1, 2, 6, 5, 3, 4

Continuing in an RXE-100: slots 11, 12, 9, 10, 7, 8, 17, 18, 15, 16, 13, 14



xSeries 455 Power, Monitors & Accessories

SBB Number	Option Number	Description
Monitors¹		
-	633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black ²
-	63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black ²
-	32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ³
-	32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard) ³
-	32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ³
-	32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard) ³
Rack and NetBAY⁴		
-		Refer to the Rack Cabinets and Options section for information concerning IBM racks and rack-supported devices.
Console Connectivity⁵		
-	1735L04	NetBAY Local Console Manager
-	1735R16	NetBAY Remote Console Manager
-	73P5832	USB Conversion Option (four-pack) ⁶
Keyboard and Mouse⁷		
-	10K3849	106-key Preferred USB Keyboard with 2-port USB Hub (stealth black) ⁸

Note: xSeries 455 systems include two 1050W hot-swap power supplies with two 2.8m/9ft IEC 320-C13 to IEC 320-C14 power cables for intrarack power distribution. Models shipped in the US also include two 2.8m/9ft IEC 320-C13 to NEMA 6-15P power cords for attachment to high voltage power sources. Power supply redundancy is standard for all configurations with a high voltage power source.

1. xSeries 455 provides an integrated ATI RageXL video controller with 8MB of video memory.
2. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).
3. Includes a 15in Flat Panel Monitor.
4. xSeries 455 is housed in a 19in rack-mountable drawer and requires one of the racks listed in the Rack Cabinets and Options section.
5. Refer to the Rack Console Options section for information regarding console connectivity using these options.
6. Required to connect one of the USB ports on the server to either a Local or Remote Console Manager. This option kit contains four 1.5m KVM cables, four 14in lengths of Cat5 cable, four large curly-lock cable connectors, and an eight-pack of velcro strips.
7. xSeries 455 supports rack configurations only and ships without a keyboard or mouse. Only USB-capable keyboards are supported.
8. Installation within a rack requires optional keyboard (P/N 28L4707). This keyboard cannot share a keyboard tray with a flat panel display.

xSeries 455 Tape Options

Part Number	Tape Drives	Bays Supported ¹	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures
59P6736	160/320GB SDLT Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	0034BOX 3503B1X
59P6744	LTO FH Generation-2 Tape Drive Option	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	0034BOX 3503B1X
External Tape Enclosures						
0034BOX	NetBAY Tape Enclosure (Rack Mount) ³	-	16 Ultra2 LVD	4U Rack	N	-
3503B1X	Full-High SCSI Tape Enclosure ⁴	-	16 Ultra2 LVD	Desktop or 3U Rack	Y	-

1. xSeries 455 does not support internal tape drives. An external tape library or tape enclosure must be used. All tape drives and enclosures are supported by PCI Wide Ultra160 SCSI Adapter (P/N 19K4646) or Single Channel Ultra320 SCSI Controller (P/N 71P8594), which have an external 0.8mm VHDCI connector, or by the external channel of the integrated Ultra320 SCSI controller (when available). Select tape drive, enclosure and controller then use Appendix D: Cables - Storage Units - Controllers to select an appropriate external cable.
2. Termination requires installing the 34in single-drop, terminated LVD SCSI cable provided with the option.
3. NetBAY Tape Enclosure (P/N 0034BOX) is a 4U rack-mounted enclosure that supports four full-high or six half-high tape drives. The backplate includes six 0.8mm VHDCI external connectors for attachment of up to six servers. Internal connection of tape drives requires the single-drop terminated LVD SCSI cable that ships with the tape drive, which also provides termination for the SCSI bus. A single 320w power supply with a low-voltage power cord is standard. An external SCSI storage cable is not provided. Refer to Appendix D: Cables - Storage Units - Controllers to select a supported cable.
4. Black desktop or 3U rack tape enclosure supports a single 133mm (5.25in) full-high LVD tape device including DLT tape drives. Requires a fixed shelf if installed in a rack (allow additional 1U for fixed shelf). Includes a 90w power supply, cooling fan, external terminator, power cord (country-specific) and 2m 68-pin to 0.8mm external cable.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

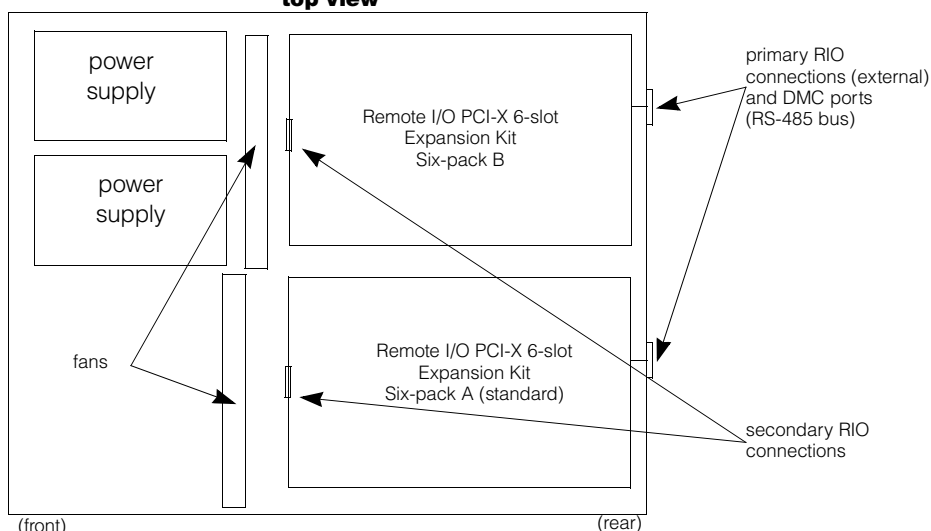
RXE-100 Remote Expansion Enclosure

Part Number
Form Factor
Power Supply Quantity (Std/Max)
Hot-Swap (Power, Slots, HDD, Fans)
Redundancy (Optional, Standard)
System Management Controller
Standard Slots (Total/Avail)
Optional Slots (Total/Avail)

RXE-100 Remote Expansion Enclosure At-A-Glance							
8684-1RX ¹	Rack (3U)	2/2	P, S, F	S - Fans S - Power ²	Y ³	6/6 ⁴	6/6 ⁵

- Housed in a 19in rack-mountable drawer. See Rack Cabinets and Options section for supported IBM racks. Ships with one 3.5m Remote I/O Cable Kit (P/N 31P6102) and one 3.5m Interconnect Management Cable Kit (P/N 31P6087). Eight-meter cables are available as options (P/N 31P6103, 31P6088).
- N+1 power supply redundancy is provided standard. Two 370w Hot-Swap Redundant Power Supplies (P/N 31P6108) ship installed in the RXE-100.
- RXE-100 management controller interfaces with Remote Supervisor Adapter standard in xSeries 360 using the standard 3.5m Interconnect Management Cable Kit (P/N 31P6087) or the 8m option (P/N 31P6088).
- RXE-100 ships with six full-length, 64-bit PCI-X slots supporting three 133MHz adapters or six 100MHz adapters. Adapters rated at 33 or 66MHz restrict PCI buses in which they are installed to the frequency of the slowest adapter.
- Support for additional six 64-bit slots available through installation of the optional Remote I/O PCI-X 6-slot Expansion Kit (P/N 31P5998). Remote I/O connection is cabled internally within the RXE-100 enclosure using the secondary connector on each PCI-X 6-slot Expansion Kit, i.e., only one connection between the server and RXE-100 is required. Although the six slots are hot-swap, the expansion kit itself is not hot-swap.

RXE-100 Remote Expansion Enclosure P/N 8684-1RX top view



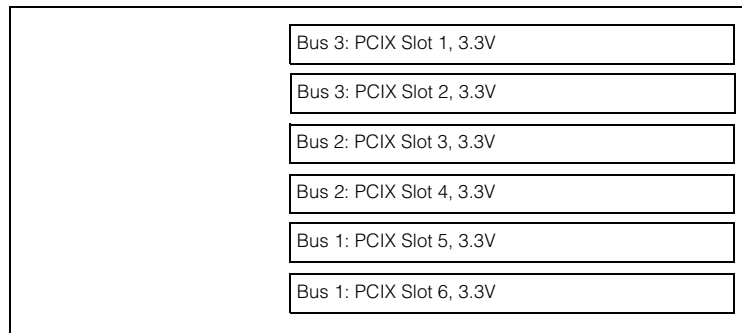
- Rack-mounted 3U enclosure that fits standard IBM racks.
- Contains six active PCI-X adapter slots with support for six optional slots (6-slot expansion kits are not hot-swap).
- Supports three 133MHz or six 100MHz adapters (backward compatible to 33 or 66MHz adapters).
- Interfaces directly to the host server memory controller.
- Interfaces with Remote Supervisor Adapter in the host server (jumper cable provided with Remote I/O PCI-X 6-slot Expansion Kit to connect second six-pack to the system management bus).
- Hot-swap redundancy for fans and power supplies (two 370W power supplies and four cooling fans).

RXE-100 Remote Expansion Enclosure External HDD Storage

Part Number	External Storage Expansion Units ¹	Form Factor
35311RU	EXP300 Storage Expansion Unit ²	Rack (3U)
17401RU	FAST EXP700 Storage Expansion Unit ³	Rack (3U)
35601RU	FAST EXP500 Storage Expansion Unit ⁴	Rack (3U)
35421RU	FAST200 Storage Server ^{5, 6}	Rack (3U)
35422RU	FAST200 HA Storage Server ⁵	Rack (3U)
19K1121	FAST200 Redundant RAID Controller	-

1. To configure an external SCSI storage device, select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.
2. EXP300 includes a single 2M Ultra2 SCSI cable and dual hot-swap 500w redundant power supplies, each with its own power cord.
3. FAST EXP700 Storage Expansion Unit (P/N 17401RU) includes dual hot-swap 400w power supplies, each with its own power cord.
4. FAST EXP500 Storage Expansion Unit (P/N 35601RU) includes dual hot-swap 350w power supplies, each with its own power cord.
5. The FAST200 includes two hot-swap, 350w auto-ranging redundant power supplies, each with its own power cord.
6. Can be upgraded to FAST200 HA Storage Server through the addition of a FAST200 Redundant RAID Controller (P/N 19K1121).

RXE-100 Remote Expansion Enclosure I/O Options



All slots are 64-bit, full-length, 133MHz Active PCI-X. Each bus supports only one 133MHz adapter. If two 133MHz adapters are installed, both will operate at 100MHz. If a lower frequency adapter is installed, the bus will operate at that frequency.

Scan sequence: slots 11, 12, 9, 10, 7, 8, 17, 18, 15, 16, 13, 14.

Part Number	Description	Adapter Length	PCI Support	Slots Supported ¹	Hot-Plug ²	PCI Voltage Key	MHz ³
Storage Controllers							
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	Half	64-bit	1 ... 6	X	Universal	66
19K4646	PCI Wide Ultra160 SCSI Adapter ⁴	Half	32-bit	1 ... 6	-	Universal	66
Fibre Storage Controllers and Options⁵							
00N6881	FAStT Host Adapter	Half	64-bit	1 ... 6	X	Universal	66
24P0960	FC2-133 Host Bus Adapter	Half	64-bit	1 ... 6	X	Universal	133
17421RU	FAStT700 Fibre Channel Storage Server	-	-	-	-	-	-
35421RU	FAStT200 Storage Server	-	-	-	-	-	-
35422RU	FAStT200 HA Storage Server	-	-	-	-	-	-
2109F16	SAN Fibre Channel Switch, 16-Port	-	-	-	-	-	-
Networking							
Ethernet							
06P3601	10/100 Ethernet Server Adapter	Half	32-bit	1 ... 6	X	Universal	33
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals ¹⁰	Half	64-bit	2, 4, 6	X	Universal	133
22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter	Half	64-bit	1 ... 6	X	Universal	133
Token Ring							
34L5001	16/4 Token-Ring PCI Management Adapter	Half	32-bit	1 ... 6	X	Universal	33
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter	Half	32-bit	1 ... 6	X	Universal	33
Associated Options							
31P5998	Remote I/O PCI-X 6-slot Expansion Kit ⁶	-	-	-	-	-	-
31P6088	8m Interconnect Management Cable Kit ⁷	-	-	-	-	-	-
31P6103	8m Remote I/O Cable Kit ⁸	-	-	-	-	-	-
31P6087	3.5m Interconnect Management Cable Kit ⁹	-	-	-	-	-	-
31P6102	3.5m Remote I/O Cable Kit ⁹	-	-	-	-	-	-

1. Slots one through six are 64 bits wide configured on three buses with two slots each, supporting either one 133MHz or two 100MHz adapters in each bus. The slots are backward compatible for adapters that operate at 33 or 66MHz, which reduce the buses in which they are installed to the frequency of the slowest adapter.
2. All six slots are full-length Active PCI-X (hot-plug capable). For Network Operating System support, access www.pc.ibm.com/us/compat.
3. All slots support either 100MHz or 133MHz adapters (as well as 33MHz and 66MHz adapters). If an adapter rated at 133MHz is installed in either slot of any of the three buses, the other slot must remain vacant.
4. For external connections only.
5. See Fibre Channel Solutions Overview section for additional configuration information.
6. Installs into the RXE-100 to expand slot availability from six to 12. The expansion enclosure must be powered down to install this option. Cables internally through the secondary RIO connectors. The additional six slots are numbered one to six with the same attributes as the standard unit.
7. Allows the host server remote management functionality to support the RXE-100. A 3.5m cable is standard for installations in the same rack. The 8m length is required when installing in a different rack.
8. Primary expansion cable connecting the expansion enclosure PCI slot capability to the system processor and memory components. A 3.5m cable is standard for installations in the same rack. The 8m length is required when installing in a different rack. Connects the RIO port on the back of the system to the primary RIO port on the back of the enclosure.
9. Ships standard with the RXE-100 Remote Expansion Enclosure.
10. Install only in even-numbered slots.



RXE-100 Remote Expansion Enclosure Power

Part Number	Description
Power¹	
31P6108	370W Hot-Swap Redundant Power Supply
Uninterruptible Power Supply (UPS)²	
32P1020	APC 2U Smart-UPS 1400RMB
2130R30	UPS3000XLV ³
2130R31	UPS3000XHV ³
32P1692	UPS Extend Run Battery Pack ³
37L6861	APC Smart-UPS 5000RMB ⁴

1. RXE-100 includes two 370W hot-swap power supplies, each with two 9ft power cords—one high voltage IEC 320-C13 to IEC 320-C14 and one low voltage IEC 320-C13 to NEMA 5-15P. N+1 power supply redundancy is standard for full configurations. A third power supply is not supported.

2. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.

3. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.

4. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.

RXE-100 Remote Expansion Enclosure Tape Options

Part Number	Tape Drives	Bays Supported ¹	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures
00N8016	100/200GB LTO Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y ²	3503B1X
24P2396	100/200GB LTO Half-High Tape Drive ⁷	-	16 Ultra2 LVD	133mm (5.25in) HH	Y ²	-
External Tape Libraries⁴						
3570C2x	Magstar MP 3570 Tape Subsystem	-	HVD	6U Rack	Y	-
External Tape Enclosures						
3503B1X	Full-High SCSI Tape Enclosure ⁶	-	16 Ultra2 LVD	Desktop or 3U Rack	Y	-

1. RXE-100 does not support internal tape drives. An external tape library or tape enclosure must be used. All tape drives and enclosures are supported by PCI Wide Ultra160 SCSI Adapter (P/N 19K4646) or Single Channel Ultra320 SCSI Controller (P/N 71P8594), which have an external 0.8mm VHDCI connector. Select tape drive, enclosure and controller then use Appendix D: Cables - Storage Units - Controllers to select an appropriate external cable.

2. Termination requires installing the 34in single-drop, terminated LVD SCSI cable provided with the option.

3. Tape library attributes and prerequisites are located in Appendix B: Tape Library Attributes.

4. Black desktop or 3U rack tape enclosure supports a single 133mm (5.25in) full-high LVD tape device including DLT tape drives. Requires a fixed shelf if installed in a rack (allow additional 1U for fixed shelf). Includes a 90w power supply, cooling fan, external terminator, power cord (country-specific), and 2m 68-pin to 0.8mm external cable. Supports the following full-high tape options: 00N8015, 00N8016.

5. This tape drive must be shipped separately as an option and installed at a customer site. Factory or vendor installation prior to shipping is not supported.

Datacenter Solution Program

The IBM Datacenter Solution Program is a comprehensive set of product and service offerings intended to deliver true enterprise computing solutions based on the Microsoft® Windows® 2000 Datacenter Server and Microsoft® Windows® 2003 Datacenter Server operating systems. Both of the Windows 2000 and 2003 Datacenter Server products run on the xSeries 445 server. The Datacenter Solution can be ordered in one- and two-node configurations from the bundles shown here, and in three- and four-node configurations by ordering additional nodes. The bundles illustrated here are base configurations that can be expanded to meet your needs. The IBM Datacenter Solution includes Microsoft-certified hardware, the Windows Datacenter Server operating system preloaded, and a set of standard and optional services.

In addition to the information on the following pages, the IBM Datacenter Solution Program includes the following software and services. The services products must be ordered separately. A complete Solutions Assurance Review will be conducted by IBM or your IBM business partner to ensure that the configuration being ordered is complete.

Software

Microsoft Windows 2000 Datacenter Server, licensed for up to 16 CPUs²
 (Client Access Licenses to be purchased separately)
 Microsoft Windows 2003 Datacenter Server, licensed for up to 16 CPUs²
 (Client Access Licenses to be purchased separately)
 IBM Director
 IBM Director Universal Management Services
 APC UPS Software

Standard Services

Solutions Assurance Review³
 Factory installation and software preload
 Limited Warranty⁴ service with 24x7 same day response

IBM Support Services

On-site installation
 Microsoft Authorized Premier Support (MAPS--base software support for Datacenter, where available)
 IBM Software Update Subscription for Microsoft Windows Datacenter (US)⁷
 Advanced Support for Mission Critical Systems (US)
 Support Line (base software support outside the US and where MAPS is not available)
 High Availability Services⁵ (including up to 99.99% availability guarantee in the US)
 xSeries 99.9% High Availability Guarantee⁶ outside the US
 Warranty upgrade (24x7x2 hour response)
 Operational Support Services, e.g., electronic system management for xSeries, account advocate
 Testing Services--proof of concept, assessment, design and planning
 Business Continuity and Recovery Services
 Custom services for unique requirements

1. Maximum memory may require replacement of standard memory with optional maximum memory module.

2. IBM makes no representations or warranties regarding non-IBM products or services. These products are offered and warranted by third parties.

3. IBM provides this service standard for all Datacenter sales direct through IBM. Business Partners will also perform this service but may choose to charge a fee.

4. For information on IBM's Statement of Limited Warranty, call 1-800-772-2227 or contact your IBM representative or reseller. Copies are available upon request. International Warranty Service available in those countries where the particular product is sold by IBM or IBM Business Partners (registration required). With respect to on-site service, IBM sends a technician after attempting to resolve the problem remotely.

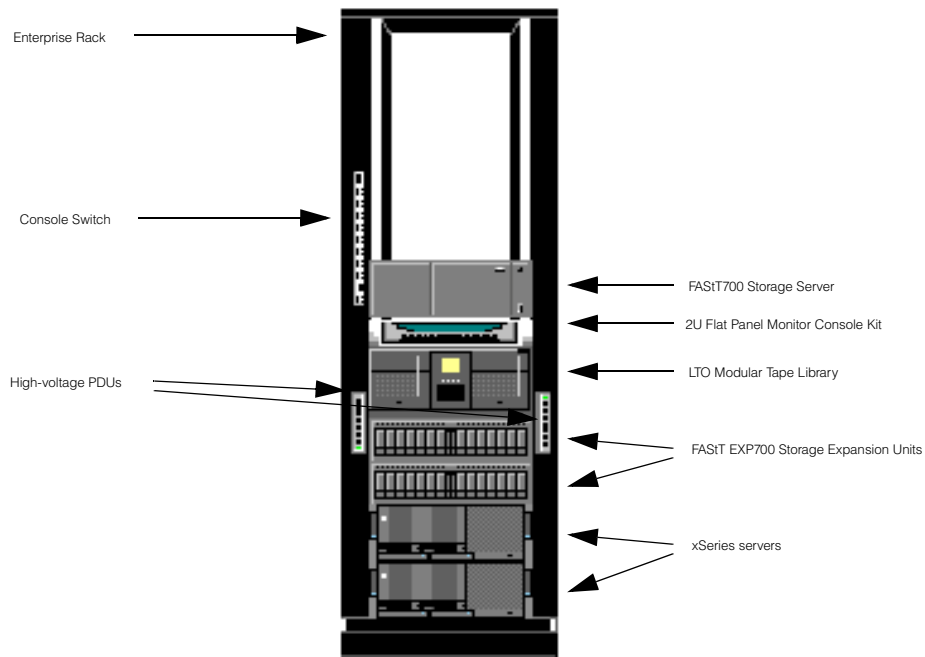
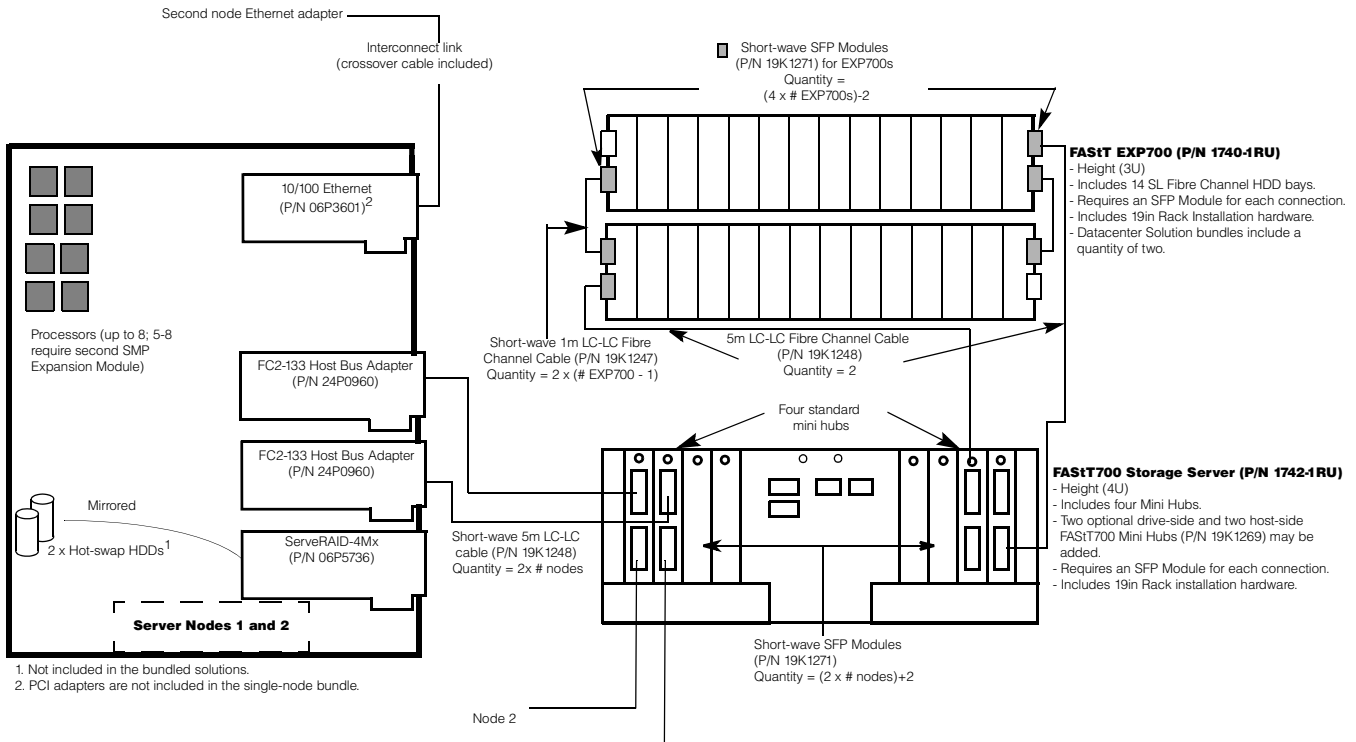
5. The High Availability Services for Business Critical Systems offering for an availability guarantee is an optional service and is only offered for eligible IBM e(logo)server xSeries environments at this time. IBM reserves the right to change the terms and conditions of the program at any time, without notice. For more details, refer to www-1.ibm.com/services/its/us/highavail2.html.

6. The xSeries 99.9% High Availability Guarantee program is an optional offering on eligible xSeries configurations. IBM reserves the right to change the terms and conditions of the program at any time, without notice. For more details, refer to www.pc.ibm.com/ww/eserver/xseries/999guarantee.html.

7. This annual subscription service ensures that customers receive all updates to the Microsoft Datacenter operating system (and roll up of IBM driver updates). Staying current on Datacenter patches is a requirement for Microsoft support; therefore, this service is highly recommended to all Datacenter customers.

Datacenter Solutions

The product content described here is consistent worldwide; however, there may be some variance in IBM part numbers outside of the US and Canada. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.





xSeries 445 Datacenter Solution

xSeries 445 Datacenter Solution - Single Node						
Bundle Components	IBM Datacenter Solution - Single Node includes the part numbers and quantities identified in this table. Required options must be purchased separately and are identified in the table labeled "Required Options." Additional options for IBM Datacenter Solutions are listed in the table labeled "Selectable Options." All final customer configurations and solutions require IBM Solution Assurance Approval.				Limited Warranty Service 24x7x4 hrs	Limited Warranty Service 24x7x2 hrs¹
Part Number	Description	Qty	Usage	Part Number	Part Number	
Standalone						
Use for adding one or two nodes to a two-node cluster.						
Select server model:						
8870-1AX	xSeries 445 2x2GHz/400MHz-1MB Xeon MP, open, 24x-8x DVD-ROM	-	-	N/A	N/A	
8870-2AX	xSeries 445 2x2.5GHz/400MHz-1MB Xeon MP, open, 24x-8x DVD-ROM	-	-	N/A	N/A	
8870-4AX	xSeries 445 2x2.8GHz/400MHz-2MB Xeon MP, open, 24x-8x DVD-ROM	-	-	N/A	N/A	
Select processor upgrades:						
Processor upgrades must match standard processor.						
02R2062	2GHz/400MHz-1MB L3 Cache with Xeon Processor MP	2 or 6		N/A	N/A	
02R2063	2.5GHz/400MHz-1MB L3 Cache with Xeon Processor MP	2 or 6		N/A	N/A	
02R2064	2.8GHz/400MHz-1MB L3 Cache with Xeon Processor MP	2 or 6		N/A	N/A	
02R1870	SMP Expansion Module	1	Required when upgrading from 4-way to 8-way node ²	N/A	N/A	
Controllers						
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	1	Supports NOS mirroring on internal HDDs.	N/A	N/A	
24P0960	FC2-133 Host Bus Adapter	2	Redundant paths to external storage subsystems (Fibre Channel storage only).	N/A	N/A	
31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper)	1	Node-to-node interconnect (required only with multiple-node cluster).	N/A	N/A	
Software						
4816-3BU	Preload Kit for Microsoft Windows 2000 Datacenter, 1-8 Processors	1	-	N/A	N/A	
4816-3DU	Preload Kit for Microsoft Windows 2000 Datacenter, 1-16 Processors	1	-	N/A	N/A	
4816-4AU	Preload Kit for Microsoft Windows 2003 Datacenter, 1-4 Processors	1	-	N/A	N/A	
4816-4BU	Preload Kit for Microsoft Windows 2003 Datacenter, 1-8 Processors	1	-	N/A	N/A	
4816-4DU	Preload Kit for Microsoft Windows 2003 Datacenter, 1-16 Processors	1	-	N/A	N/A	
Services						
06P7505	Image Load Fee	1	-	N/A	N/A	
58P8663	Hardware Integration - Server - up to 3 options	as required		N/A	N/A	
58P8665	Hardware Integration - Server - 4 or more options	as required		N/A	N/A	

1. This Service offering is not available in all countries and is limited to selected areas (see Fax #8146 on 1-800-IBM-4FAX). All final customer configurations and solutions require IBM Solution Assurance Approval.

2. MHz/GHz only measure microprocessor internal clock speed; many factors affect application performance.

3. Refer to xSeries 440 Processors and I/O Options sections for details on SMP expansion cabling.



xSeries 445 Datacenter Solution - Two Node

Bundle Components	IBM Datacenter Solution - Two Node includes the part numbers and quantities identified in this table. Required options must be purchased separately and are identified in the table labeled "Required Options." Additional options for IBM Datacenter Solutions are listed in the table labeled "Selectable Options." All final customer configurations and solutions require IBM Solution Assurance Approval.				Limited Warranty Service 24x7x4 hrs	Limited Warranty Service 24x7x2 hrs ¹
Part Number	Description	Qty/ Node	Total Qty	Usage	Part Number	Part Number
Server Nodes 1 and 2						
Select server model:						
8870-1AX	xSeries 445 2x2GHz/400MHz-1MB Xeon MP, open, 24x	-	2	-	N/A	N/A
8870-2AX	xSeries 445 2x2.5GHz/400MHz-1MB Xeon MP, open, 24x	-	2	-	N/A	N/A
8870-4AX	xSeries 445 2x2.8GHz/400MHz-2MB Xeon MP, open, 24x	-	2	-	N/A	N/A
Select processor upgrade: Processor upgrades must match standard processor.						
02R2062	2GHz/400MHz-1MB L3 Cache Upgrade with Xeon Processor MP	2 or 6	4 or 12	-	N/A	N/A
02R2063	2.5GHz/400MHz-1MB L3 Cache Upgrade with Xeon Processor MP	2 or 6	4 or 12	-	N/A	N/A
02R2064	2.8GHz/400MHz-2MB L3 Cache Upgrade with Xeon Processor MP	2 or 6	4 or 12	-	N/A	N/A
02R1870	SMP Expansion Module	1	2	Required when upgrading from 4-way to 8-way node ² .	N/A	N/A
Controllers						
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	1	2	Supports NOS mirroring on internal HDDs.	N/A	N/A
24P0960	FC2-133 Host Bus Adapter	2	4	Redundant paths to external storage subsystems (Fibre Channel storage only)	N/A	N/A
31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper)	1	2	Node to node interconnect.	N/A	N/A
Software						
4816-3BU	Preload Kit for Microsoft Windows 2000 Datacenter, 1-8 processors	1	2	-	N/A	N/A
4816-3DU	Preload Kit for Microsoft Windows 2000 Datacenter, 1-16 Processors	1	2	-	N/A	N/A
4816-4AU	Preload Kit for Microsoft Windows 2003 Datacenter, 1-4 processors	1	2	-	N/A	N/A
4816-4BU	Preload Kit for Microsoft Windows 2003 Datacenter, 1-8 processors	1	2	-	N/A	N/A
4816-4DU	Preload Kit for Microsoft Windows 2003 Datacenter, 1-16 processors	1	2	-	N/A	N/A
Services						
06P7505	Image Load Fee	1	2	-	N/A	N/A
58P8663	Hardware Integration - Server - up to 3 options	as required		-	N/A	N/A
58P8665	Hardware Integration - Server - 4 or more options	as required		-	N/A	N/A

1. This Service offering is not available in all countries and is limited to selected areas (see Fax #8146 on 1-800-IBM-4FAX). All final customer configurations and solutions require IBM Solution Assurance Approval.

2. Refer to xSeries 445 Processors and I/O Options sections for details on SMP expansion cabling.



xSeries 445 Datacenter Solution - 16-way						
Bundle Components	IBM Datacenter Solution - 16-way includes the part numbers and quantities identified in this table. Required options must be purchased separately and are identified in the table labeled "Required Options." Additional options for IBM Datacenter Solutions are listed in the table labeled "Selectable Options." All final customer configurations and solutions require IBM Solution Assurance Approval.				Limited Warranty Service 24x7x4 hrs	Limited Warranty Service 24x7x2 hrs¹
Part Number	Description	Qty/ chassis	Total Qty	Usage	Part Number	Part Number
16-way-capable server chassis'						
Select server model:						
8870-1AX	xSeries 445 2x2GHz/400MHz-1MB Xeon MP, open, 24x	2	2	-	N/A	N/A
8870-2AX	xSeries 445 2x2.5GHz/400MHz-1MB Xeon MP, open, 24x	2	2	-	N/A	N/A
8870-4AX	xSeries 445 2x2.8GHz/400MHz-2MB Xeon MP, open, 24x	2	2	-	N/A	N/A
Controllers						
06P5736	ServerRAID-4Mx Ultra160 SCSI Controller	1	-	Supports NOS mirroring on internal HDDs.	N/A	N/A
24P0960	FC2-133 Host Bus Adapter	2	-	Redundant paths to external storage subsystems (Fibre Channel storage only)	N/A	N/A
31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper)	1	-	Node to node interconnect (required only with multiple node cluster)	N/A	N/A
Software						
4816-3DU	Preload Kit for Microsoft Windows 2000 Datacenter, 1-16 processors	1	-	-	N/A	N/A
4816-4DU	Preload Kit for Microsoft Windows 2003 Datacenter, 1-16 processors	1	-	-	N/A	N/A
Services						
06P7505	Image Load Fee	1	2	-	N/A	N/A
58P8663	Hardware Integration - Server - up to 3 options	as required		-	N/A	N/A
58P8665	Hardware Integration - Server - 4 or more options	as required		-	N/A	N/A

¹. This Service offering is not available in all countries and is limited to selected areas (see Fax #8146 on 1-800-IBM-4FAX). All final customer configurations and solutions require IBM Solution Assurance Approval

xSeries 445 Datacenter Solution - Required Options						
Required Options	Required Options provide alternative methods of meeting minimum memory and storage requirements. Customer requirements will vary; therefore, these options are configured and purchased separate from the base solution bundle. All final customer configurations and solutions require IBM Solution Assurance Approval.				Limited Warranty Service 24x7x4 hrs	Limited Warranty Service 24x7x2 hrs¹
Part Number	Description	Qty/Node	Usage	Part Number	Part Number	
Install a minimum of two RDIMMs per SMP Expansion Module in each chassis						
33L5038	512MB PC2100 DDR ECC SDRAM RDIMM	2+2N		N/A	N/A	
33L5039	1GB PC2100 DDR ECC SDRAM RDIMM	2+2N		N/A	N/A	
33L5040	2GB PC2100 DDR ECC SDRAM RDIMM	2+2N		N/A	N/A	
Install two identical internal HDD options per node						
32P0726	36.4GB 10Krpm Ultra320 SCSI Hot-swap SL HDD	2	Internal HDDs for NOS installation.	N/A	N/A	
32P0727	73.4GB 10Krpm Ultra320 SCSI Hot-swap SL HDD	2	Internal HDDs for NOS installation.	N/A	N/A	
32P0728	146.8GB 10Krpm Ultra320 SCSI Hot-swap SL HDD	2	Internal HDDs for NOS installation.	N/A	N/A	
32P0734	36.4GB 15Krpm Ultra320 SCSI Hot-swap SL HDD	2	Internal HDDs for NOS installation.	N/A	N/A	
32P0735	73.4GB 15Krpm Ultra320 SCSI Hot-swap SL HDD	2	Internal HDDs for NOS installation.	N/A	N/A	
Interconnect cable						
19K5788	25ft Ethernet crossover cable	1	Interconnects 2 nodes without an Ethernet switch. Not required in 16-way configuration.	N/A	N/A	
Storage Subsystems						
174290U*	FASTt900 Fibre Channel Storage Server	1	Required for Fibre Channel storage configurations only	41L2768	41L2769	



17401RU*	FAST EXP700 Storage Expansion Unit	2	Required for Fibre Channel storage configurations only	41L2766	41L2767
Select Fibre Channel HDD options (multiple of two) per bundle		Qty	A minimum of 2 HDDs must be installed, one in each FAST EXP700 Storage Expansion Unit. Additional HDDs must be installed in multiples of 2.		
06P5761	2Gbps FC 36.4GB/10K drive	2-28	Install in FAST EXP700s.	N/A	N/A
06P5762	2Gbps FC 73.4GB/10K drive	2-28	Install in FAST EXP700s.	N/A	N/A
06P5771	2Gbps FC 18.2GB/15K drive	2-28	Install in FAST EXP700s.	N/A	N/A
06P5772	2Gbps FC 36.4GB/15K drive	2-28	Install in FAST EXP700s.	N/A	N/A
Storage Cables		Qty	Calculations assume no switches are installed.		
19K1248	5m LC-LC Fibre Channel Cable	6	Redundant paths: nodes - storage server - FAST EXP700	N/A	N/A
19K1271	Short-wave SFP Module	12	Redundant paths: (2 x # EXP700s) + 2	N/A	N/A
Rack and Related Components		Qty			
32P1702*	NetBAY 2U Flat Panel Monitor Kit (with US Space Saver keyboard)	1	-	30L9183	N/A
930842S	NetBAY42 Enterprise Rack Cabinet (ER)	1	-	41L2762	41L2763
94G6670	Blank Filler Panel Kit	2	Fills empty front panel space to control air flow.	N/A	N/A
09N4290*	NetBAY 1x4 Console Switch	1	Attaches up to 4 nodes to a single monitor, keyboard and mouse.	N/A	N/A
94G7447	NetBAY Console Cable Set 12ft (3.66m)	number of nodes	Attaches each node to a Console Server Selector Switch.	N/A	N/A
94G7448	Power Cable Type C12 (3.7m, 12ft)	number of devices or nodes with power supplies	Provides IEC 320-C13 (Device) to IEC320-C14 (Power Unit) power cord.	N/A	N/A
Services		Qty			
58P8663	Hardware Integration - Server - up to 3 options	as required	-	N/A	N/A
58P8665	Hardware Integration - Server - 4 or more options	as required	-	N/A	N/A
06P7514	Enterprise Rack Prep Fee	as required	Quantity equals the number of racks.	N/A	N/A
06P7515	Enterprise Rack Installation Fee	as required	Quantity equals the number of major rack components installed (part numbers of rack components subject to this fee are marked with an asterisk).	N/A	N/A
Select one of the two warranty services per bundle			-		
24x7x4 option	Use the above applicable PNs with the correct quantity.		-	N/A	N/A
24x7x2 option	Use the above applicable Ens with the correct quantity.		-	N/A	N/A

* Indicates component is subject to Rack Install Fee (P/N 06P7515).

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2. IBM makes no representations or warranties with respect to non-IBM products. These products are offered and warranted by third parties, not IBM

xSeries 445 Datacenter Solution - Selectable Options						
Selectable Options	Selectable options are not required but are compatible for use with IBM Datacenter bundles. All final customer configurations and solutions require IBM Solution Assurance Approval.			Limited Warranty Service 24x7x4 hrs	Limited Warranty Service 24x7x2 hrs¹	Enterprise Rack Assembly Fee
Part Number	Description	Usage	Part Number	Part Number	Part Number	
Additional node:						
	Datacenter additional node (see single node offering for configuration options and rules)	Preloaded xSeries 445 1AX, 2AX or 4AX, for nodes 3 and 4.	N/A	N/A	N/A	
4816-3BU	Preload Kit for Microsoft Windows 2000 Datacenter, 1-8 processors	-	N/A	N/A	N/A	
4816-3DU	Preload Kit for Microsoft Windows 2000 Datacenter, 1-16 processors	-	N/A	N/A	N/A	
4816-4AU	Preload Kit for Microsoft Windows 2003 Datacenter, 1-4 processors	-	N/A	N/A	N/A	
4816-4BU	Preload Kit for Microsoft Windows 2003 Datacenter, 1-8 processors	-	N/A	N/A	N/A	
4816-4DU	Preload Kit for Microsoft Windows 2003 Datacenter, 1-16 processors	-	N/A	N/A	N/A	
Processor upgrades: (processor upgrades must match the standard processor installed in each node)						
02R2062	2GHz/400MHz-1MB L3 Cache Upgrade with Xeon Processor MP	Two, four or eight processors supported.	N/A	N/A	N/A	
02R2063	2.5GHz/400MHz-1MB L3 Cache Upgrade with Xeon Processor MP	Two, four or eight processors supported.	N/A	N/A	N/A	
02R2064	2.8GHz/400MHz-2MB L3 Cache Upgrade with Xeon Processor MP	Two, four or eight processors supported.	N/A	N/A	N/A	
4-way to 8-way upgrade kits:						
02R1870	xSeries SMP Expansion Module	Required when upgrading from 4-way to 8-way node. Requires installation of four processors (fully populated). ³	N/A	N/A	N/A	
8-way to 16-way upgrade kits:						
02R2013	Two Chassis 16-way Enablement Kit ²	Required when upgrading 8-way to 16-way.	N/A	N/A	N/A	
External Fibre Channel storage: Test results of third party storage solutions are available at: www.pc.ibm.com/ww/eserver/xseries/windows/datacenter.html ⁷						
24P0960	FC2-133 Host Bus Adapter	-	N/A	N/A	N/A	
174290U*	FASiT900 Fibre Channel Storage Server (U.S. line cord)	-	41L2768	41L2769	21P3342	
174290X*	FASiT900 Fibre Channel Storage Server (no line cord)	-	41L2768	41L2769	21P3342	
17401RU*	FASiT EXP700 Storage Expansion Unit	-	41L2766	41L2767	21P3342	
24P7984	Upgrade from 16 to 64 Storage Partitions					
24P7985	FASiT900 FlashCopy Activation					
24P7986	FASiT900 Remote Mirror Activation					
Cables, connectors and switches:						
19K1247	1m LC-LC Fibre Channel Cable	2Gb Fibre Channel	N/A	N/A	N/A	
19K1248	5m LC-LC Fibre Channel Cable	2Gb Fibre Channel	N/A	N/A	N/A	
19K1249	25m LC-LC Fibre Channel Cable	2Gb Fibre Channel	N/A	N/A	N/A	
19K1271	Short-wave SFP Module	2Gb Fibre Channel	N/A	N/A	N/A	
2109F16*	SAN Fibre Channel Switch, 16-port	2Gb Fibre Channel	Standard	N/A	21P3342	
18P3576	Additional Power Supply for 2109F16	-	N/A	N/A	N/A	
3534F08*	TotalStorage SAN Switch F08 - 8-port	2Gb Fibre Channel	N/A	N/A	N/A	
I/O-related:						
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	-	N/A	N/A	N/A	
31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper)	-	N/A	N/A	N/A	
31L3820	Fast Ethernet on STP Adapter 2.5m Cable	Attachment from Ethernet adapter to Ethernet switch.	N/A	N/A	N/A	
8684-1RX*	RXE-100 Remote Expansion Enclosure	-	N/A	N/A	N/A	
Rack-related:						
930842S	NetBAY42 Enterprise Rack Cabinet (ER)	-	41L2762	41L2763	21P3341	
930842E	NetBAY42 Enterprise Expansion Rack Cabinet (EX)	-	41L2762	41L2763	21P3341	
32P1703*	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)	-	N/A	N/A	N/A	
28L3647*	NetBAY 2U Flat Panel Monitor Console Kit for French (without keyboard)	-	N/A	N/A	N/A	



28L3650*	NetBAY 2U Flat Panel Monitor Console Kit for Spanish (without keyboard)	-	N/A	N/A	N/A
09N4290*	NetBAY 1x4 Console Switch	-	N/A	N/A	N/A
94G7447	NetBAY Console Cable Set 12ft (3.66m)	-	N/A	N/A	N/A
37L6886*	NetBAY Three-phase Front-end 30a PDU (US)	-	N/A	N/A	N/A
37L6887*	NetBAY Three-phase Front-end 30a PDU (IEC 309 Type 3P+N+GND)	-	N/A	N/A	N/A
37L6865*	NetBAY Server Dual-cord 30a PDU (US)	-	N/A	N/A	N/A
37L6863*	NetBAY Server Dual-cord 30a PDU (without line cord)	-	N/A	N/A	N/A
73P5790*	NetBAY 200-240v Single-phase 60a Front-end PDU (US)	-	N/A	N/A	N/A
73P5789*	NetBAY 200-240v Single-phase 60a Front-end PDU (International)	-	N/A	N/A	N/A
94G6666*	100-120v Power Distribution Unit	-	N/A	N/A	N/A
37L6861*	APC Smart-UPS 5000RMB	-	N/A	N/A	21P3342
06P3882 ⁴	Cisco CAT2912 12-port Ethernet Switch/Enterprise Edition	Used for heartbeat interconnect.	N/A	N/A	21P3342
19K5788 ⁴	25ft Ethernet Crossover Cable	Interconnects two nodes without an Ethernet switch.	N/A	N/A	N/A
4560SLX ⁵	SDLT/LTO Modular Tape Library (5U rack)	Base chassis into which options are installed.	N/A	N/A	N/A
59P6657	Modular Fibre Channel Option	Router to convert Fibre Channel signal to SCSI.	N/A	N/A	N/A
59P6658	Modular LTO Drive Upgrade Option	Required to operate tape library.	N/A	N/A	N/A
59P6659	Modular LTO Cartridge Magazine Option	Installs in front bay. Holds tape media cartridges.	N/A	N/A	N/A
59P6662	Modular Elevator Link Option	Used to connect second stacked tape library.	N/A	N/A	N/A
59P6663	Modular Elevator Link Extension Option	Used for additional stacked tape libraries (up to eight per stack).	N/A	N/A	N/A
08L9120	LTO Data Cartridge	Installs in Cartridge Magazine option.	N/A	N/A	N/A
Services					
58P8663	Hardware Integration - Server - up to 3 options		N/A	N/A	N/A
58P8665	Hardware Integration - Server - 4 or more options		N/A	N/A	N/A
06P7514	Enterprise Rack Prep Fee	Quantity equals the number of racks.	N/A	N/A	N/A
06P7515	Enterprise Rack Installation Fee	Quantity equals the number of major rack components installed (part numbers of rack components subject to this fee are marked with an asterisk).	N/A	N/A	N/A
Software Update Subscriptions⁶					
4816-ABX ⁶	Software Update Subscription for Microsoft Windows 2000 Datacenter, 1-8 processors	-	N/A	N/A	N/A
4816-ADX ⁶	Software Update Subscription for Microsoft Windows 2000 Datacenter, 1-16 processors	-	N/A	N/A	N/A
4816-CAX	Software Update Subscription for Microsoft Windows 2003 Datacenter, 1-4 processors		N/A	N/A	N/A
4816-CBX	Software Update Subscription for Microsoft Windows 2003 Datacenter, 1-8 processors		N/A	N/A	N/A
4816-CDX	Software Update Subscription for Microsoft Windows 2003 Datacenter, 1-16 processors		N/A	N/A	N/A
4816-DAX	Maintenance Update Subscription for Microsoft Windows 2003 Datacenter, 1-4 processors		N/A	N/A	N/A
4816-DBX	Maintenance Update Subscription for Microsoft Windows 2003 Datacenter, 1-8 processors		N/A	N/A	N/A
4816-DDX	Maintenance Update Subscription for Microsoft Windows 2003 Datacenter, 1-16 processors		N/A	N/A	N/A

* Indicates component is subject to Rack Install Fee (P/N 06P7515).

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2. The 16-way Scalability Kit includes four 2.5m scalability cables and a short crossover Ethernet cable.

3. Refer to xSeries 445 Processors and I/O Options sections for details on SMP expansion cabling.

4. There may be some variance in IBM part numbers outside of the US and Canada.

5. LTO tape libraries are not certified but will be supported in Datacenter configurations, subject to Solutions Assurance approval. SDLT components are not supported for Datacenter solutions.

6. This annual subscription service ensures that customers receive all updates to the Microsoft Datacenter operating system (and roll up of IBM driver updates). Staying current on Datacenter patches is a requirement for Microsoft support; therefore, this service is highly recommended to all Datacenter customers.

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eServer 325

Part Number^{1, 10}
AMD Processor Model²
Number of Processors (Std/Max)
L2 ECC Cache
Memory (Std/Max)^{3, 4}
Form Factor
Power Supply Quantity (Std/Max)⁵
Hot-Swap (Power, Slots, HDD, Fans)
Redundancy (Optional, Standard)
System Management Processor
Onboard Ethernet (Mbps)⁶
Storage Controller⁷
Removable Media Bays (Total/Avail)
Internal HDD Storage (Std/Max)^{8, 9}
CD-ROM (IDE)
Bays (Total/Avail)
Slots (Total/Avail)

eServer 325 At-A-Glance																
8835-21X	240	1/2	1MB	1GB/12GB	Rack (1U)	1/1	H	-	Y	2x10/100/1000	Single U320	1/0	0/293.6GB	24x-10x	3/2	2/2
8835-22X	240	1/2	1MB	1GB/12GB	Rack (1U)	1/1	-	-	Y	2x10/100/1000	EIDE	1/0	80GB/240GB	24x-10x	3/1	2/2
8835-31X	242	1/2	1MB	1GB/12GB	Rack (1U)	1/1 ⁴	H	-	Y	2x10/100/1000	Single U320	1/0	0/293.6GB	24x-10x	3/2	2/2
8835-32X	242	1/2	1MB	1GB/12GB	Rack (1U)	1/1	-	-	Y	2x10/100/1000	EIDE	1/0	80GB/240GB	24x-10x	3/1	2/2
8835-51X	246	1/2	1MB	1GB/12GB	Rack (1U)	1/1	H	-	Y	2x10/100/1000	Single U320	1/0	0/293.6GB	24x-10x	3/2	2/2
8835-52X	246	1/2	1MB	1GB/12GB	Rack (1U)	1/1	-	-	Y	2x10/100/1000	EIDE	1/0	80GB/240GB	24x-10x	3/1	2/2
8835-5DX	246	2/2	1MB	2GB/12GB	Rack (1U)	1/1	H	-	Y	2x10/100/1000	Single U320	1/0	36.4GB/293.6GB	24x-10x	3/1	2/2

- eServer 325 also provides four USB ports (two in front and two in rear) and one serial port (16550A-compatible). It does not ship with a diskette drive. eServer 325 installs in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
- Supports up to two AMD Opteron Processors.
- Two 512MB RDIMMs are standard in 1GB models; Four 512MB RDIMMs are standard in the 2GB models. All models support two-way interleaving and Chipkill technology.
- If/when a supported 2GB DIMM is available, uni-processor systems will support a maximum of 8GB and dual-processor systems will support a maximum of 12GB.
- A single 411w power supply is standard. Redundancy and hot-swap are not supported.
- Broadcom 5704 integrated dual gigabit Ethernet controllers.
- The single-channel, 64-bit, Ultra320 LSI integrated controller on SCSI models supports RAID-1 mirroring. Mirrored HDDs must match.
- All models support up to two HDDs.
- Maximum storage is based on two 146.8GB SCSI HDDs for SCSI models and two 120GB IDE HDDs for EIDE models. Any standard HDD may need to be replaced.
- All models include a one-year parts and labor warranty.

SBB Number	Option Number	Processor Upgrades	SMP Support ¹
88P9618	24P8189	AMD Opteron Processor Model 240	2xX
88P9619	24P8190	AMD Opteron Processor Model 242	3xX
88P9663	13N0700	AMD Opteron Processor Model 246	5xX

1. All models support up to two of the same processor model.

eServer 325 Memory

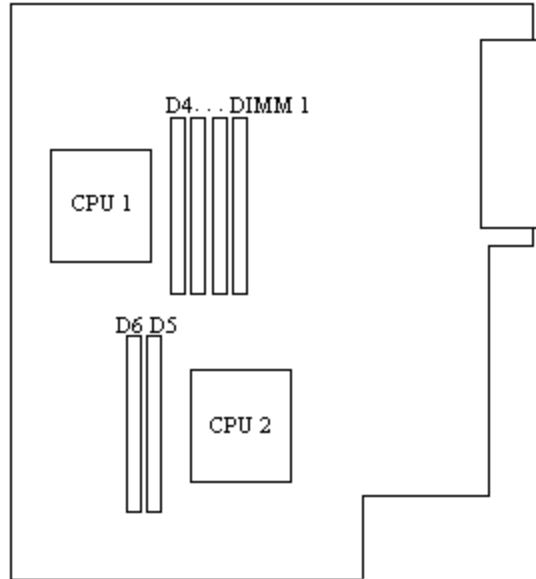
SBB Number	Option Number	Memory Description ^{1, 2}
88P9638	73P2266	512MB PC2700 ECC DDR SDRAM RDIMM
73P2575	73P2267	1GB PC2700 ECC DDR SDRAM RDIMM

1. Due to two-way interleaving, DIMMs must be installed in pairs.
 2. DIMMs feature Chipkill technology.

Uni-processor memory configuration		
DIMM Pair	DIMM Sockets	Installation Sequence
Set 1	DIMM 1 & DIMM 2	1st (standard in all models)
Set 2	DIMM 3 & DIMM 4	2nd
N/A ¹		

Dual-processor memory configuration		
DIMM Pair	DIMM Sockets	Installation Sequence
Set 1	DIMM 1 & DIMM 2	1st (standard in all models)
Set 2	DIMM 5 & DIMM 6	2nd
Set 3	DIMM 3 & DIMM 4	3rd

1. DIMM sockets five and six are not used in uni-processor configurations.



Total System Memory ¹	Quantity of RDIMMs Added	
	512MB DIMM	1GB DIMM
1GB Models (2 x 512MB)		
2GB ²	2	-
3GB ³	4	-
3GB ²	-	2
4GB ³	2	2
5GB ³	-	4
6GB ^{3, 4}	-	6

Total System Memory ¹	Quantity of RDIMMs Added	
	512MB DIMM	1GB DIMM
2GB Models (4 x 512MB)		
3GB ³	2	-
4GB ³	-	2
6GB ^{3, 4}	-	6

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Configuration valid for both uni and dual-processor systems.
3. Configuration valid only for dual-processor systems which support up to 6 DIMMs. Uni-processor systems support a maximum of four DIMMs.
4. Requires removal of standard memory.

eServer 325 Internal Cabling

IDE Configurations

The standard IDE HDD is cabled to the primary IDE controller using a two-drop IDE cable. An additional IDE HDD may be installed in the available HDD bay and connected to the second drop of the standard two-drop IDE cable. A single-drop IDE cable connects the standard CDROM to the secondary IDE connector.

SCSI Configurations

SCSI models support two hot-swap SCSI HDDs on a DASD backplane. The backplane is connected to the integrated Ultra320 single-channel controller through a 16-bit nonterminated SCSI cable. Attachment of external SCSI devices require a supported optional SCSI or RAID controller. A single-drop IDE cable connects the standard CDROM to the secondary IDE controller.

RAID configurations are supported by the integrated LSI chipset, which provides integrated mirroring. Optional ServeRAID-4Lx or -6M controllers can be installed to support the internal HDDs, in which case the standard cable would be used to attach the backplane to the RAID controller.

For additional information regarding internal cabling, refer to Appendix F: Internal Cabling Overview.

eServer 325 Hard Disk Drive (HDD)

SCSI Models			
Total Internal Storage ^{1, 2}	Quantity of SCSI HDDs added to standard configuration		
	36.4GB HDD	73.4GB HDD	146.8GB HDD
36.4GB	1	-	-
72.8GB	2	-	-
73.4GB	-	1	-
146.8GB	-	2	1
293.6GB	-	-	2

This table may not represent all possible HDD configurations.

1. Select a total storage row then add the quantity of HDDs from the columns of the preferred HDD.
2. Quantities shown assume open-bay. All SCSI models ship open-bay with the exception of the 5DX. It ships with one 36.4GB HDD.

IDE Models			
Total Internal Storage ¹	Quantity of IDE HDDs added to standard configuration		
	40GB	80GB	120GB
80GB ²	-	-	-
120GB	1	-	-
160GB	-	1	-
200GB	-	-	1
240GB ³	-	-	2

This table does not represent all possible HDD configurations.

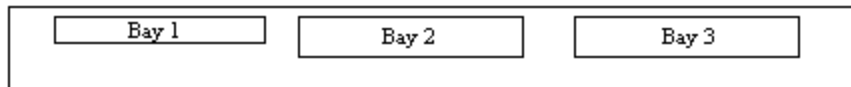
1. Select a total storage row then add the HDDs from all columns to the standard HDD.
2. IDE models ship standard with one 80GB 7200rpm IDE HDD.
3. Requires replacing the standard HDD.

SBB Number	Part Number	Description	Height	Bays Supported ³	Maximum Quantity
EIDE HDDs¹					
74P5145	22P7157	40GB 7200 rpm ATA-100 (EIDE) HDD	SL	2, 3	2
49P2895	09N4226	80GB 7200 rpm ATA-100 (EIDE) HDD	SL	2, 3	2
02R2677	09N4231	120GB 7200 rpm ATA-100 (EIDE) HDD	SL	2, 3	2
Hot-swap Ultra320 HDDs¹					
32P0746	32P0726	36.4GB 10K rpm Ultra320 SCSI Hot-swap HDD	SL	2, 3	2
32P0747	32P0727	73.4GB 10K rpm Ultra320 SCSI Hot-swap HDD	SL	2, 3	2
32P0748	32P0728	146.8GB 10K rpm Ultra320 SCSI Hot-swap HDD	SL	2, 3	2
32P0744	32P0734	36.4GB 15K rpm Ultra320 SCSI Hot-swap HDD	SL	2, 3	2
32P0745	32P0735	73.4GB 15K rpm Ultra320 SCSI Hot-swap HDD	SL	2, 3	2
Optical Devices					
59P5800	22P7047	8x Max Slimline DVD-ROM Drive ²	SL	1	1

1. Mixing of IDE and SCSI hard disk drives is not supported.
2. Requires removing and replacing the standard optical drive.

Bay	Form Factor	Height	Front Access	Usage
1 ¹	89mm (3.5in)	Slim	yes	Standard optical
2 ²	Hot-swap or fixed 89mm (3.5in) ¹	SL	yes (SCSI) ³	HDD
3 ²	Hot-swap or fixed 89mm (3.5in) ¹	SL	yes (SCSI) ³	HDD ⁴

1. Boot drive should be located in bay one.
2. On SCSI models install SCSI boot drive in bay two. On IDE models install IDE primary master drive in bay three.
3. Bays two and three are not front-accessible on IDE models.
4. Standard HDD on IDE models is installed in bay three.

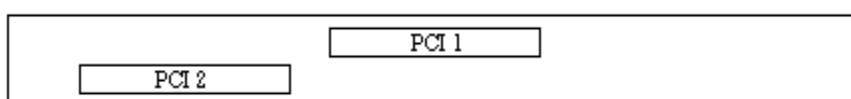


eServer 325 I/O Options

SBB Number	Option Number	Description	Adapter Length	PCI Support ¹	Slots Supported	Hot-Plug
Storage Controllers²						
02R0996	02R0988	ServeRAID-6M Controller (256MB Cache)	Full	64-bit/133MHz	1	-
02R0225	32P0033	ServeRAID-6M Controller (128MB Cache)	Full	64-bit/133MHz	1	-
24P3472	06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	Half	64-bit/66MHz	1, 2 ³	-

1. eServer 325 supports 3.3v or universal adapters only.
2. eServer 325 has a single-channel, Ultra320 integrated controller that supports RAID-1 mirroring.
3. When the ServeRAID-4Lx adapter is installed in slot 2, only external connections are supported.

eServer 325 Rear



PCI 1: Bus 3, 100MHz, 64-bit, 3.3v, full-length, PCI-X
 PCI 2: Bus 3, 100MHz, 64-bit, 3.3v, half-length, PCI-X

eServer 325 Power, Monitors & Accessories

SBB Number	Option Number	Description
Monitors		
-	633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black ¹
-	63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black ¹
-	32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ²
-	32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard) ²
-	32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver keyboard) ²
-	32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard) ²
Rack and NetBAY^{3, 4}		
-		Refer to Rack Cabinets and Options section for information concerning IBM racks and rack-supported devices.
Console Connectivity⁵		
-	1735L04	NetBAY Local Console Manager
-	1735R16	NetBAY Remote Console Manager
Keyboard and Mouse		
-	10K3849	106-key Preferred USB Keyboard with 2-port USB Hub (stealth black) ⁶
13M7124	06P4069	USB Optical Wheel Mouse
USB Devices⁷		
-	33L5151	USB Portable CD-ROM
-	05K9276	USB Portable Diskette Drive

1. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).
2. Includes a 15in Flat Panel Monitor.
3. eServer 325 is housed in a 19in rack-mountable drawer and requires one of the racks listed in the Rack Cabinets and Options section.
4. Note any limitations and restrictions required for adequate cooling in the Rack Cabinets and Options Section. If non-IBM racks are to be used, assure that both front and rear doors offer a minimum of 48% open area uniformly distributed and in line with installed servers. A clearance of 51 to 64mm (2 to 2.5in) must be maintained between the front door and the system unit's front bezel. The rear door must maintain the same or greater clearance.
5. Refer to the Rack Console Options section for information regarding console connectivity using these options.
6. Installation within a rack requires optional keyboard tray (P/N 28L4707). This keyboard cannot share a keyboard tray with a flat panel display.
7. USB accessories attach to a single USB-capable server. They are not compatible with the NetBAY console switches.

BladeCenter™

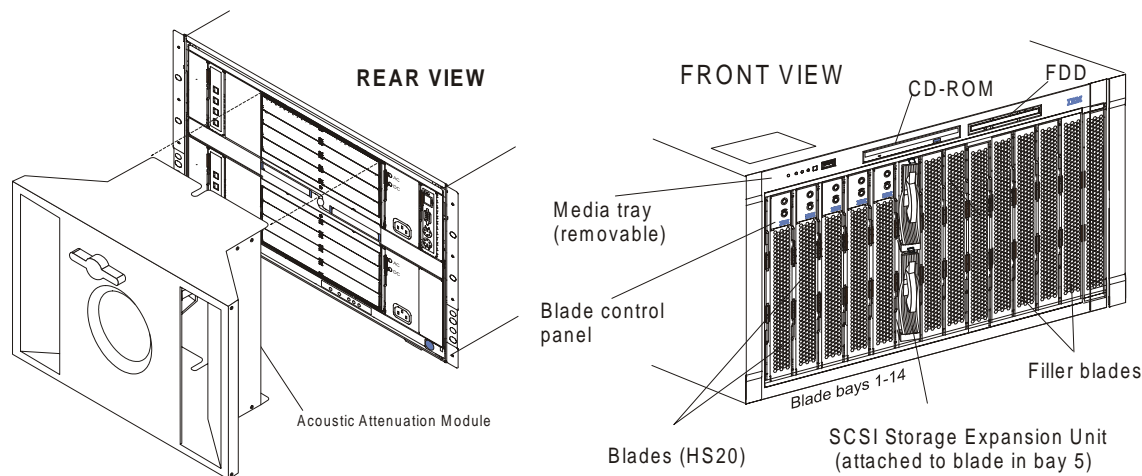
Option Part Number
 Form Factor
 Power Module Quantity (Std/Max)
 Hot-swap (Power, Bays, Blowers)⁵
 Redundancy (Optional, Standard)
 System Management Module (Std/Max)
 Integrated Ethernet
 Switch Module Bays (Total/Avail)
 CD-ROM
 Floppy Disk Drive
 Blade Bays (Total/Avail)
 PCI Slots / HDD Bays (Total/Avail)

BladeCenter™ At-A-Glance											
8677-1XX	Rack (7U) ¹	2/4 ^{2, 4}	P, B, B	S-Blowers S-Power	1/2 ⁶	10/100/ 1000 ⁷	4/4	24x-10x USB	1.44MB USB	14/14	0/0 ⁸
8677-2XX	Rack (7U) ¹	2/4 ^{3, 4}	P, B, B	S-Blowers S-Power	1/2 ⁶	10/100/ 1000 ⁷	4/4	24x-10x USB	1.44MB USB	14/14	0/0 ⁸

Notes:
 A fully configured eServer BladeCenter™ chassis doubles the density of 14 equally configured 1U xSeries 335 servers by accommodating up to 14 BladeCenter HS20 units installed in a 7U rack space.

BladeCenter™ increases usability and reduces complexity because it provides common sourcing for up to 14 BladeCenter HS20 units for cabling and cabling connections, I/O options, power modules, system management requirements (optional adapters and external cabling), external Fibre Channel storage switching and connectivity, and network management and expansion.

- Housed in a 7U, 19in rack-mountable chassis (28in deep). See Rack Cabinets and Options section for supported IBM racks.
- Model 1XX ships standard with a 220v 1200w power module installed in both power module bays one and two.
- Model 2XX ships standard with a 220v 1800w power module installed in both power module bays one and two.
- N+N power supply redundancy is provided standard for blade bays one through six and all module bays. Two additional power modules are required to support any blade server installed in blade bays seven through 14. See BladeCenter Power, Monitors and Accessories for more information.
- The blade bays in the front of the chassis support hot-swapping of blade servers. A spring-action cover closes the bay opening when the blade server is removed, allowing the blade to be removed for up to two hours before thermal restrictions require replacement.
- Comprehensive system management functionality is provided through the standard management module installed in management module bay one, which communicates with the integrated service processor on each HS20 planar. The management module also acts as a multiplexor for installed HS20 units for console connectivity (keyboard, video and mouse). Optional KVM/Redundant Management Module (P/N 48P7055) is available for full redundancy of system management functions (redundancy for console connectivity requires additional KVM option attachment).
- One of the dual integrated gigabit Ethernet controllers on each HS20 planar connects to an optional BladeCenter 4-port Gigabit Ethernet Switch Module (P/N 48P7054) installed in switch module bay one. An additional Ethernet switch module may be installed in switch module bay two, to which the second Ethernet controller integrated into each HS20 planar is connected. Ethernet capability is not provided standard in BladeCenter.
- BladeCenter contains no PCI expansion slots or HDD bays. Internal HDD expansion is provided in the individual HS20 units. Standard I/O support includes system management, KVM (console) and Ethernet connectivity. Expanded I/O functionality is provided through optional Fibre Channel switch modules that install into the BladeCenter chassis. System management functionality is controlled by a system management module, which also installs into the rear system chassis. Expansion switch modules may not be mixed in a BladeCenter configuration because all HS20 units installed in a single BladeCenter must contain either the same kind of expansion card or no expansion card. (If an expansion card is installed, only one IDE HDD is allowed.)



BladeCenter™ Sales Building Blocks

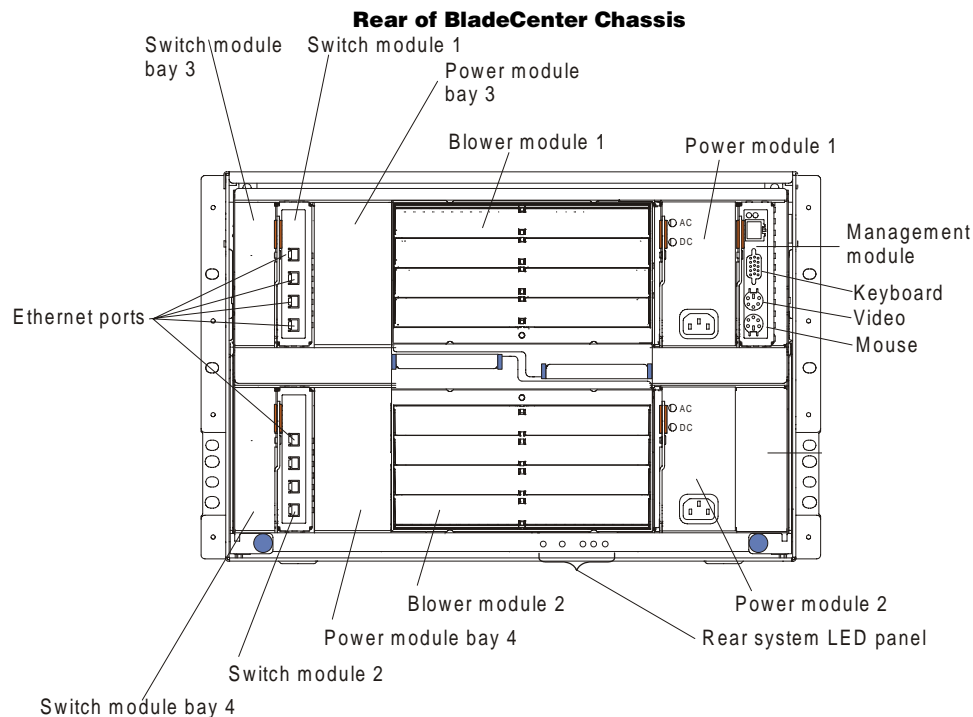
SBB Number	Option Part Number	SBB Description	Rules
Selectable Hardware			
Select one power cord. An identical power cord will be derived in Easy Access for each power supply installed (total quantities of two or four).			
24P2605	-	Rack Power Cable - 2.8m, 100-240v, C13 to IEC 320-C14 (WW)	Two cables ship with MTM. Two additional are provided with the MTM power supply option, which includes two power supplies.
32P9071	-	Rack Power Cable - 4.3m, 100-240v, C13 to IEC 320-C14 (WW)	Optional for CTO. Power cords for all power supplies must match.
32P9072	-	Line cord - 2.8m, 200-240v, C13 to NEMA 6-15P (US)	Optional for CTO. Power cords for all power supplies must match.
32P9073	-	Line cord - 1.8m, 200-240v, C13 to NEMA 6-15P (US)	Optional for CTO. Power cords for all power supplies must match.
21P9459	-	Line cord - 2.8m, 200-240v, C13 to GB 2099.1 (China)	Optional for CTO. Power cords for all power supplies must match.
21P9452	-	Line cord - 2.8m, 200-240v, C13 to AS/NZ 3112 (Australia/NZ)	Optional for CTO. Power cords for all power supplies must match.
21P9454	-	Line cord - 2.8m, 200-240v, C13 to CEE7-VII (European)	Optional for CTO. Power cords for all power supplies must match.
21P9456	-	Line cord - 2.8m, 200-240v, C13 to DK2-5a (Denmark)	Optional for CTO. Power cords for all power supplies must match.
21P9461	-	Line cord - 2.8m, 200-240v, C13 to SABS 164 (S Africa/India)	Optional for CTO. Power cords for all power supplies must match.
21P9455	-	Line cord - 2.8m, 200-240v, C13 to BS 1363/A (UK)	Optional for CTO. Power cords for all power supplies must match.
21P9462	-	Line cord - 2.8m, 200-240v, C13 to SEV 1011-S24507 (Swiss)	Optional for CTO. Power cords for all power supplies must match.
21P9457	-	Line cord - 2.8m, 200-240v, C13 to CEI 23-16 (Italy)	Optional for CTO. Power cords for all power supplies must match.
21P9460	-	Line cord - 2.8m, 200-240v, C13 to SI 32 (Israel)	Optional for CTO. Power cords for all power supplies must match.
21P9458	-	Line cord - 2.8m, 200-240v, C13 to IRAM 2073 (Argentina)	Optional for CTO. Power cords for all power supplies must match.
Switch and Power Modules			
48P7080	-	BladeCenter 1200w Power Supplies one and two	Standard with MTM, required for CTO. Provides redundant power to blade bays 1-6 and all media bays.
48P7082	48P7054	BladeCenter 4-port GB Ethernet Switch Module	Required to enable one of two integrated Ethernet controllers on the HS20 planar, installed in module bay 1. Select a second to enable the second integrated Ethernet controller, installed in module bay 2.
59P6627	48P7062	BladeCenter 2-port Fibre Channel Switch Module	Select up to two. First one installs in module bay 3, the second in module bay 4 supporting two FC controller ports on expansion card.
59P6648	48P7052	BladeCenter 1200w Power Supplies three and four	Required to provide redundant power to blade bays 7-14. Installs in bays 3 and 4. (The MTM option also includes both power supplies.)
Derived Hardware			
49P2654	-	Base System	BladeCenter chassis with empty blade and module bays.
48P7077	-	Blade Filler Panel	Required for each open blade bay
73P5950	48P7055	BladeCenter KVM/Management Module	Standard with MTM. Derived for CTO from base system. Provides system management connectivity for HS20s and console connectivity for keyboard, video and mouse. Includes PS/2 keyboard, PS/2 mouse and video connectors.
48P7081	48P7055	BladeCenter Redundant KVM/Management Module	Selectable for system management redundancy.
32P0902	-	24x Slim CD-ROM Internal IDE Drive	Standard with MTM and CTO.
48P7078	-	Switch/Management Module Filler	Required for each open module bay.
48P7079	-	Power Module Filler	Required for each open power supply bay.
Publications			
01R1100	-	Pubs and Software - U.S. English	Standard with MTM. Selectable for CTO.



BladeCenter™ Storage and Communications Expansion

SBB Number	Option Part Number	Description	Form Factor
Fibre Channel Storage Controllers			
-	174290U	FAStT900 Storage Server (US line cord)	Rack (4U)
-	17421RU	FAStT700 Fibre Channel Storage Server	Rack (4U)
-	172260U	FAStT600 Storage Server (US line cord)	Rack (3U)
-	35421RU	FAStT200 Storage Server	Rack (3U)
-	35422RU	FAStT200 HA Storage Server	Rack (3U)
Fibre Channel Switches, Hubs and Routers			
-	3534F08	TotalStorage SAN Switch F08 - 8-port	Rack (1U)
-	2109F16	SAN Fibre Channel Switch, 16-port	Rack (1U)
Fibre Channel External Storage Enclosures			
-	171010U	FAStT EXP100 Storage Expansion Unit	Rack (3U)
-	17401RU	FAStT EXP700 Storage Expansion Unit	Rack (3U)
-	35601RU	FAStT EXP500 Storage Expansion Unit	Rack (3U)
BladeCenter Switch Modules			
59P6627	48P7062	BladeCenter 2-port Fibre Channel Switch Module ^{1, 2}	-
48P7082	48P7054	BladeCenter 4-port Gigabit Ethernet Switch Module ³	-
73P9043	73P9057	Nortel Networks Layer 2-7 GbE Switch Module ³	-
02R9081	02R9080	BladeCenter Optical Pass-thru Module ⁴	-
73P5989	73P5992	BladeCenter Optical Pass-thru Module SC Cable ⁵	-
73P6031	73P6033	BladeCenter Optical Pass-thru Module LC Cable ⁵	-
System Management			
48P7081	48P7055	KVM/Redundant Management Option	-
Blade Server Expansion Card^{6, 7}			

1. Short- or Long-wave SFP Modules (P/N 19K1271, 2) are required for each port connection.
2. Installs in switch module bay 3 or 4. When installed in bay 3, Channel 1 on blade-installed Fibre Channel expansion cards are enabled. When installed in bay 4, channel 2 on blade-installed Fibre Channel expansion cards are enabled.
3. When installed in switch module bay 1, integrated Ethernet controller 1 is enabled on all blades. When installed in bay 2, integrated Ethernet controller 2 is enabled on all blades.
4. Must be installed in switch module bay 4 when Myrinet cluster expansion cards are installed in blade servers.
5. This cable allows connection between the optical module and the BladeCenter blades. It is 1.5m in length and presents four connections.
6. Connection/Channel 1 on expansion cards communicate with BladeCenter I/O module bay 3; Connection/Channel 2 on expansion cards communicate with BladeCenter I/O module bay 4. Differing expansion cards can be installed among blades as long as OPM I/O modules are installed in BladeCenter I/O module bays 3 and 4.
7. Refer to the individual blade server for Blade Server Expansion card configuration information.



BladeCenter™ Power, Monitors and Accessories

SBB Number	Option Number	Description
Power^{1, 2}		
59P6648	48P7052	BladeCenter 1200w Power Supply Modules ^{2, 3}
N/A	90P0197	BladeCenter 1200w to 1400w Power Supply Upgrade Kit ^{2, 4}
13N0593	13N0570	BladeCenter 1800w Power Supply Modules ^{2, 5}
Uninterruptible Power Supply (UPS)⁶		
-	2130R31	UPS3000XHV ⁷
-	32P1692	UPS Extend Run Battery Pack ⁷
-	37L6861	APC Smart-UPS 5000RMB ⁸
Monitors⁹		
-	633147N	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black ¹⁰
-	63324HN	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black ¹⁰
-	32P1031	NetBAY 1U Flat Panel Monitor Console Kit (with US Space Saver Keyboard) ¹¹
-	32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard) ¹¹
-	32P1702	NetBAY 2U Flat Panel Monitor Console Kit (with US Space Saver Keyboard) ¹¹
-	32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without Keyboard) ¹¹

1. BladeCenter includes two hot-swap power modules (installed in power module bays one and two) with two Rack Power Cables for intrack power distribution. These provide power for blade bays one through six and for all module bays. When one or more blade servers are installed in blade bays 7 through 14, the appropriate Power Supply Modules option must be installed in power module bays 3 and 4. BladeCenter model 1XX ships with two 2.8m/9ft IEC 320-C13 to IEC320-C14 Rack Power Cables. BladeCenter model 2XX ships with two 2.5m/8ft IEC 320-C19 to IEC320-C20 Rack Power Cables. Only high voltage connections are supported.

2. Refer to Appendix H: eServer BladeCenter Power Upgrade Guidelines for important information that will help determine when a BladeCenter power module upgrade is necessary. Not covered in this guideline is the JS20 blade server. Install 1800w power supply modules when JS20 blade servers are installed in BladeCenter 1XX models.

3. This option provides two hot-swap power supplies and two 2.8m/9ft IEC 320-C13 to IEC 320-C14 power cables.

4. The 1200w to 1400w Power Supply Upgrade Kit is available for 8677-1XX models only and may be required depending on power requirements. See Appendix H: eServer BladeCenter Power Upgrade Guidelines for rules determining if this option is required.

5. The 1800w Power Supply Modules option must be installed in power module bays 3 and 4 in BladeCenter models 2XX when a blade server is installed in any of blade bays 7 through 14. It is also available as an upgrade for the BladeCenter 1XX models as needed per the power supply upgrade guidelines or whenever JS20 blade servers are installed. This option provides two hot-swap power supply modules and two 2.8m/9ft IEC 320-C19 to IEC 320-C20 power cables.

6. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.

7. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.

8. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.

9. HS20 units are equipped with an integrated ATI Rage XL video controller with 8MB of video memory. Optional video adapters are not supported.

10. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).

11. Includes a 15in Flat Panel Monitor.



SBB Number	Option Number	Description
Rack and NetBAY¹		
		Refer to the Rack Cabinets and Options section for information concerning IBM racks and rack-supported devices.
Console Connectivity²		
-	1735L04	NetBAY Local Console Manager
-	1735R16	NetBAY Remote Console Manager
-	32P1636	250mm KVM Conversion Option
-	32P1652	1.5m KVM Conversion Option
Acoustic Option		
-	49P2694	BladeCenter Acoustic Attenuation Module ³
Keyboard and Mouse⁴		
32P8917	28L3644	Space Saver II Keyboard ^{5, 6}
02R3206	31P7415	Preferred Pro Full-size Keyboard - 104 Keys (stealth black) ⁷
02R3421	28L3673	Sleek 2-Button Stealth Black Mouse

1. BladeCenter is housed in a 7U, 19in rack-mountable chassis and requires one of the racks listed in the Rack Cabinets and Options section.

2. BladeCenter includes a standard management module that provides system management connectivity for all installed HS20s as well as console connectivity for keyboard, video and mouse (KVM). The management module includes one PS/2 keyboard connector, one PS/2 mouse connector, one 15-pin D-shell video connector and one RJ45 connector for a 100Mb Ethernet remote console connection to support system management functionality. Refer to the Rack Console Options section for information regarding console connectivity using these options.

3. Installs over the fan modules in the rear of the chassis to reduce decibels in sound-sensitive environments. BladeCenter generates 80 decibels (8 bels) at maximum performance levels. The Acoustic Attenuation Module reduces the decibel level by 11 (approximately 12%). Must be shipped separately from the BladeCenter chassis.

4. BladeCenter supports rack configurations only and ships without a keyboard or mouse.

5. Installation within a rack requires optional keyboard tray (P/N 28L4707), which stows in ready-to-use position, or NetBAY 1U or 2U Flat Panel Monitor Console Kit (P/N 32P1032, 32P1702). Standard with 1U and 2U NetBAY console kits (P/N 32P1031, 32P1702).

6. Advanced TrackPoint IV features are not available.

7. Installation within a rack requires optional keyboard tray (P/N 28L4707). This keyboard cannot share a keyboard tray with a flat panel display.

BladeCenter™ HS20

Option Part Number	Withdrawal Date ¹³	Processor/FSB Speed (GHz/MHz)	Number of Processors (Std/Max)	Cache	Memory (Std/Max) ⁴	IDE Storage Controller	IDE HDD Bays (Total/Avail) ⁵	Internal IDE HDD Capacity (Std/Max) ⁶	Onboard Ethernet (Mbps) ⁷	Integrated System Management Processor ⁸	Video Controller / Memory	SCSI Storage Expansion Unit (Std/Max) ⁹	SCSI Interface ¹⁰	SCSI HDD Bays (Total/Avail) ¹⁰	SCSI HDD Capacity (Std/Max) ¹¹	Expansion Cards (Std/Max) ¹²
BladeCenter™ HS20 At-A-Glance																
8678-51X	-	2.6/400 ²	1/2	512KB L2	512MB/8GB	Dual ATA-100	2/2	0/80GB	2 x 10/100/1000	Y	ATI Rage XL/ 8MB	0/1	U320	2/2	0/293.6GB	0/1
8678-61X	30-Dec	2.8/400 ²	1/2	512KB L2	512MB/8GB	Dual ATA-100	2/2	0/80GB	2 x 10/100/1000	Y	ATI Rage XL/ 8MB	0/1	U320	2/2	0/293.6GB	0/1
8832-21X	-	2.8/533 ³	1/2	512KB L2	512MB/8GB	Dual ATA-100	2/2	0/80GB	2 x 10/100/1000	Y	ATI Rage XL/ 8MB	0/1	U320	2/2	0/293.6GB	0/1
8832-31X ¹	-	3.06/533 ³	1/2	512KB L2	512MB/8GB	Dual ATA-100	2/2	0/80GB	2 x 10/100/1000	Y	ATI Rage XL/ 8MB	0/1	U320	2/2	0/293.6GB	0/1
8832-G1X ¹	-	3.2/533 ³	1/2	1MB L3	1GB/8GB	Dual ATA-100	2/2	0/80GB	2 x 10/100/1000	Y	ATI Rage XL/ 8MB	0/1	U320	2/2	0/293.6GB	0/1

1. Blade servers with 3.xxGHz processors will require power modules in BladeCenter models 1XX to be upgraded to 1800w power modules.

2. Intel Xeon processor with advanced transfer L2 cache and 400MHz (quad-pumped) Front Side Bus (FSB).

3. Intel Xeon processor with advanced transfer ECC L2 cache and 533MHz (quad-pumped) Front Side Bus (FSB). Some processors have an additional L3 cache as noted in the table above.

4. Memory is two-way interleaved, PC2100 ECC DDR RDIMMs supporting Chipkill technology.

5. When two IDE HDDs are installed in machine type 8832 models, IDE HDD mirroring can be enabled.

6. Maximum IDE HDD storage capacity based on two 40GB 5400rpm IDE HDDs. Space for only one IDE HDD is available if an expansion card is installed.

7. Broadcom 5703 dual integrated copper gigabit Ethernet controller.

8. System management functionality, interconnect network connectivity and console connectivity are managed through the standard management module. The standard integrated service processor monitors HS20 system management activity, communicating with the management module in the BladeCenter.

9. Optional HS20 SCSI Storage Expansion Unit (P/N 48P7058) provides an integrated single-channel Ultra320 storage controller and two hot-swap SCSI HDD bays. The expansion unit installs onto the HS20 by connecting the SCSI connector, then installing both units together into the BladeCenter. The storage expansion module is the same size as the HS20. The integrated controller supports both Ultra160 and Ultra320 HDDs, but the entire SCSI bus will default to the slower rate (MB/second) if HDDs of different technologies are mixed on the same bus. The LSI chipset allows for two HDDs to be allocated for mirroring.

10. Two hot-swap SCSI HDD bays and an integrated Ultra320 single-channel storage controller are provided in the HS20 SCSI Storage Expansion Unit.

11. Maximum capacity requires installing two 146.8GB SCSI HDDs. Mixing of Ultra320 and Ultra160 HDDs is supported, but the bus will operate at the speed of the lowest rated HDD.

12. HS20 Fibre Channel Expansion Card (P/N 48P7061) installs over IDE connector two attaching into the expansion card connector, preventing installation of a second IDE HDD. The expansion card includes two Fibre Channel channels and two ports. One channel connects the HS20 to one optional BladeCenter 2-port Fibre Channel Switch Module (P/N 48P7062) installed in switch module bay three. The second channel connects to a second optional Fibre Channel switch module in bay four, which provides a redundant environment. Ethernet and serial I/O expansion cards are planned for future release. Expansion card selections cannot be mixed within a single BladeCenter chassis because they must connect to switch modules installed in switch module bays three and four.

13. Not available from IBM after this date. Business Partner inventory may be available.



HS20 Sales Building Blocks

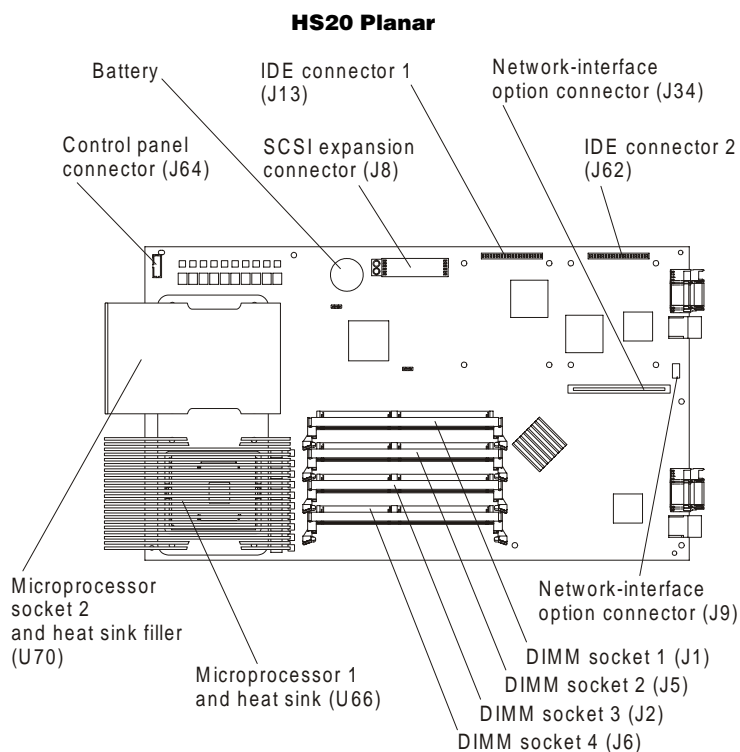
SBB Number	Option Part Number	SBB Description	Rules
Selectable Hardware			
48P7067	48P7060	2.0GHz/400MHz-512KB L2 Cache with Xeon DP Processor	One standard with MTM. Selectable for CTO. A maximum of two allowed. Selected processors must be identical.
48P7069	48P7096	2.4GHz/400MHz-512KB L2 Cache with Xeon DP Processor	One standard with MTM. Selectable for CTO. A maximum of two allowed. Selected processors must be identical.
73P5997	73P5982	2.6GHz/400MHz-512KB L2 Cache with Xeon DP Processor	One standard with MTM. Selectable for CTO. A maximum of two allowed. Selected processors must be identical.
73P5998	74P5983	2.8GHz/400MHz-512KB L2 Cache with Xeon DP Processor	One standard with MTM. Selectable for CTO. A maximum of two allowed. Selected processors must be identical.
71P8835	73P9073	2.8GHz/533MHz-512KB L2 Cache with Xeon DP Processor	One standard with MTM. Selectable for CTO. A maximum of two allowed. Selected processors must be identical.
32P0915	33L5037	256MB PC2100 ECC DDR SDRAM RDIMM	Two standard installed in MTMs. Select in pairs for both CTM and MTM. Maximum of four supported.
37L3538	33L5038	512MB PC2100 ECC DDR SDRAM RDIMM	Select in pairs for both CTO and MTM. Maximum of four supported.
33P3126	33L5039	1GB PC2100 ECC DDR SDRAM RDIMM	Select in pairs for both CTO and MTM. Maximum of four supported.
48P7099	48P7063	HS20 40GB 5400 rpm ATA-100 HDD	Maximum of two supported in CTO and MTM. Only one supported with expansion card installed.
48P7097	48P7058	HS20 SCSI Storage Expansion Unit	Includes integrated Ultra320 SCSI controller (onboard mirroring supported). Required to support up to two SCSI hot-swap HDDs.
32P9018	06P5755	36.4GB 10Krpm SCSI U160 HDD (Hot-swap)	Selectable for CTO and MTM. Up to two supported if SCSI Storage Expansion Unit is installed.
32P9011	06P5756	73.4GB 10Krpm SCSI U160 HDD (Hot-swap)	Selectable for CTO and MTM. Up to two supported if SCSI Storage Expansion Unit is installed.
32P9025	06P5768	36.4GB 15Krpm SCSI U160 HDD (Hot-swap)	Selectable for CTO and MTM. Up to two supported if SCSI Storage Expansion Unit is installed.
32P0746	32P0726	36.4GB 10K rpm SCSI U320 HDD (Hot-swap)	Selectable for CTO and MTM. Up to two supported if SCSI Storage Expansion Unit is installed.
32P0747	32P0727	73.44GB 10K rpm SCSI U320 HDD (Hot-swap)	Selectable for CTO and MTM. Up to two supported if SCSI Storage Expansion Unit is installed.
32P0748	32P0728	146.8GB 10K rpm SCSI U320 HDD (Hot-swap)	Selectable for CTO and MTM. Up to two supported if SCSI Storage Expansion Unit is installed.
32P0744	32P0734	36.4GB 15K rpm SCSI U320 HDD (Hot-swap)	Selectable for CTO and MTM. Up to two supported if SCSI Storage Expansion Unit is installed.
32P0745	32P0735	73.4GB 15K rpm SCSI U320 HDD (Hot-swap)	Selectable for CTO and MTM. Up to two supported if SCSI Storage Expansion Unit is installed.
59P6613	48P7061	HS20 Fibre Channel Expansion Card	Selectable for CTO and MTM. Limits IDE HDD selection to one. Includes two Fibre Channel controller ports that connect to a Fibre Channel switch module in switch module bay 3 or 4.
Derived Hardware			
22P0113	-	3.5in SL Hot-swap Bezel ASM (Filler)	Required for each open SCSI bay in SCSI Storage Expansion Unit.
48P7066	-	Blade Base Supporting 400MHz Front-side Bus Processors	Derived from processor selection for CTO. Includes planar and left cover.
48P7076	-	Heatsink Filler	Required for open processor socket.
59P6647	-	Blade Cover and Bus Terminator Card	Required for HS20 when a SCSI Storage Expansion unit is not attached.
Software			
22P0159	-	Windows 2000 Advanced Server (preloaded)	OS installed and configured with all hardware selections.
22P0160	-	Windows 2000 Server (preloaded)	OS installed and configured with all hardware selections.
25P2853	-	Unknown or not required	Hardware installed without OS limitations or compatibility.
24P3442	-	Windows 2000 Server (customer provided and installed)	Hardware selected for OS compatibility. OS not provided.
24P3445	-	Windows 2000 AdvancedServer (customer provided and installed)	Hardware selected for OS compatibility. OS not provided.
48P7914	-	Red Hat 7.3 (customer provided and installed)	Hardware selected for OS compatibility. OS not provided.
25P2854	-	Customer provided and installed	Operating System Language (OSL) for customer-provided or unknown OS.
59P3597	-	Windows 2000 Server (US English)	OSL for preloaded OS.
59P3598	-	Windows 2000 Advanced Server (US English)	OSL for preloaded OS.

Manufacturing Instructions			
59P5805	-	Enable onboard mirroring - two identical SCSI HDDs required	Required for onboard mirroring of two identical SCSI HDDs installed in a SCSI Storage Expansion Unit.
73P6011	-	Enable onboard IDE mirroring - two identical IDE HDDs required	Required for onboard mirroring of two identical IDE HDDs installed in the blade server, restricting installation of an expansion card.

HS20 Processors

SBB Number	Option Number	Processor Upgrades	SMP Support ¹
48P7067	48P7060	2GHz 400MHz-512KB L2 Cache Xeon Processor	8678-21X
48P7069	48P7096	2.4GHz 400MHz-512KB L2 Cache Xeon Processor	8678-41X
73P5997	73P5982	2.6GHz/400MHz-512KB L2 Cache Xeon Processor	8678-51X
73P5998	73P5983	2.8GHz/400MHz-512KB L2 Cache Xeon Processor	8678-61X
71P8835	73P9073	2.8GHz/533MHz-512KB L2 Cache Xeon Processor	8832-21X
71P8836	73P9074	3.06GHz/533MHz-512KB L2 Cache Xeon Processor	8832-31X
25K9518	13N0650	3.2GHz/533MHz-1MB L3 Cache Xeon Processor	8832-G1X

1. One additional processor may be installed, providing a maximum of two. All processors must be identical in type, speed and cache size.





HS20 Memory

SBB Number	Option Number	Memory Description ¹
32P0915	33L5037	256MB DDR PC2100 ECC RDIMM
37L3538	33L5038	512MB DDR PC2100 ECC RDIMM
33P3126	33L5039	1GB DDR PC2100 ECC RDIMM
32P9223	33L5040	2GB DDR PC2100 ECC RDIMM

1. Due to two-way interleaving, installation of memory options in pairs is required. Standard RDIMMs are installed in sockets three and four. One RDIMM pair is not required to match the other. Provides Error Checking and Correcting (ECC) via 16-bit Checksum Chipkill (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips).

Total System Memory ¹	Quantity of RDIMMs Added			
	256MB	512MB	1GB	2GB
8678				
All Models (2x256)				
1GB	2	-	-	-
1.5GB	-	2	-	-
2.5GB	-	-	2	-
4GB ²	-	-	4	-
4.5GB	-	-	-	2
6GB ²	-	-	2	2
8GB ²	-	-	-	4
8832				
21X, 31X (2x256)				
1GB	2	-	-	-
1.5GB	-	2	-	-
2.5GB	-	-	2	-
4GB ²	-	-	4	-
4.5GB	-	-	-	2
6GB ²	-	-	2	2
8GB ²	-	-	-	4
G1X (2x512)				
1.5GB	2	-	-	-
2GB	-	2	-	-
3GB	-	-	2	-
4GB ²	-	-	4	-
5GB	-	-	-	2
8GB ²	-	-	-	4

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Requires removal of standard memory.

HS20 Hard Disk Drive (HDD) Storage

SCSI HDD Configuration with Storage Expansion Unit Installed			
Total Int Storage ¹	Quantity of HDDs added to standard configuration		
	36.4GB HDD	73.4G HDD	146.8GB HDD
0GB ²			
18.2GB	-	-	-
36.4GB	1	-	-
72.8GB	2	-	-
73.4GB	-	1	-
146.8GB	-	2	1
293.6GB	-	-	2

This table does not represent all possible HDD configurations. Total Internal Storage listed is within +/-0.2GB unless otherwise noted.

1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.
2. All models ship open-bay.

HDD Options					
SBB Number	Option Number	Description	Height	Bays Supported	Maximum Quantity ¹
IDE HDD¹					
48P7099	48P7063	HS20 40GB 5400 rpm ATA-100 HDD	Slim	1, 2	2
Hot-swap Ultra160 HDDs²					
32P9108	06P5755	36.4GB 10K rpm Ultra160 SCSI Hot-swap HDD	SL	1, 2	2
32P9011	06P5756	73.4GB 10K rpm Ultra160 SCSI Hot-swap HDD	SL	1, 2	2
32P0749	32P0750	146.8GB 10K rpm Ultra160 SCSI Hot-swap HDD	SL	1, 2	2
32P9025	06P5768	36.4GB 15K rpm Ultra160 SCSI Hot-swap HDD	SL	1, 2	2
Hot-swap Ultra320 HDDs²					
32P0746	32P0726	36.4GB 10K rpm Ultra320 SCSI Hot-swap HDD	SL	1, 2	2
32P0747	32P0727	73.4GB 10K rpm Ultra320 SCSI Hot-swap HDD	SL	1, 2	2
32P0748	32P0728	146.8GB 10K rpm Ultra320 SCSI Hot-swap HDD	SL	1, 2	2
32P0744	32P0734	36.4GB 15K rpm Ultra320 SCSI Hot-swap HDD	SL	1, 2	2
32P0745	32P0735	73.4GB 15K rpm Ultra320 SCSI Hot-swap HDD	SL	1, 2	2
Internal Storage Expansion					
48P7097	48P7058	SCSI Storage Expansion Unit ³	-	-	-

1. Up to two IDE HDDs may be installed in each HS20. The second IDE HDD cannot be added if a Fibre Channel expansion card is installed. IDE HDDs may remain installed when a SCSI Storage Expansion Unit and up to two SCSI HDDs are added to the configuration. Either the IDE or SCSI bus can support the boot disk. Onboard mirroring is not supported on the IDE bus.
2. Two SCSI HDDs may be installed in a SCSI Storage Expansion Unit. The integrated Ultra320 SCSI controller supports both Ultra320 and Ultra160 HDDs, though bus speed is reduced to the rated performance of the slowest HDD. The LSI chipset supports onboard HDD mirroring when two identical SCSI HDDs are installed.
3. Optional HS20 SCSI Storage Expansion Unit (P/N 48P7058) provides an integrated single-channel Ultra320 storage controller and two hot-swap SCSI HDD bays. The expansion unit installs onto the HS20 by connecting the SCSI connector, then installing both units together into the BladeCenter. The storage expansion unit mechanical is the same size as the HS20. The integrated controller supports both Ultra160 and Ultra320 HDDs, but the entire SCSI bus will default to the slower rate (MB/second) if HDDs of different technologies are mixed on the same bus. The LSI chipset allows for two matched SCSI HDDs to be allocated for mirroring.

HS20 I/O Options

SBB Number	Option Number	Description	Form Factor
Blade Server Expansion Cards^{1, 2}			
59P6613	48P7061	BladeCenter Fibre Channel Expansion Card	-
73P9029	73P9030	BladeCenter Gigabit Ethernet Expansion Card	-
73P5999	73P6000	Myrinet Cluster Expansion Card ³	-

1. One expansion card is allowed per blade server and installs over IDE HDD bay 2, preventing installation of second IDE HDD.
2. Requires appropriate I/O modules to be installed in the BladeCenter chassis. Refer to 'BladeCenter Storage and Communications Expansion' for appropriate I/O module options and configuration information.
3. Requires an OPM I/O module to be installed in BladeCenter I/O module bay 4.



BladeCenter Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

Microsoft Exchange Cluster Solution¹

Option Number	Description	Quantity
8677-2XX	eServer BladeCenter	1
13N0570	BladeCenter 1800w Power Supply Modules	1 ²
48P7054	BladeCenter 4-port Gigabit Ethernet Switch Module	2
48P7062	BladeCenter 2-port Fibre Channel Switch Module	2 ³
8832-G1X	BladeCenter HS20 (3.2GHz/533MHz)	14
33L5037	256MB DDR PC2100 ECC RDIMM	28 ⁴
48P7061	HS20 Fibre Channel Expansion Card	14
External Storage ⁵		
17421RU	FASiT700 Storage Server	1
17401RU	FASiT EXP700 Storage Expansion Unit	16
06P5771	2Gbps FC 18.2GB/15K Drive	224 ⁶

1. Rack, console and power options not included.
2. Total of four power modules, which provides full redundancy. Two power modules are standard in BladeCenter.
3. Each connected switch module port requires either a Short-wave or Long-wave SFP Module (P/N 19K1271, 2).
4. Total memory of 1GB per HS20.
5. Fibre Channel cable, SFP Modules and FASiT700 Mini Hubs not included.
6. Fourteen Fibre Channel HDDs per FASiT EXP700.

Citrix Solution¹

Option Number	Description	Quantity
8677-2XX	eServer BladeCenter	1
13N0570	BladeCenter 1800w Power Supply Modules	1 ²
48P7054	BladeCenter 4-port Gigabit Ethernet Switch Module	2
8832-G1X	BladeCenter HS20 (3.2GHz/533MHz)	14
48P7063	BladeCenter 40GB 5400rpm ATA-100 HDD	28
33L5039	1GB DDR PC2100 ECC RDIMM	56 ³

1. Rack, console and power options not included.
2. Total of four power modules, which provides full redundancy. Two power modules are standard in BladeCenter.
3. Total memory of 4GB per HS20. Requires replacing the standard RDIMMs.

BladeCenter™ JS20

Option Part Number¹
 Processor/FSB Speed (GHz/MHz)²
 Number of Processors (Std/Max)
 Cache
 Memory (Std/Max)³
 Storage Controller
 HDD Bays (Total/Avail)
 HDD Capacity (Std/Max)⁴
 Onboard Ethernet (Mbps)⁵
 Integrated System Management Processor⁶
 Expansion Cards (Std/Max)⁷

BladeCenter™ JS20 At-A-Glance											
8842-21X	1.6/800	2/2	512KB L2	512MB/4GB	Dual ATA-100	2/2	0/80GB	2 x 1GB	Y	0/1	

- 2-way, 1U blade server which installs in a BladeCenter chassis and ships without keyboard and mouse. Up to 14 JS20 blade servers are supported in the BladeCenter chassis. Power modules in BladeCenter models 1XX will need to be upgraded to 1800w power modules in order to support JS20 blade servers.
- PowerPC 970 processors with full-speed L2 cache and 800MHz Front-side Bus (FSB).
- Memory is two-way interleaved, PC2700 ECC DDR RDIMMs supporting Chipkill technology.
- Maximum HDD storage capacity is based on installation of two 40GB 5400rpm IDE HDDs.
- Broadcom dual integrated copper gigabit Ethernet controllers.
- System management functionality, interconnect network connectivity and console connectivity are managed through the standard management module. The standard integrated service processor monitors JS20 system management activity, communicating with the management module in the BladeCenter.
- Installation of an I/O expansion card prevents installation of a 2nd IDE HDD.

JS20 Memory

SBB Number	Option Number	Memory Description ¹
90P0862	73P2265	256MB PC2700 ECC DDR RDIMM
13N1266	73P2275	512MB PC2700 ECC DDR RDIMM
13N1267	73P2276	1GB PC2700 ECC DDR RDIMM

1. DIMMs are installed in matched pairs using the following population order: DIMM3 & DIMM4, DIMM1 & DIMM2

Total System Memory ¹	Quantity of RDIMMs Added to Standard Configuration		
	256MB	512MB	1GB
21X Models (2 x 256MB)			
1GB	2	-	-
1.5GB	-	2	-
2GB ²	-	4	-
2.5GB	-	-	2
3GB ²	-	2	2
4GB ²	-	-	4

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs.

- Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
- Requires removal of standard memory.



JS20 Hard Disk Drive (HDD) Storage

Total Internal Storage ¹	Quantity of HDDs added to standard configuration
	40GB HDD
0GB ²	-
40GB	1
80GB	2

This table does not represent all possible HDD configurations.

1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.
2. All models ship open-bay.

SBB Number	Option Part Number	Description	Height	Bays Supported	Maximum Quantity ¹
IDE HDD					
48P7099	48P7063	40GB 5400rpm ATA-100 HDD	Slim	1, 2	2

1. Up to two IDE HDDs may be installed in each JS20. A second IDE HDD cannot be added if a I/O expansion card is installed.

JS20 I/O Options

SBB Number	Option Number	Description	Form Factor
Blade Server Expansion Cards^{1, 2}			
59P6613	48P7061	BladeCenter Fibre Channel Expansion Card	-
73P9029	73P9030	BladeCenter Gigabit Ethernet Expansion Card	-

1. One expansion card is allowed per blade server and installs over IDE HDD bay 2, preventing installation of second IDE HDD.
2. Requires appropriate I/O modules to be installed in the BladeCenter chassis. Refer to 'BladeCenter Storage and Communications Expansion' for appropriate I/O module options and configuration information.

VMware ESX Server 1.5

Virtual machine software for consolidating and partitioning systems in high-performance environments

Worldwide Part Number ¹	EMEA Part Number ¹	Description
4817-12X	73P6315	VMware ESX Server 1.5 (1-2 processors)
4817-14X	73P6316	VMware ESX Server 1.5 (2-4 processors)
4817-18X	73P6317	VMware ESX Server 1.5 (5-8 processors)
4817-16X	73P6318	VMware ESX Server 1.5 (9-16 processors)

1. Orderable only when configured with an xSeries server, not separately.

Server Compatibility

Server	4817-12X	4817-14X	4817-18X	4817-16X
xSeries 255	yes	yes	no	no
xSeries 360	yes	yes	no	no
xSeries 440	yes	yes	yes	yes

Warning: Options that are compatible with a supported system may not be supported by VMware. To confirm support of an option, review the current device list for VMware on the ServerProven Web site at www.pc.ibm.com/us/support.

- IBM provides support for Windows, Linux and leading applications in a VMware environment (through separate Support Line offerings).
- Differences in system configurations are invisible to operating systems and applications.
- Clustering environments can be supported within a single server.
- Provides a cost-effective failover solution for mixed OS environments.
- Supports up to 64 1GB virtual machines in an 8U rack space (using 16-way xSeries 440).

For additional information on the Web, go to www.pc.ibm.com/ww/eserver/xseries/vmware.html.



xSeries Network Operating System Preloads

IBM Systems Group offers a range of Microsoft Windows Network Operating Systems (NOS) on most xSeries servers and IntelliStation workstations as a certified preloaded package that includes option firmware. IBM preloads are documented after testing to operate as reliable solutions, providing a simple, cost-effective start-up process.

The following chart shows which NOS preloads are available for each xSeries server and IntelliStation workstation. The second chart shows which options are supported in these preloads for each system (exceptions are footnoted in the first chart).

Network Operating System (NOS) Preload ¹	HS20	x205	x225	x235	x255	x305	x335	x345	x360	x440	x450	Z Pro 6221	M Pro 6219	E Pro 6226	E Pro 6216
Windows 2000 Server with Service Pack 3 ²	X	X	X	X	X	X	X	X	X	X					
Windows 2000 Advanced Server with Service Pack 3 ²	X	X	X	X	X	X	X	X	X	X					
Microsoft SBS with Service Pack 3 ²			X	X											
Windows 2003 Server, Standard Edition ^{2, 3}				X				X		X					
Windows 2003 Server, Enterprise Edition ^{2, 3}				X				X		X					
Windows XP Professional Edition ⁴												X	X	X	X
Windows 2000 Professional Edition ²												X	X	X	X

Note: IBM Operational Support Services - Support Line provides fee-based direct support to enhance your productivity with voice and electronic access. Additionally, Support Line will help answer questions pertaining to usage and suspected software defects for eligible products.

- Orderable only when configured with an xSeries server or IntelliStation workstation, not separately. Available in select countries. For more information, check with your local IBM representative.
- Language support for US English only.
- System support only. Option support will be added and documented in a later edition.
- Language support includes US English, French, German, Italian, Spanish, Dutch, Danish, Swedish, Finnish and Norwegian.

Options Supported in NOS Preloads

Option Part Number	Sales Building Block (SBB) Level 1 Part Number	Description	HS20	x205	x225	x235	x255	x305	x335	x345	x360	x440	x450	Z Pro 6221	M Pro 6219	E Pro 6226	E Pro 6216
Storage Controllers																	
06P5740	24P3472	ServeRAID-4Lx Ultra160 SCSI Controller		X	X	X	X	X	X	X	X	X					
06P5736	24P3471	ServeRAID-4Mx Ultra160 SCSI Controller		X	X	X	X		X	X	X	X					
37L6889	24P2333	ServeRAID-4H Ultra160 SCSI Controller			X		X		X		X	X					
25P3492	32P0022	ServeRAID-5i Controller			X	X			X								
19K4646	24P2650	PCI Wide Ultra160 SCSI Adapter	X	X	X	X	X		X	X	X		X	X	X	X	X
Fibre Channel Storage Controllers and Options																	
00N6881	24P2334	FAST Host Adapter				X	X		X	X	X	X					
19K1246 ¹	19K1311	FAST FC-2 Host Bus Adapter				X	X		X	X	X	X					
24P0960	24P0963	FC2-133 Host Bus Adapter			X	X	X		X	X	X	X					
48P7061	59P6613	HS20 Fibre Channel Expansion Card	X														
Network Adapters																	
Ethernet																	
06P3601	25P2889	10/100 Ethernet Server Adapter		X	X	X	X			X	X	X					
06P3701 ¹	25P2890	Gigabit Ethernet SX Server Adapter (fiber)		X		X	X	X	X	X	X	X					
09N3601 ¹	23P1422	10/100 EtherLink PCI Management Adapter by 3Com												X	X	X	X
09N9901 ¹	24P2324	10/100 EtherLink Server Adapter by 3Com		X	X			X									



Option Part Number	Sales Building Block (SBB) Level 1 Part Number	Description	Processor Models														
			H520	x205	x225	x235	x255	x305	x335	x345	x360	x440	x450	Z Pro 6221	M Pro 6219	E Pro 6226	E Pro 6216
22P4501	24P9559	Intel Pro/100S Desktop Adapter												X		X	
22P4701	02R3283	Intel Pro/100S Low Profile Desktop Adapter															X
22P4901	49P2846	10/100 Dual Port Server Adapter		X	X		X		X					X			
22P6501	02R3435	Pro/1000 T Desktop Adapter by Intel													X	X	
22P6801	09N8049	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals	X	X	X	X	X	X	X	X	X	X					
22P6901	33P2970	Wireless LAN Adapter											X	X	X	X	
22P7801	32P9296	NetXtreme 1000 SX Fiber Ethernet Adapter		X	X	X		X	X	X	X		X	X			
31P6301	31P6305	NetXtreme 1000 T Ethernet Adapter (copper)			X									X			
31P6401	32P9298	NetXtreme 1000 T Dual Port Ethernet Adapter (copper)												X			
Token Ring																	
07P2701	24P9620	16/4 Token-ring Low Profile PCI Management Adapter						X									X
34L5001	02R2647	16/4 Token-ring PCI Management Adapter	X			X	X	X		X	X		X		X		
34L5201	24P2327	High-speed 100/16/4 Token-ring PCI Management Adapter	X	X	X	X		X	X	X	X		X	X	X		
Removable Media																	
22P6950	25P5573	16x Max RAM-read DVD-ROM Drive		X	X	X	X							X	X	X	X
22P6959 ¹	02R3280	Combination DVD-RAM/R Drive	X													X	X
22P6970	59P3581	Multi-Burner	X		X								X	X	X	X	
22P6973	59P5005	32x-10x-40x-16x Max CD-RW/DVD-ROM Combination Drive	X		X								X	X			
22P6976 ¹	59P4987	40x-12x-40x Max Black CD-RW Drive	X	X									X	X	X	X	
22P6997	02R3432	48x-24x-48x CD-RW Drive											X	X	X	X	
22P7031	02R3482	48x-24x-48x-16x Max CD-RW/DVD-ROM Combination Drive											X	X	X	X	
22P7047	59P5800	8x Max Slim-line DVD-ROM Drive					X	X		X							
08K9603	32P9070	ThinkPad Removable Diskette Drive										X					
05K9233	32P9069	ThinkPad 24x-10x CD-ROM Ultrabay 2000 Drive										X					
22P9102	02R2032	ThinkPad Ultralight 8x Max DVD-ROM Ultrabay 2000 Drive										X					
System Management																	
09N7585	32P8914	Remote Supervisor Adapter		X	X	X	X	X	X	X							
Communications																	
19K4162	49P3881	V90 Low Profile PCI Modem				X				X							X
33L4618	32P8862	V90 PCI Data/Fax Modem			X	X				X			X	X	X		
Tape Drives																	
48P7042	49P3228	20/40GB TR7 Internal IDE Tape Drive		X	X									X	X	X	
00N7991	32P8861	20/40GB DDS/4 4mm Internal Tape Drive		X	X	X	X						X	X			
00N8015	49P3224	110/220GB Super DLT Internal SCSI Tape Drive			X	X	X										
00N8016	49P3225	100/200GB LTO Tape Drive			X	X	X										
24P2396	49P3226	100/200GB LTO Half-high Tape Drive			X	X	X										
24P2398	32P8860	40/80GB Half-high DLT/VS Internal SCSI Tape Drive			X	X	X										
59P6736	71P9199	160/320GB SDLT Tape Drive				X								X			

1. This option is withdrawn.

NOS Preloads

NOS Preloads



IBM and Third Party Software Applications

Check with your IBM representative to verify application software availability for your system.

Director v4.1	
	<ul style="list-style-type: none"> • Basic hardware management including inventory, monitoring, alerting, group management, RAID manager and management processor. • Help Desk and Support including remote control, remote session, file transfer and real-time diagnostics. • Up to 5,000 managed nodes. • Upward integration to Tivoli, CA, HP, MS, SMS, BMC or Net/Q.
	Director for IBM systems
	Director v4.1 Server (provided with all xSeries servers)
	Director v4.1 Agent (provided with all xSeries servers, IntelliStation and NetVista systems)
	Director for Non-IBM Environments (OEM installations)
71P7613	Director v4.1 CD with 20 Client License
71P7614	Director v4.1 Single Server License Proof of Entitlement
71P7615	Director v4.1 20 Additional Client License Proof of Entitlement
71P7616	Director v4.1 50 Additional Client License Proof of Entitlement
71P7617	Director v4.1 100 Additional Client License Proof of Entitlement
71P7626	Director v4.1 Single Client License Proof of Entitlement
	Server Plus Pack for xSeries systems Advanced predictive tools with self-managing technologies including capacity manager, software rejuvenation, rack manager, system availability and active PC manager.
71P7618	Director v4.1 xSeries All Server Plus Pack CD Single License Proof of Entitlement
71P7619	Director v4.1 xSeries All Server Plus Pack 20 additional License Proof of Entitlement
71P7620	Director v4.1 xSeries All Server Plus Pack 50 additional License Proof of Entitlement
71P7621	Director v4.1 xSeries All Server Plus Pack 100 additional License Proof of Entitlement
71P7627	Director v4.1 xSeries All Server Plus Pack Single License Proof of Entitlement
	Remote Deployment Manager
	Remote replication of system installations (including blades), including remote unattended system deployment, updating of system and option firmware, and restoration of system HDDs with PowerRestore.
4836AMX	Remote Deployment Manager v4.1 Media Package + Single Managed System Proof of Entitlement
4836A2X	Remote Deployment Manager v4.1 20 Additional License Proof of Entitlement
4836ACX	Remote Deployment Manager v4.1 100 Additional Server License Proof of Entitlement
4836B1X	Remote Deployment Manager v4.1 Single IntelliStation License Proof of Entitlement
4836B2X	Remote Deployment Manager v4.1 20 Additional IntelliStation License Proof of Entitlement
4836BCX	Remote Deployment Manager v4.1 100 Additional IntelliStation License Proof of Entitlement
	Software Distribution Premium Edition
	Remote packaging and distribution of applications from a single console to an end-user or user group.
73P8563	Software Distribution Premium Edition Media Package + Single Agent License Proof of Entitlement
73P8582	Software Distribution Premium Edition Single Agent License Proof of Entitlement
73P8566	Software Distribution Premium Edition 20 Agent License Proof of Entitlement
73P8568	Software Distribution Premium Edition 50 Agent License Proof of Entitlement
73P8570	Software Distribution Premium Edition 100 Agent License Proof of Entitlement
	Application Workload Manager
	Protection of availability and performance of server workloads, allowing multiple applications to share a server and management of resource contention.
73P8603	Application Workload Manager for IBM Director - Media Pack, Single License Proof of Entitlement
73P8604	Application Workload Manager for IBM Director - Single License Proof of Entitlement
73P8605	Application Workload Manager for IBM Director - 20 License Proof of Entitlement
73P8606	Application Workload Manager for IBM Director - 50 License Proof of Entitlement
73P8607	Application Workload Manager for IBM Director - 100 License Proof of Entitlement

Sphera HostingBusiness Suite	
Automation and streamlining of Web hosting operations	
71P9888	Sphera HostingDirector Suite v3.4 - Windows
71P9889	Sphera HostingDirector Suite v3.5 - Linux Red Hat
71P9890	Sphera HostingDirector SingleServer v3.4 - Windows
71P9891	Sphera HostingDirector SingleServer v3.5 - Linux Red Hat
71P9892	Sphera ResellerDirector v1.0 - Base
71P9893	Sphera ResellerDirector v1.0 - Additional License
SteelEye LifeKeeper HA Clustering Software	
Core Lifekeeper software for popular applications as well as proprietary application recovery kits for application health monitoring and recovery.	
02R3087	SteelEye Lifekeeper for Oracle Solution on Linux
02R3088	SteelEye Lifekeeper for DB2 Solution on Linux
02R3089	SteelEye Lifekeeper for Data Replication Option on Linux
02R3090	SteelEye Lifekeeper for Communication Services Solution on Linux
02R3091	SteelEye Lifekeeper for Infrastructure Solution on Linux
02R3092	SteelEye Lifekeeper for mySAP.com Solution on Linux
02R3093	SteelEye Lifekeeper for Microsoft Exchange 2000 Solution
02R3094	SteelEye Lifekeeper for SQL Server Solution on Windows
02R3095	SteelEye Lifekeeper for DB2 Solution on Windows
02R3096	SteelEye Lifekeeper for Oracle Solution on Windows
02R3097	Support Package 1
02R3098	Support Package 2
ARMTech 2.0 Active Resource Management for Windows	
Comprehensive solutions for the allocation, management and control of critical system resources such as CPU and memory.	
90P0350	ARMTech Active Resource Management v2.x for Windows (1 CPU)
90P0291	ARMTech Active Resource Management v2.x for Windows (2 CPU)
90P0292	ARMTech Active Resource Management v2.x for Windows (4 CPU)
90P0293	ARMTech Active Resource Management v2.x for Windows (8 CPU)
90P0349	ARMTech Active Resource Management v2.x for Windows (Media Pack)

Note: IBM makes no representations or warranties regarding third-party products or services. Some software may differ from its retail version (if available) and may not include user manuals or all program functionality. Software license agreements may apply.



xSeries DC Power and NEBS-compliant Models

For Telecommunications Industry Applications

Refer to individual system sections for complete configuration details

Part Number
Processor Speed (GHz)
Number of Processors (Std/Max)
L2 ECC Cache
Memory (Std/Max)
Form Factor
Power Supply Quantity (Std/Max)
Hot-Swap (Power, Slots, HDD, Fans)
Redundancy (Optional, Standard)
System Management Processor
Onboard Ethernet (Mbps)
SCSI Controller (Dual, Ultra, RAID)
Removable Media Bays (Total/Avail)
Internal HDD Storage (Std/Max)
CD-ROM (IDE)
Bays (Total/Avail)
Slots (Total/Avail)

xSeries DC Power and NEBS-compliant Models At-A-Glance

xSeries 305 DC Power Model

8673-4AX ¹	2.4 ²	1/1	512KB	256MB/ 4GB	Rack (1U)	1/1	-	-	N	2x10/100/ 1000	U160 ³	2/0	36.4GB/ 293.6GB ⁴	24x-10x	4/1	2/1
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xSeries 335 DC Power Model

8676-1AX ⁵	2.8 ⁶	1/2	512KB	512MB/ 8GB	Rack (1U)	1/1	H	-	Y	2x10/100/ 1000	U320 ⁷	2/0	0/293.6GB ⁸	24x-10x	4/2	2/2
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xSeries 343 NEBS-compliant Model

8827-14X ⁹	1.26 ¹⁰	2/2	512KB	2GB/6GB	Rack (2U)	2/2	P	S-Power	Y	2x10/100	D, U160 ¹¹	-	36.4GB/ 72.8GB ¹²	24x-10x	4/1	6/6 ¹³
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1. Includes a -48v to -60v 200w direct current (DC) power supply designed for utilization in a telecommunications network infrastructure.
2. Intel Pentium 4 processor with advanced transfer L2 cache and 533MHz (quad-pumped) FSB.
3. Single-channel Adaptec 29160 Ultra160 low-profile PCI SCSI storage controller installed in slot two.
4. Maximum capacity requires removing the standard SCSI HDD and installing two 146.8GB SCSI HDDs.
5. Includes a -48v to -60v 332w DC power supply designed for telecommunications applications.
6. Intel Xeon processor with advanced transfer L2 cache and 533MHz (quad-pumped) FSB.
7. The single-channel, Ultra320 integrated controller supports both Ultra160 and Ultra320 HDDs, but the entire SCSI bus will default to the lower rate (MB/second) if HDDs of different technologies are mixed on the same bus. The LSI chipset allows for two HDDs to be allocated for mirroring if a RAID adapter is not used to support the internal HDDs. Mirrored HDDs must match.
8. Maximum capacity requires installing two 146.8GB SCSI HDDs. Mixing of Ultra320 and Ultra160 HDDs is supported, but the bus will operate at the speed of the lowest rated HDD.
9. This system is Network Equipment Building System (NEBS) Level 3 compliant and includes two 350w, -48v DC power supplies requiring a direct current power source (-48v to -60v) for telecommunications applications.
10. Intel Pentium III processor with 133MHz FSB and 512KB advanced transfer cache.
11. Includes an integrated dual-channel Ultra160 SCSI controller supporting both internal and external SCSI attachment.
12. One 10,000rpm 36.4GB Ultra160 HDD ships standard with this specific NEBS configuration. Please contact your IBM representative, Business Partner or the IBM Help Center with questions regarding different NEBS configurations. This system does not support hot-swap HDDs.
13. Optional third-party PCI networking adapters are supported on this system. Refer to ServerProven test results for supported third-party options at www.pc.ibm.com/us/compat. Select x343 from the Fast Access pull-down menu, click Go, then select the appropriate categories on the following screen. IBM makes no representations or warranties with respect to non-IBM products. These products are offered and warranted by third parties, not IBM.

External Storage Expansion Unit Overview

Name	Part Number	Subsystem Type	Total Bays	Hot-Swap Bays (total/avail)	Maximum Storage Capacity (GB)	Dimensions (W x D x H)	Form Factor	Max Cfg Wt	Power Supply
SCSI External Storage Expansion At-A-Glance									
EXP300 ⁴	35311RU ¹	Ultra160 LVDS	14	14/14 ²	2055.2	444mm x 519mm x 127.5mm (17.5in x 20.4in x 5in)	Rack Drawer (3U) ³	34.5kg (76.1lbs)	Dual 500w, Redundant
EXP400 ⁴	1733 (1RU, 2RX) ⁵	Ultra320 LVDS	14	14/14 ²	2055.2	445mm x 552mm x 128mm (17.5in x 21.7in x 5in)	Rack Drawer (3U) ³	38kg (85lbs)	Dual 500w, Redundant ⁶
Fibre Channel External Expansion At-A-Glance									
FASiT200	35421RU	Fibre Channel	10	10/10	1,468	480mm x 575mm x 131.8mm (18.9in x 22.63in x 5.2in)	Rack Drawer (3U)	42.3kg (94lbs)	Dual 350w, Redundant
FASiT200 HA	35422RU ⁷	Fibre Channel	10	10/10	1,468	480mm x 575mm x 131.8mm (18.9in x 22.63in x 5.2in)	Rack Drawer (3U)	42.3kg (94lbs)	Dual 350w, Redundant
FASiT EXP100 ¹¹	171010U ¹²	SATA	14	0/0	3,500	481.8mm x 597.4mm x 132.3mm (18.97in x 23.52in x 5.21in)	Rack Drawer (3U)	40.2kg (57lbs)	Dual 390w, Redundant
FASiT EXP500	35601RU ⁸	Fibre Channel	10	10/10 ²	1,468	447mm x 563mm x 128mm (17.6in x 22.2in x 5in)	Rack Drawer (3U)	36.1kg (79.6lbs)	Dual 350w, Redundant
FASiT600 ¹⁰	172260U	Fibre Channel	14	14/14	2,055.2	481.8mm x 597.4mm x 132.3mm (18.97in x 23.52in x 5.21in)	Rack Drawer (3U)	45.87kg (101.26lbs)	Dual 390w, Redundant
FASiT EXP700	17401RU ⁹	Fibre Channel	14	14/14 ²	2,055.2	482mm x 597mm x 132mm (18.97in x 23.52in x 5.21in)	Rack Drawer (3U)	41.47kg (91.42lbs)	Dual 400w, Redundant

1. To attach a SCSI storage enclosure to an xSeries server, an appropriate RAID controller and external cable is required. See Appendix D: Cables - Storage Units - Controllers.
2. EXP300, EXP400 and FastT EXP700 support slim-line drives only. FASiT EXP500 supports either half-high or slim-line HDDs.
3. A rack-to-tower conversion kit option (P/N 09N7296) is available.
4. Includes a single 2m Ultra2 SCSI cable and dual hot-swap 500w redundant power supplies, each with its own power cord.
5. EXP400 model 2RX is DC powered.
6. Two 500w power supplies are standard in models 1RU and 1RX only.
7. Identical to FASiT200 (P/N 35421RU) with the addition of a FASiT200 Redundant RAID Controller (P/N 19K1121).
8. Attachment to a FASiT500 Storage Server (P/N 35521RU) or FASiT700 Storage Server (P/N 17421RU) is required. This expansion unit does not attach directly to an xSeries server. See FASiT EXP500 section for more information.
9. Attachment to a FASiT700 Storage Server (P/N 17401RU) is required. This expansion unit does not attach directly to an xSeries server. See FASiT EXP700 section for more information.
10. The FASiT600 can also be purchased with the FASiT600 Turbo Option installed, which significantly increases performance and scalability. See the 'Fibre Channel Solutions Quickview' for more information.
11. Attachment to a FASiT600 Storage Server or FASiT900 Storage Server is required. This expansion unit does not attach directly to an xSeries server. See FASiT EXP100 section for more information.
12. FASiT EXP100 ships with the rail mounting kit, two 2.8m/9ft intra-rack power cords (IEC 320-C13 to IEC 320-C14), and two U.S. power cords (IEC 320-C13 to NEMA 5-15P).

IBM Storage Expansion Unit



EXP300 (35311RU)

EXP300 Hard Disk Drive (HDD) Storage

Total Int Storage ¹	Quantity of HDDs added to standard configuration		
	36.4GB	73.4GB	146.8GB
0GB ²			
18.2GB	-	-	-
36.4GB	1	-	-
54.6GB	-	-	-
72.8GB	2	-	-
91GB	-	-	-
109.2GB	3	-	--
127.4GB	-	-	-
145.6GB	4	-	-
182GB	5	-	-
218.4GB	6	-	-
254.8GB	7	-	-
291.2GB	8	-	-
364.0GB	10	-	-
436.8GB	12	-	-
509.6GB	14	-	-
587.2GB	-	8	-
734GB	-	10	-
880.8GB	-	12	-
1027.6GB	-	14	-
1174.4GB	-	-	8
1321.2GB	-	-	9
1468GB	-	-	10
1761.6GB	-	-	12
2055.2GB	-	-	14

This table does not represent all possible HDD configurations.

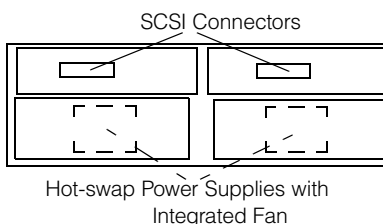
1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice. Total internal storage listed is within +/- 0.2GB unless otherwise noted.
2. EXP300 ships open-bay.

Part Number	Description	RPM	Height	Bays Supported ¹	Maximum Quantity
Ultra 160 HDDs					
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	10000	SL	1 ... 14	14 ²
06P5756	73.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	10000	SL	1 ... 14	14 ²
32P0750	146.8GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	10000	SL	1 ... 14	14 ²
06P5768	36.4GB 15Krpm Ultra160 SCSI Hot-swap SL HDD	15000	SL	1 ... 14	14 ²
External Storage Expansion Units		Form Factor			
35311RU	EXP300 Storage Expansion Unit ³	Rack (3U)			
09N7296	EXP300 Rack-to-Tower Conversion Kit	-			

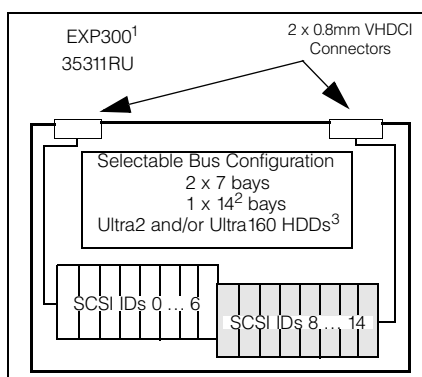
1. EXP300 Storage Expansion Unit ships with 14 slim-line hot-swap bays which can be configured as a single bus, two independent buses or a twintailed single bus.
2. Twintailing reduces the maximum number of HDDs on a single bus to 13.
3. EXP300 includes a single 2M Ultra2 SCSI cable and dual hot-swap 500W redundant power supplies, each with its own power cord.

SCSI ID	Form Factor	Height	Front Access	Usage
0 ... 6	HS	SL	Yes	open
8 ... 14	HS	SL	Yes	open

EXP300 Storage Expansion Unit 35311RU



- Fourteen slim-high drive bays.
- Supports Ultra160 SCSI data transfer speeds - up to 160MB/s.
- Single or dual SCSI bus configurations.
- Dual hot-swap 500W redundant power supplies with integrated fan assemblies.
- Height is 3U (1U=1.75in or 44.45mm).
- Tower capability through optional Rack-to-Tower Conversion Kit.



1. Housed in a 19in rack mountable drawer and ships standard with redundant 500W hot-swap power supplies, two power cords and a single 2M Ultra2 SCSI cable capable of supporting Ultra160 speeds.
2. Twintailing reduces the maximum number of HDDs on a single bus to 13.
3. When combined with a ServeRAID-4x controller, Ultra2 and Ultra160 HDDs may be mixed on the same bus and operate at up to their maximum respective speeds.

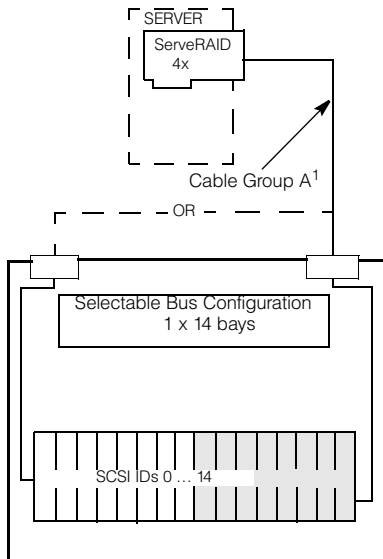
Requires IBM NetBAY 42 Enterprise Rack or Expansion Cabinet (930842S, E), NetBAY 42 Standard Rack Cabinet or Expansion Cabinet (9306420, 1), NetBAY 25 (9306250), NetBAY 11 (9306110) or Rack-to-Tower Conversion Kit (09N7296).

External Storage Expansion Units require storage controllers and external cables. Select a supported RAID controller from the system configurator and cables from Appendix D: Cables - Storage Units - Controllers.

Cables and Controllers: See Appendix D: Cables - Storage Units - Controllers

EXP300 Sample Configurations

EXP300 One Independent SCSI Bus



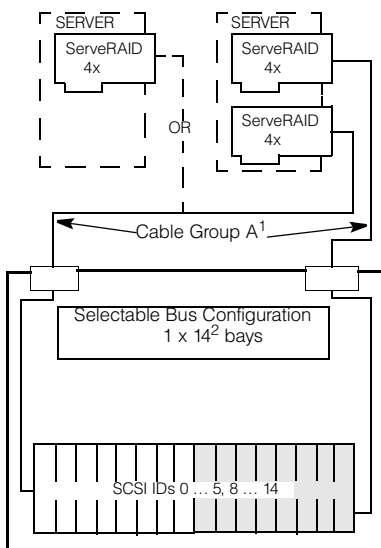
Order:

- 1 x 35311RU
- 1 x External Cable from Group A¹
- Up to 14 Ultra2 and/or Ultra160 HDDs

1. One 2M Ultra2 cable is included with each EXP300. If a longer cable is desired, select one from cable group A.

EXP300 One Independent Twintail SCSI Bus High Availability Configuration

To configure as one independent twintailed 13-bay SCSI bus, attach two external cables from two ServeRAID adapters, in the same or separate servers, to the two external ports of the EXP300. The EXP300 must be set for 1 x 14² bays.



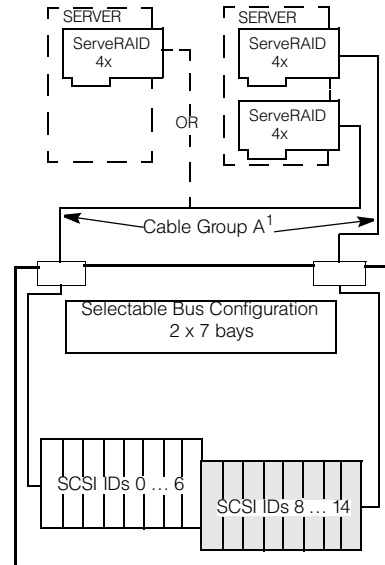
Order:

- 1 x 35311RU
- 2 x External Cables from Group A¹
- Up to 13 Ultra2 and/or Ultra160 HDDs

1. One 2M Ultra2 cable is included with each EXP300. If a longer cable is desired, select one from cable group A.
2. Twintailing reduces the maximum number of HDDs on a single bus to 13.

EXP300 Two Independent SCSI Buses

To configure as two independent seven-bay SCSI buses, attach two external cables from two ServeRAID adapters, in the same or separate servers, to the two external ports of the EXP300. The EXP300 must be set for 2 x 7 bays.



Order:

- 1 x 35311RU
- 2 x External Cables from Group A¹
- Up to 14 Ultra2 and/or Ultra160 HDDs

1. One 2M Ultra2 cable is included with each EXP300. If a longer cable is desired, select one from cable group A.

EXP400 (17331RU)

EXP400 Hard Disk Drive (HDD) Storage

Total Int Storage ¹	Quantity of HDDs added to standard configuration		
	36.4GB	73.4GB	146.8GB
0GB ²	-	-	-
36.4GB	1	-	-
72.8GB	2	-	-
109.2GB	3	-	-
145.6GB	4	-	-
182GB	5	-	-
218.4GB	6	-	-
254.8GB	7	-	-
291.2GB	8	-	-
327.6GB	9	-	-
364GB	10	-	-
400.4GB	11	-	-
436.8GB	12	-	-
440.4GB	-	6	-
473.2GB	13	-	-
509.6GB	14	-	-
734GB	-	10	-
807.4GB	-	11	-
880.8GB	-	12	6
954.2GB	-	13	-
1027.6GB	-	14	-
1468GB	-	-	10
1614.8GB	-	-	11
1761.6GB	-	-	12
1908.4GB	-	-	13
2055.2GB	-	-	14

This table does not represent all possible HDD configurations.

1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice. Total internal storage listed is within +/- 0.2GB unless otherwise noted.

2. EXP400 ships open-bay.

Part Number	Description	RPM	Height	Bays Supported ¹	Maximum Quantity
Ultra320 HDDs					
32P0726	36.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	10000	SL	1 ... 14	14 ²
32P0727	73.4GB 10Krpm Ultra320 SCSI Hot-swap HDD	10000	SL	1 ... 14	14 ²
32P0728	146.8GB 10Krpm Ultra320 SCSI Hot-swap HDD	10000	SL	1 ... 14	14 ²
32P0734	36.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	15000	SL	1 ... 14	14 ²
32P0735	73.4GB 15Krpm Ultra320 SCSI Hot-swap HDD	15000	SL	1 ... 14	14 ²
Related Options					
59P5018	SCSI Bus Expander and Enclosure Services Module (ESM) ³	-	-	-	-
09N7296	Rack-to-Tower Conversion Kit	-	-	-	-

1. EXP400 Storage Expansion Unit ships with 14 slim-line hot-swap bays which can be configured as a single bus, two independent buses or a twintailed single bus.

2. Twintailing reduces the maximum number of HDDs on a single bus to 13.

3. The optional ESM allows for twintailing and clustering.



Fibre Channel Solutions Quickview

Fibre Channel Solutions Quickview At-A-Glance

Part Number	Description	Max Supported Storage	Host Partitions (Std/Max)	Host Fabric Ports (Std/Max)	Max Redundant Host Connections	Drive Side Mini Hubs (Std/Max)	Redundant Drive Loops (Std/Max)	Form Factor
FAST Storage Servers								
35421RU	FAST200 Storage Server	1.468TB ¹	64/64 ⁶	1/1	-	-	-	3U
35422RU	FAST200 HA Storage Server	8.8TB ²	64/64 ⁶	2/2	1	-	1/1	3U
172260U	FAST600 Storage Server (US line cord)	8.221TB ³	*16 ⁷	4/4	2	-	1/1	3U
24P8215	FAST600 Turbo Storage Server ⁸	16.442TB ⁴	8/64	4/4	2	-	1/1	3U
17421RU	FAST700 Fibre Channel Storage Server	32.883TB ⁵	64/64	4/8	4	2/4	1/2	4U
174290U	FAST900 Storage Server (US line cord)	32.883TB ⁵	64/64	4/8	4	2/4	1/2	4U
Fibre Channel HDD Expansion Units								
35601RU	FAST EXP500 Storage Expansion Unit	1.468TB	-	-	-	-	-	3U
17401RU	FAST EXP700 Storage Expansion Unit	2.0552TB	-	-	-	-	-	3U
Storage Server Premium Features								
24P8149	FAST600 1st EXP700 Attach ⁹							
24P8151	FAST600 2nd EXP700 Attach ¹⁰							
24P8066	FAST600 Two EXP700 Attach ¹¹							
24P8183	FAST600 3rd EXP700 Attach ¹²							
24P8180	FAST600 Three EXP700 Attach ¹³							
24P8067	Intel Pack ¹⁴							
24P8068	FAST600 Linux/Intel Host Kit ^{15, 16}							
24P8069	FAST600 Novell NetWare Host Kit ^{15, 16}							
24P8070	FAST600 VMware Host Kit ^{15, 16}							
24P8072	FAST600 AIX Host Kit ^{15, 16}							
24P8073	FAST600 Sun Host Kit ^{15, 16}							
24P8074	FAST600 HP-UX Host Kit ^{15, 16}							
24P8075	FAST600 4-Storage Partition Activation ¹⁷							
24P8157	FAST600 8-Storage Partition Activation							
24P8221	FAST600 16-Storage Partition Activation							
24P8154	FAST600 4 to 8 Storage Partition Upgrade							
24P8223	FAST600 8 to 16 Storage Partition Upgrade ¹⁶							
24P8220	FAST600 FlashCopy Activation with Storage Manager v8.4							
24P8216	FAST600 Turbo Option Upgrade Kit ⁸							
24P8222	FAST600 Turbo 8 to 64 Partitions							
24P8224	FAST600 Turbo 16 to 64 Partition Upgrade							
24P8217	FAST600 Turbo FlashCopy Activation							
24P8218	FAST600 Turbo VolumeCopy Activation							
24P8219	FAST600 Turbo combined FlashCopy and VolumeCopy Activation							
24P8229	FAST700 Storage Manager v8.4 Upgrade							
19K1294	FAST700 FlashCopy Activation							
24P8230	FAST700 VolumeCopy Activation ¹⁸							
24P8231	FAST700 combined FlashCopy and VolumeCopy Activation ¹⁸							
19K1295	FAST700 Remote Mirror Activation							
24P7981	FAST900 AIX Host Kit ¹⁵							
24P7982	FAST900 Sun Host Kit ¹⁵							
24P7983	FAST900 HP-UX Host Kit ¹⁵							
24P8226	FAST900 Storage Manager v8.4 Upgrade							
24P7984	FAST900 Upgrade from 16 to 64 Storage Partitions							
24P7985	FAST900 FlashCopy Activation ¹⁵							
24P8227	FAST900 VolumeCopy Activation ¹⁸							
24P8228	FAST900 combined FlashCopy and VolumeCopy Activation ¹⁸							

24P7986	FAST900 Remote Mirror Activation ¹⁵								
1Gb Fibre Channel Fabric Components									
00N6881	FAST Host Adapter	-	-	-	-	-	-	-	-
19K1121	FAST200 Redundant RAID Controller	-	-	-	-	-	-	-	-
03K9307	FC Long-wave GBIC	-	-	-	-	-	-	-	-
03K9308	FC Short-wave GBIC	-	-	-	-	-	-	-	-
03K9305	Fibre Channel 25m Cable	-	-	-	-	-	-	-	-
03K9306	Fibre Channel 5m Cable	-	-	-	-	-	-	-	-
36L9973	Fibre Channel 1m Cable	-	-	-	-	-	-	-	-
2Gb Fibre Channel Fabric Components									
24P0960	FC2-133 Host Bus Adapter	-	-	-	-	-	-	-	-
19K1269	FAST700/900 Mini Hub	-	-	-	-	-	-	-	-
3534F08	TotalStorage SAN Switch F08, 8-port ¹⁹	-	-	-	-	-	-	-	-
2109F16	SAN FC Switch, 16-Port ²⁰	-	-	-	-	-	-	-	-
19K1271	Short-wave SFP Module	-	-	-	-	-	-	-	-
19K1272	Long-wave SFP Module	-	-	-	-	-	-	-	-
19K1247	1m LC-LC Fibre Channel Cable	-	-	-	-	-	-	-	-
19K1248	5m LC-LC Fibre Channel Cable	-	-	-	-	-	-	-	-
19K1249	25m LC-LC Fibre Channel Cable	-	-	-	-	-	-	-	-
19K1250	LC-SC Fibre Channel Adapter Cable ²¹	-	-	-	-	-	-	-	-
Fibre Channel HDDs									
19K0653	36.4GB 10K rpm 1Gbps FC Hot-swap HDD	-	-	-	-	-	-	-	-
19K0654	73.4GB 10K rpm 1Gbps FC Hot-swap HDD	-	-	-	-	-	-	-	-
06P5707	18.2GB 15K rpm 1Gbps FC Hot-swap HDD	-	-	-	-	-	-	-	-
06P5761	36.4GB 10K rpm 2Gbps FC Hot-swap HDD	-	-	-	-	-	-	-	-
06P5762	73.4GB 10K rpm 2Gbps FC Hot-swap HDD	-	-	-	-	-	-	-	-
32P0765	146.8GB 10K rpm 2Gbps FC Hot-swap HDD	-	-	-	-	-	-	-	-
06P5771	18.2GB 15K rpm 2Gbps FC Hot-swap HDD	-	-	-	-	-	-	-	-
06P5772	36.4GB 15K rpm 2Gbps FC Hot-swap HDD	-	-	-	-	-	-	-	-
32P0768	73.4GB 15K rpm 2Gbps FC Hot-swap HDD	-	-	-	-	-	-	-	-

1. Attaching expansion units to a FAST200 Storage Server is not recommended because a single point-of-failure occurs when external storage is connected through only one RAID controller. The maximum storage value is based on 10 internal 146.8GB internal FC HDDs.
2. Based on a maximum of 60 146.8GB FC HDDs installed in the redundant storage loop that includes the FAST200 internal HDD bays and five FAST EXP500 expansion units.
3. Based on a maximum of 56 146.8GB FC HDDs installed in the redundant storage loop that includes the FAST600 internal HDD bays and three EXP700 expansion units.
4. Based on a maximum of 112 146.8GB FC HDDs installed in the redundant storage loop that includes the FAST600 internal HDD bays and seven EXP700 expansion units.
5. Based on a maximum of 224 146.8GB Fibre Channel HDDs installed in a maximum of 16 FAST EXP700 expansion units. A maximum of eight expansion units are supported in a redundant drive loop (cable pair). Four drive-side mini hubs are required to support two loops running in redundant mode.
6. Existing systems in the field may require a free software download in order to support the number of partitions shown.
7. The base FAST600 ships with a Host Default Group.
8. The FAST600 Turbo option includes two RAID Blades with 1GB Cache each (2GB total), FAST Storage Manager v8.4, license to attach 112 HDDs through seven EXP700s and license for eight partitions.
9. License to attach 15 to 28 HDDs.
10. License to attach 29 to 42 HDDs.
11. License kit upgrade to support up to 42 HDDs.
12. License to attach 43 to 56 HDDs.
13. License to attach up to 56 HDDs.
14. Upgrade to support four partitions and provides the Novell Netware and Linux Host kits.
15. Licensed one per controller.
16. This option is available for both FAST600 and FAST600 Turbo.
17. Upgrade to support four partitions.
18. Requires Storage Manager v8.4.
19. Additional related options include F08 Full Fabric Activation (P/N 18P5060), Performance Bundle Activation (P/N 18P4405), Fabric Manager Version 4.0 (F08) (P/N 17P7180) and F08 Advanced Security Activation (P/N 18P4411).
20. Additional related options include Remote Switch Activation (P/N 18P3579), Extended Fabric Activation (P/N 18P3580), F16 Performance Bundle Activation (P/N 18P3590), Fabric Manager Version 4.0 (F16) (P/N 17P7182) and F16 Advanced Security Activation (P/N 18P3596). Power cords for nonrack installation are available by country.
21. The LC-SC Fibre Channel Adapter Cable (P/N 19K1250) is designed to connect any 1Gb device or cable to any 2Gb device or cable. When 2Gb and 1Gb technology are combined in a configuration, the signal transfer automatically converts to the slower speed.



FAST200 Storage Server (3542xRU)

FAST200 (HA) Storage Expansion Unit

Total Internal Storage ¹	10,000rpm HDDs			15,000rpm HDDs		
	36.4GB (19K0653, 06P5761)	73.4GB (19K0654, 06P5762)	146.8GB (32P0765)	18.2GB (06P5707, 06P5771)	36.4GB (06P5772)	73.4GB (32P0768)
0GB	Standard in base model					
18.2GB	-	-	-	1	-	-
36.4GB	1	-	-	2	1	-
54.6GB	-	-	-	3	-	-
72.8GB	2	-	-	4	2	-
73.4GB	-	1	-	-	-	1
91GB	-	-	-	5	-	-
109.2GB	3	-	-	6	3	-
145.6GB	4	-	-	8	4	-
146.8GB	-	2	1	-	-	2
182GB	5	-	-	10	5	-
218.4GB	6	-	-	-	6	-
220.2GB	-	3	-	-	-	3
254.8GB	7	-	-	-	7	-
291.2GB	8	-	-	-	8	-
293.6GB	-	4	2	-	-	4
327.6GB	9	-	-	-	9	-
364GB	10	-	-	-	10	-
367GB	-	5	-	-	-	5
440.4GB	-	6	3	-	-	6
513.8GB	-	7	-	-	-	7
587.2GB	-	8	4	-	-	8
660.6GB	-	9	-	-	-	9
734GB	-	10	5	-	-	10
880.8GB	-	-	6	-	-	-
1027.6GB	-	-	7	-	-	-
1174.4GB	-	-	8	-	-	-
1321.2GB	-	-	9	-	-	-
1468GB	-	-	10	-	-	-

This table does not represent all valid HDD configurations.

1. Select a total storage row and then select the quantity of HDDs from a column corresponding to the HDD of choice. Total internal storage listed is within +/- 0.2GB unless otherwise noted.

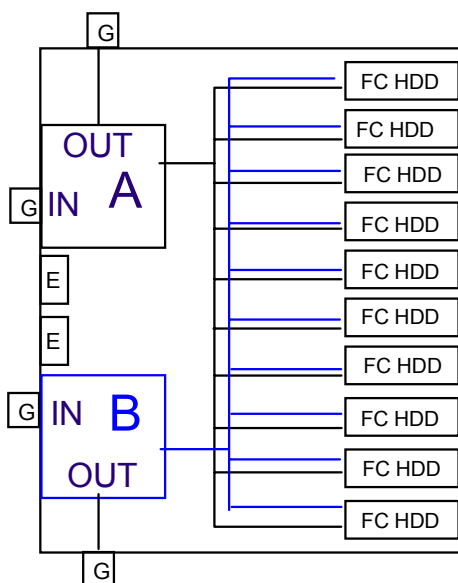
Part Number	Description	RPM	Height	Bays Supported	Maximum Quantity
19K0653	Netfinity 36.4GB 10K-4 FC Hot-Swap HDD	10,000	SL	1 ... 10	10
19K0654	Netfinity 73.4GB 10K-4 FC Hot-Swap HDD	10,000	HH	1 ... 10	10
06P5707	Netfinity 18.2GB 15Krpm FC Hot-Swap HDD	15,000	SL	1 ... 10	10
06P5761	2Gbps FC 36.4GB/10K Drive	10,000	SL	1 ... 10	10
06P5762	2Gbps FC 73.4GB/10K Drive	10,000	SL	1 ... 10	10
32P0765	146.8GB Fibre Channel Disk Drive Module	10,000	SL	1 ... 10	10
06P5771	2Gbps FC 18.2GB/15K Drive	15,000	SL	1 ... 10	10
06P5772	2Gbps FC 36.4GB/15K Drive	15,000	SL	1 ... 10	10
32P0768	73.4GB/15K Disk Module	15000	SL	1 ... 10	10
External Storage Expansion Units		Form Factor			
35421RU	FAST200 Storage Server ^{1, 2}	Rack (3U)			
35422RU	FAST200 HA Storage Server ¹	Rack (3U)			
19K1121	FAST200 Redundant RAID Controller	-			

1. The FAST200 includes two hot-swap, 350W auto-ranging redundant power supplies, each with its own power cord.

2. Can be upgraded to FAST200 HA Storage Server through the addition of a FAST200 Redundant RAID Controller (P/N 19K1121).

FAST200 Storage Server

35421RU²/35422RU



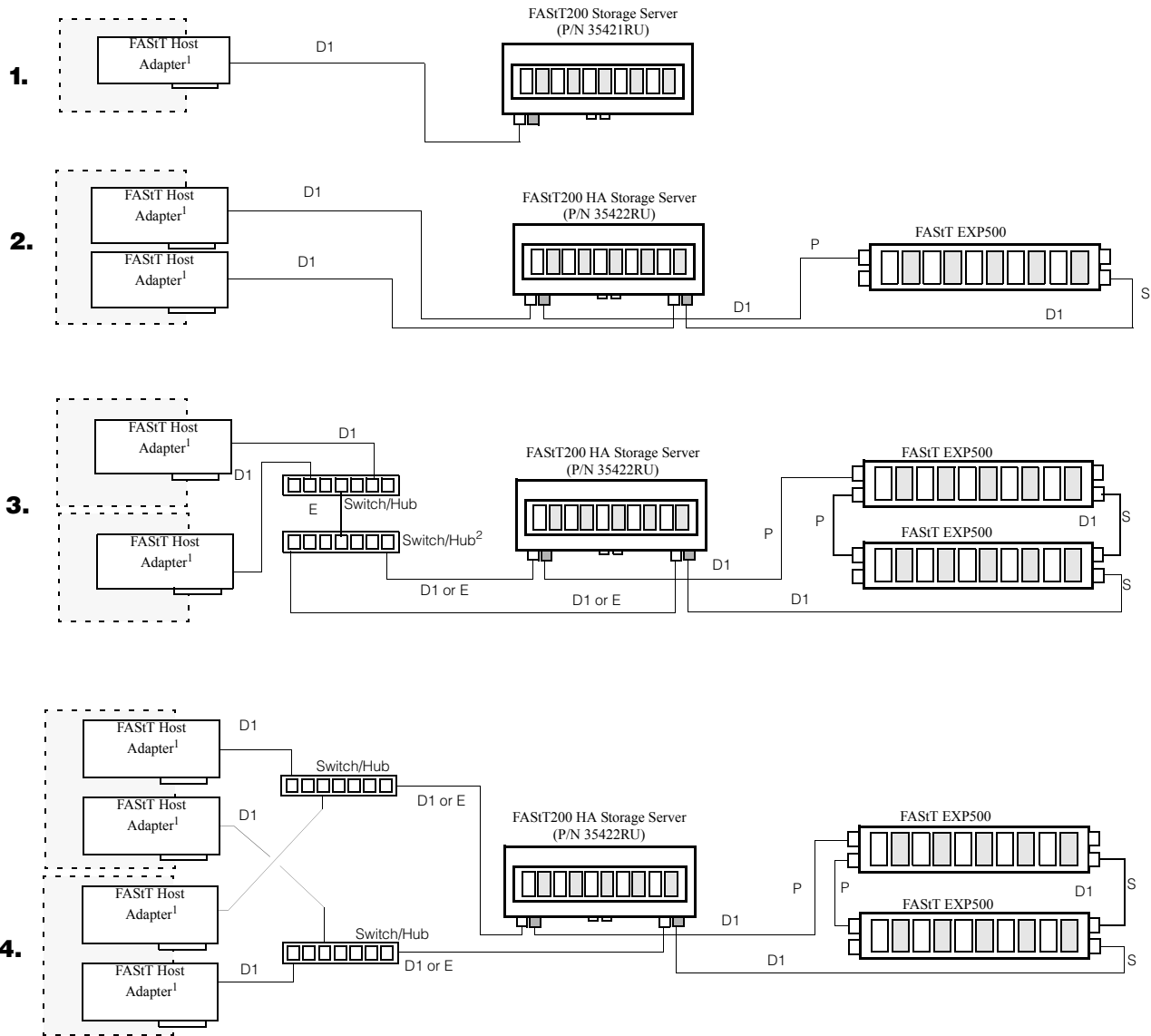
A and B=Fibre Channel controllers; G=GBIC; E=Ethernet
 GBICs are not included. Either Fibre Channel Long- or Short-wave GBICs (P/N 03K9307 or 03K9308 respectively) may be used.

IN=host connection; OUT=expansion connection

1. Housed in a 19in rack-mountable drawer and ships standard with redundant power supplies and two power cables requiring separate power sources. Requires an IBM industry standard 19in rack, EIA-310D with a minimum depth of 24in (711.2mm). External Storage Expansion Units require storage controllers and external cables. Select a supported controller from the system configurator and cables from Appendix D: Cables-Storage Units-Controllers.
2. 35421RU includes a single loop only. The second loop is available with the addition of FAST200 Redundant RAID Controller (P/N 19K1121).

Fibre / Fibre Configuration Examples (FAST200)

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.



1. FAST Host Adapter (P/N 00N6881) supports short-wave connections only.

2. Buffering the long-wave optic cable expanse with a second switch or hub at the remote storage location is required to requalify the signal. A managed hub supports only one long-wave GBIC.

- P = primary path, S = secondary (redundant) path
- Shaded boxes represent separate hosts.
- Cable groups are represented by letters.
- Maximum of 60 external storage HDDs are supported for optimum performance (up to 10 in the storage server with the remainder in expansion units).
- The number of servers that can be used in configurations with managed hubs or Fibre Channel switches are dependent on partitioning restrictions of the management system or cluster software.
- An optional short- or long-wave GBIC is required for all FAST200 storage server and FAST EXP500 storage connections. GBICs are not depicted in these diagrams. See device drawings at the end of this section for details.
- Other Fibre Channel devices may not require optional GBICs. For specific requirements, see the Fibre Device Ports Reference.

Refer to the following Supported Cable Groups chart for cable type definitions.

Supported Cable Groups

Cable Group A (0.8mm to 0.8mm)	
03K9310	2m Ultra2 SCSI Cable
03K9311	4.2m Ultra2 SCSI Cable
37L7101	20m Ultra2 SCSI Cable
Cable Group D (short-wave Fibre Channel)	
<i>Group D1 - 1Gb (SC-SC) short-wave Fibre Channel cables</i>	
36L9973	Fibre Channel 1m Cable
03K9306	Fibre Channel 5m Cable
03K9305	Fibre Channel 25m Cable
<i>Group D2 - 2Gb (LC-LC) short-wave Fibre Channel cables</i>	
19K1247	1m LC-LC Fibre Channel Cable
19K1248	5m LC-LC Fibre Channel Cable
19K1249	25m LC-LC Fibre Channel Cable
Customer-supplied short-wave cable of up to 500m (0.31 miles)	
Cable Group E (long-wave Fibre Channel)	
Customer-supplied long-wave cable of up to 10km (6.2 miles)	
Fibre Channel Connectors	
<i>1Gb (SC-SC) GBICs</i>	
03K9308	Fibre Channel Short-wave GBIC
03K9307	Fibre Channel Long-wave GBIC
<i>2Gb (LC-LC) SFP Modules</i>	
19K1271	Short-wave SFP Module
19K1272	Long-wave SFP Module
<i>2Gb to 1Gb (LC-SC) adapter</i>	
19K1250	LC-SC Fibre Channel Adapter Cable



FAST EXP500 (35601RU)

FAST EXP500 Storage Expansion Unit

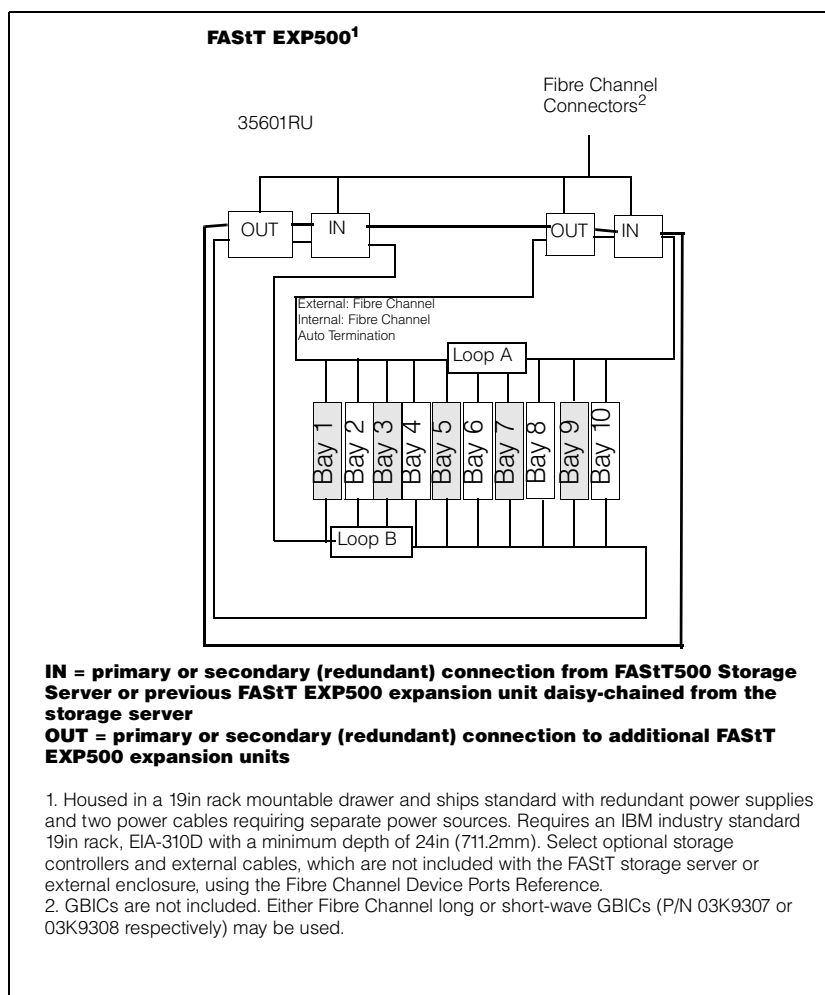
Total Internal Storage ¹	10,000rpm HDDs			15,000rpm HDDs		
	36.4GB (19K0653, 06P5761)	73.4GB (19K0654, 06P5762)	146.8GB (32P0765)	18.2GB (06P5707, 06P5771)	36.4GB (06P5772)	73.4GB (32P0768)
0GB	Standard in base model					
18.2GB	-	-	-	1	-	-
36.4GB	1	-	-	2	1	-
54.6GB	-	-	-	3	-	-
72.8GB	2	-	-	4	2	-
73.4GB	-	1	-	-	-	1
91GB	-	-	-	5	-	-
109.2GB	3	-	-	6	3	-
145.6GB	4	-	-	8	4	-
146.8GB	-	2	1	-	-	2
182GB	5	-	-	10	5	-
218.4GB	6	-	-	-	6	-
220.2GB	-	3	-	-	-	3
254.8GB	7	-	-	-	7	-
291.2GB	8	-	-	-	8	-
293.6GB	-	4	2	-	-	4
327.6GB	9	-	-	-	9	-
364GB	10	-	-	-	10	-
367GB	-	5	-	-	-	5
440.4GB	-	6	3	-	-	6
513.8GB	-	7	-	-	-	7
587.2GB	-	8	4	-	-	8
660.6GB	-	9	-	-	-	9
734GB	-	10	5	-	-	10
880.8GB	-	-	6	-	-	-
1027.6GB	-	-	7	-	-	-
1174.4GB	-	-	8	-	-	-
1321.2GB	-	-	9	-	-	-
1468GB	-	-	10	-	-	-

This table does not represent all valid HDD configurations.

1. Select a total storage row and then select the quantity of HDDs from a column corresponding to the HDD of choice. Total internal storage listed is within +/- 0.2GB unless otherwise noted.

Part Number	Description	RPM	Height	Bays Supported	Maximum Quantity
19K0653	Netfinity 36.4GB 10K-4 FC Hot-Swap HDD	10,000	SL	1 ... 10	10
19K0654	Netfinity 73.4GB 10K-4 FC Hot-Swap HDD	10,000	HH	1 ... 10	10
06P5707	Netfinity 18.2GB 15Krpm FC Hot-Swap HDD	15,000	SL	1 ... 10	10
06P5761	2Gbps FC 36.4GB/10K Drive	10,000	SL	1 ... 10	10
06P5762	2Gbps FC 73.4GB/10K Drive	10,000	SL	1 ... 10	10
32P0765	146.8GB Fibre Channel Disk Drive Module	10,000	SL	1 ... 10	10
06P5771	2Gbps FC 18.2GB/15K Drive	15,000	SL	1 ... 10	10
06P5772	2Gbps FC 36.4GB/15K Drive	15,000	SL	1 ... 10	10
32P0768	73.4GB/15K Disk Module	15,000	SL	1 ... 10	10
External Storage Expansion Units		Form Factor			
35601RU	FAST EXP500 Storage Expansion Unit ¹	Rack (3U)			

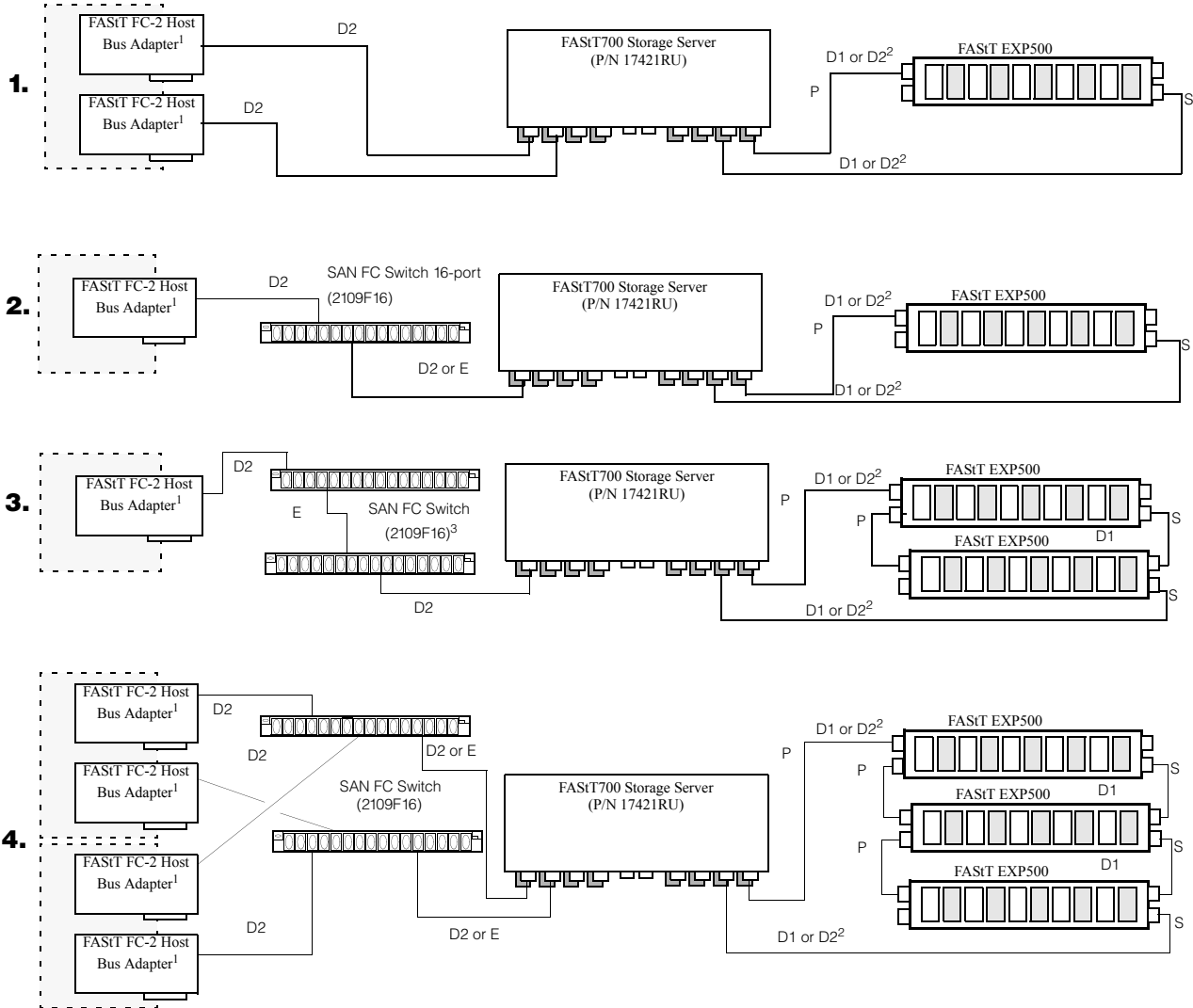
1. The FAST EXP500 includes two hot-swap, 350W auto-ranging redundant power supplies, each with its own power cord.



Fibre / Fibre Configuration Examples

FASTt EXP500 with FASTt700 Fibre Channel Storage Server

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.



1. FASTt FC-2 Host Bus Adapter (P/N 24P0960) includes an integrated short-wave SFF Module, supporting short-wave connections only.
2. Fibre Channel connections to the FASTt EXP500 require GBICs. LC-LC Fibre Channel cable does not connect directly into a GBIC. LC-SC Fibre Channel Adapter Cable (P/N 19K1250) is required. Use SC Fibre Channel cable for daisy-chaining FASTt EXP500 units (see the Supported Cable Groups chart for a list of SC cables).
3. Buffering the long-wave optic cable expanse with a second switch or hub at the remote storage location is required to requalify the signal.

- P = primary path, S = secondary (redundant) path
- Shaded boxes represent separate hosts.
- Cable groups are represented by letters.
- Maximum of 220 external storage HDDs are supported through a maximum of 11 enclosures in each channel pair (22 enclosures total).
- The number of servers that can be used in configurations with managed hubs or Fibre Channel switches are dependent on partitioning restrictions of the management system or cluster software.
- An optional short- or long-wave GBIC is required for all FASTt500 EXP500 storage connections. FASTt700 and 2Gb FC switch connections require SFP Modules. LC-SC FC Adapter Cables are required to connect LC-LC FC cables to GBICs in FASTt EXP500 connections. GBICs, SFP Modules and adapter cables are not depicted in these diagrams. See device drawings at the end of this section for details.
- For specific requirements concerning connections, refer to the Fibre Device Ports Reference or Fibre Interconnection Guidelines.

Refer to the Supported Cable Groups chart following the FASTt 200 configuration examples for cable type definitions.



FAStT600 Storage Server

FAStT600 Storage Server

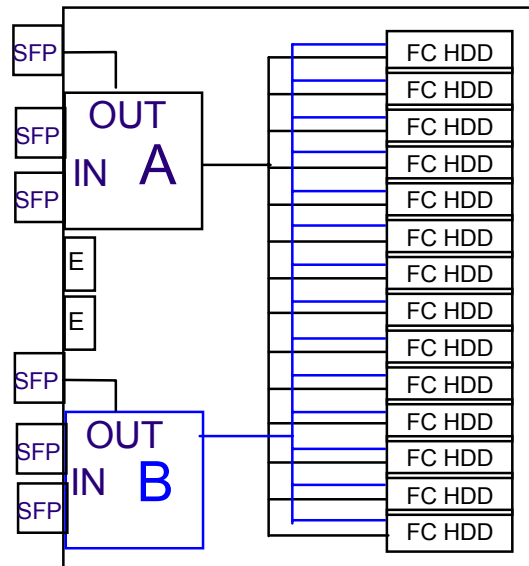
Total Internal Storage ¹	10,000rpm HDDs			15,000rpm HDDs		
	36.4GB (06P5761)	73.4GB (06P5762)	146.8GB (32P0765)	18.2GB (06P5771)	36.4GB (06P5772)	73.4GB (32P0768)
18.2GB	-	-	-	1	-	-
36.4GB	1	-	-	2	1	-
54.6GB	-	-	-	3	-	-
72.8GB	2	-	-	4	2	-
73.4GB	-	1	-	-	-	1
91GB	-	-	-	5	-	-
109.2GB	3	-	-	6	3	-
127.4GB	-	-	-	7	-	-
145.6GB	4	-	-	8	4	-
146.8GB	-	2	1	-	-	2
163.8GB	-	-	-	9	-	-
182GB	5	-	-	10	5	-
200.2GB	-	-	-	11	-	-
218.4GB	6	-	-	12	6	-
220.2GB	-	3	-	-	-	3
236.6GB	-	-	-	13	-	-
254.8GB	7	-	-	14	7	-
291.2GB	8	-	-	-	8	-
293.6GB	-	4	2	-	-	4
327.6GB	9	-	-	-	9	-
364GB	10	-	-	-	10	-
367GB	-	5	-	-	-	5
400.4GB	11	-	-	-	11	-
436.8GB	12	-	-	-	12	-
440.4GB	-	6	3	-	-	6
473.6GB	13	-	-	-	13	-
510GB	14	-	-	-	14	-
513.8GB	-	7	-	-	-	7
587.2GB	-	8	4	-	-	8
660.6GB	-	9	-	-	-	9
734GB	-	10	5	-	-	10
807.4GB	-	11	-	-	-	11
880.8GB	-	12	6	-	-	12
954.2GB	-	13	-	-	-	13
1027.6GB	-	14	7	-	-	14
1174.4GB	-	-	8	-	-	-
1321.2GB	-	-	9	-	-	-
1468GB	-	-	10	-	-	-
1614.8GB	-	-	11	-	-	-
1761.6GB	-	-	12	-	-	-
1908.4GB	-	-	13	-	-	-
2055.2GB	-	-	14	-	-	-

This table does not represent all possible HDD configurations.

1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.

Part Number	Description	RPM	Height	Bays Supported	Maximum Quantity
06P5761	2Gbps FC 36.4GB/10K Drive	10,000	SL	1 ... 14	14
06P5762	2Gbps FC 73.4GB/10K Drive	10,000	SL	1 ... 14	14
32P0765	146.8GB Fibre Channel Disk Drive Module	10,000	SL	1 ... 14	14
06P5771	2Gbps FC 18.2GB/15K Drive	15,000	SL	1 ... 14	14
06P5772	2Gbps FC 36.4GB/15K Drive	15,000	SL	1 ... 14	14
32P0768	73.4GB/15K Disk Module	15,000	SL	1 ... 14	14
External Storage Expansion Units		Form Factor			
172260U	FAST600 Storage Server (US line cord)	Rack (3U)			
171010U	FAST EXP100 Storage Expansion Unit				
17401RU	FAST EXP700 Storage Expansion Unit	Rack (3U)			

FAST 600 Storage Server¹
172260U



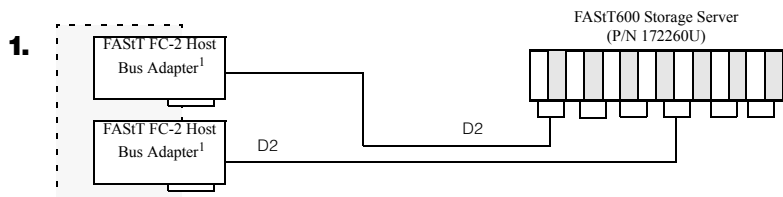
A and B=Fibre Channel controllers; E=Ethernet
SFP modules are not included. Either Fibre Channel Long- or Short-wave SFP modules (P/N 19K1272 or 19K1271 respectively) may be used.
IN=host connection; OUT=expansion connection

1. Housed in a 19in rack-mountable drawer and ships standard with redundant power supplies and two power cables requiring separate power sources. Requires an IBM industry standard 19in rack, EIA-310D with a minimum depth of 24in (711.2mm).

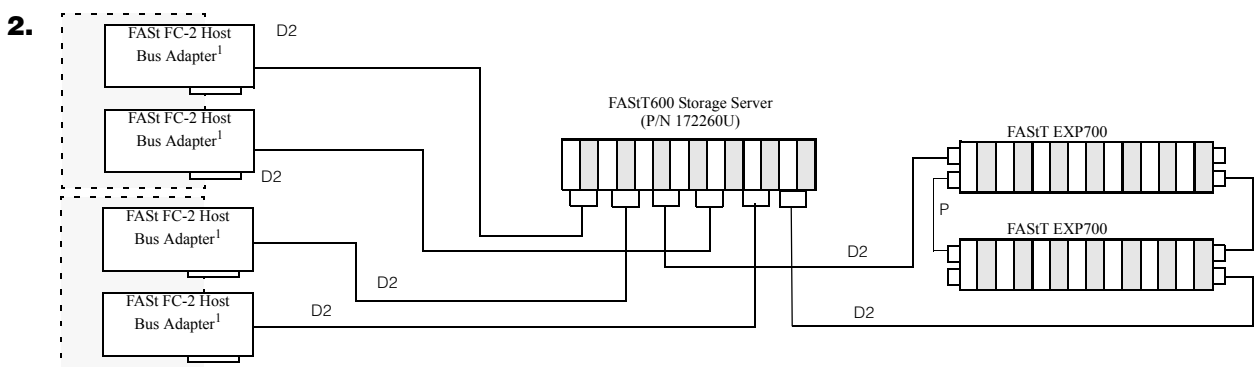
Fibre Channel Configuration Examples (FAST600)

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

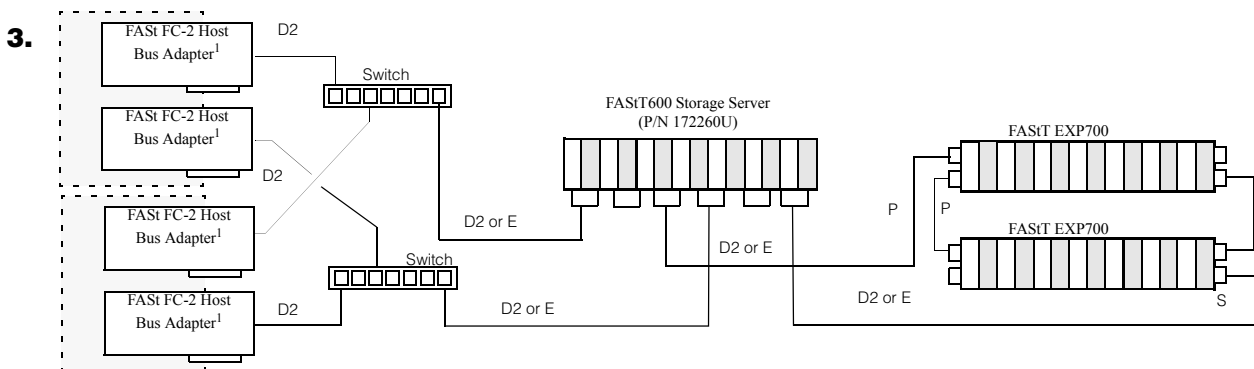
Direct Attachment



High-availability Without Switch



High-availability With Switch



1. FAST FC2 Host Bus Adapter (P/N 24P0960) supports short-wave connections only.

• P = primary path, S = secondary (redundant) path.

• Shaded boxes represent separate hosts.

• Cable groups are represented by letters.

• Maximum of 42 Fibre Channel HDDs are supported by the FAST600 Storage Server for optimum performance (up to 14 in storage server with remainder in expansion units).

• An optional short- or long-wave SFP Module is required for all FAST600 storage server and FAST EXP700 storage connections. SFP Modules are not depicted in these diagrams. See device drawings at the end of this section for details.

Refer to the Supported Cable Groups chart following the FASTT 200 configuration examples for cable type definitions.



FAStT EXP700 (17401RU)

FAStT EXP700 Storage Expansion Unit

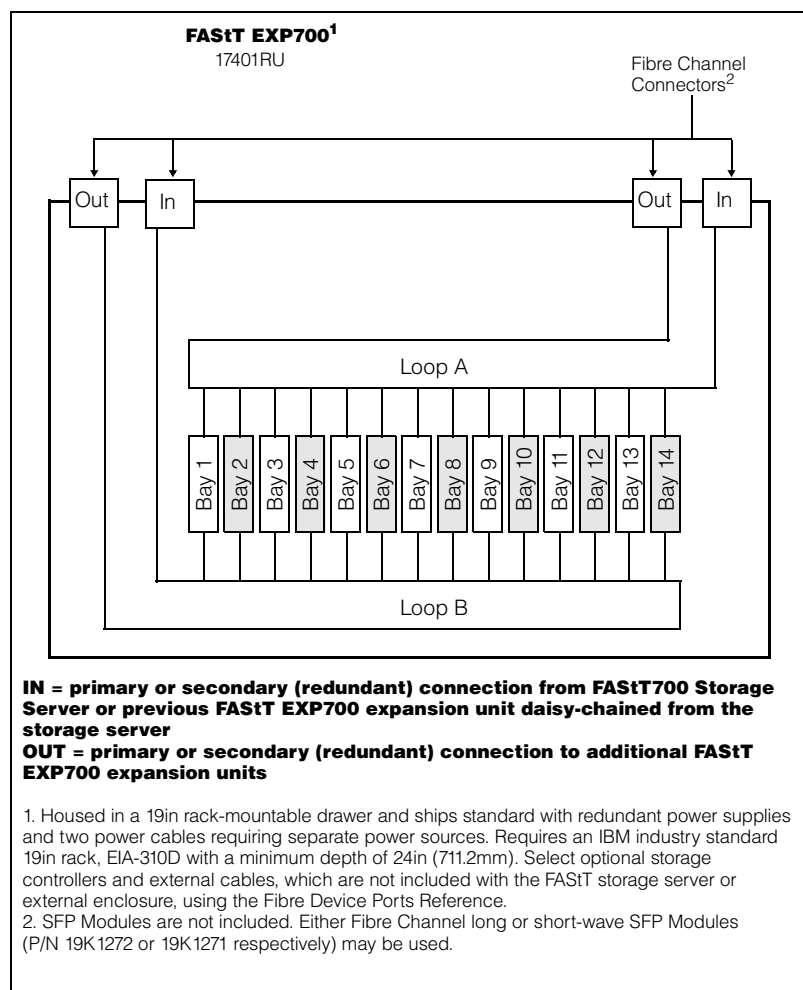
Total Internal Storage ¹	10,000rpm HDDs			15,000rpm HDDs		
	36.4GB (06P5761)	73.4GB (06P5762)	146.8GB (32P0765)	18.2GB (06P5771)	36.4GB (06P5772)	73.4GB (32P0768)
0GB	Standard in base model					
18.2GB	-	-	-	1	-	-
36.4GB	1	-	-	2	1	-
54.6GB	-	-	-	3	-	-
72.8GB	2	-	-	4	2	-
73.4GB	-	1	-	-	-	1
91GB	-	-	-	5	-	-
109.2GB	3	-	-	6	3	-
127.4GB	-	-	-	7	-	-
145.6GB	4	-	-	8	4	-
146.8GB	-	2	1	-	-	2
163.8GB	-	-	-	9	-	-
182GB	5	-	-	10	5	-
200.2GB	-	-	-	11	-	-
218.4GB	6	-	-	12	6	-
220.2GB	-	3	-	-	-	3
236.6GB	-	-	-	13	-	-
254.8GB	7	-	-	14	7	-
291.2GB	8	-	-	-	8	-
293.6GB	-	4	2	-	-	4
327.6GB	9	-	-	-	9	-
364GB	10	-	-	-	10	-
367GB	-	5	-	-	-	5
400.4GB	11	-	-	-	11	-
436.8GB	12	-	-	-	12	-
440.4GB	-	6	3	-	-	6
473.6GB	13	-	-	-	13	-
510GB	14	-	-	-	14	-
513.8GB	-	7	-	-	-	7
587.2GB	-	8	4	-	-	8
660.6GB	-	9	-	-	-	9
734GB	-	10	5	-	-	10
807.4GB	-	11	-	-	-	11
880.8GB	-	12	6	-	-	12
954.2GB	-	13	-	-	-	13
1027.6GB	-	14	7	-	-	14
1174.4GB	-	-	8	-	-	-
1321.2GB	-	-	9	-	-	-
1468GB	-	-	10	-	-	-
1614.8GB	-	-	11	-	-	-
1761.6GB	-	-	12	-	-	-
1908.4GB	-	-	13	-	-	-
2055.2GB	-	-	14	-	-	-

This table does not represent all possible HDD configurations.

1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.

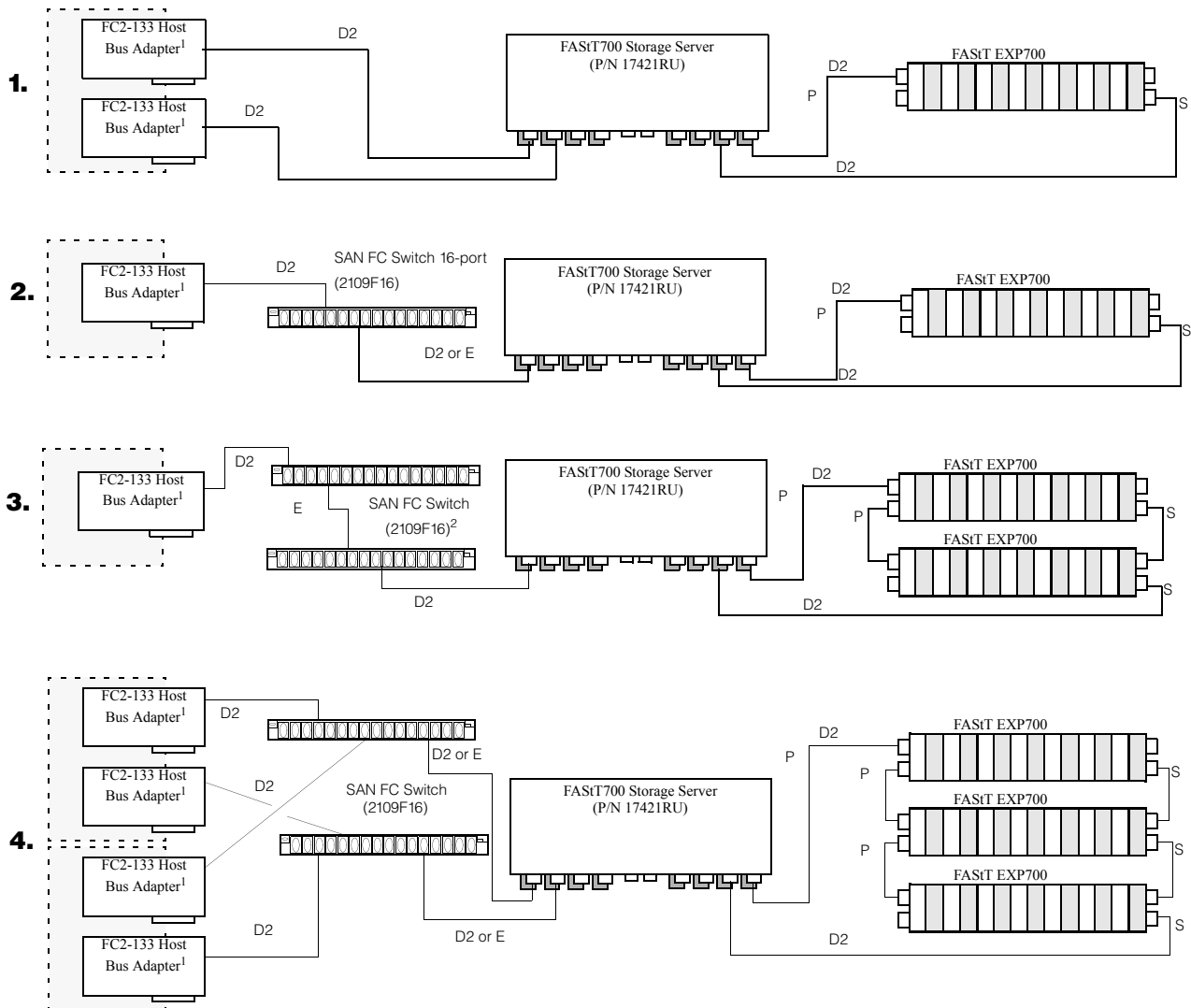
Part Number	Description	RPM	Height	Bays Supported	Maximum Quantity
06P5761	2Gbps FC 36.4GB/10K Drive	10,000	SL	1 ... 14	14
06P5762	2Gbps FC 73.4GB/10K Drive	10,000	SL	1 ... 14	14
32P0765	146.8GB Fibre Channel Disk Drive Module	10,000	SL	1 ... 14	14
06P5771	2Gbps FC 18.2GB/15K Drive	15,000	SL	1 ... 14	14
06P5772	2Gbps FC 36.4GB/15K Drive	15,000	SL	1 ... 14	14
32P0768	73.4GB/15K Disk Module	15,000	SL	1 ... 14	14
External Storage Expansion Units		Form Factor			
17401RU	FAStT EXP700 Storage Expansion Unit ¹	Rack (3U)			

1. The FAStT EXP700 includes two hot-swap, 400w auto-ranging redundant power supplies, each with its own power cord.



Fibre / Fibre Configuration Examples FAST EXP700 with FAST700 Fibre Channel Storage Server

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.



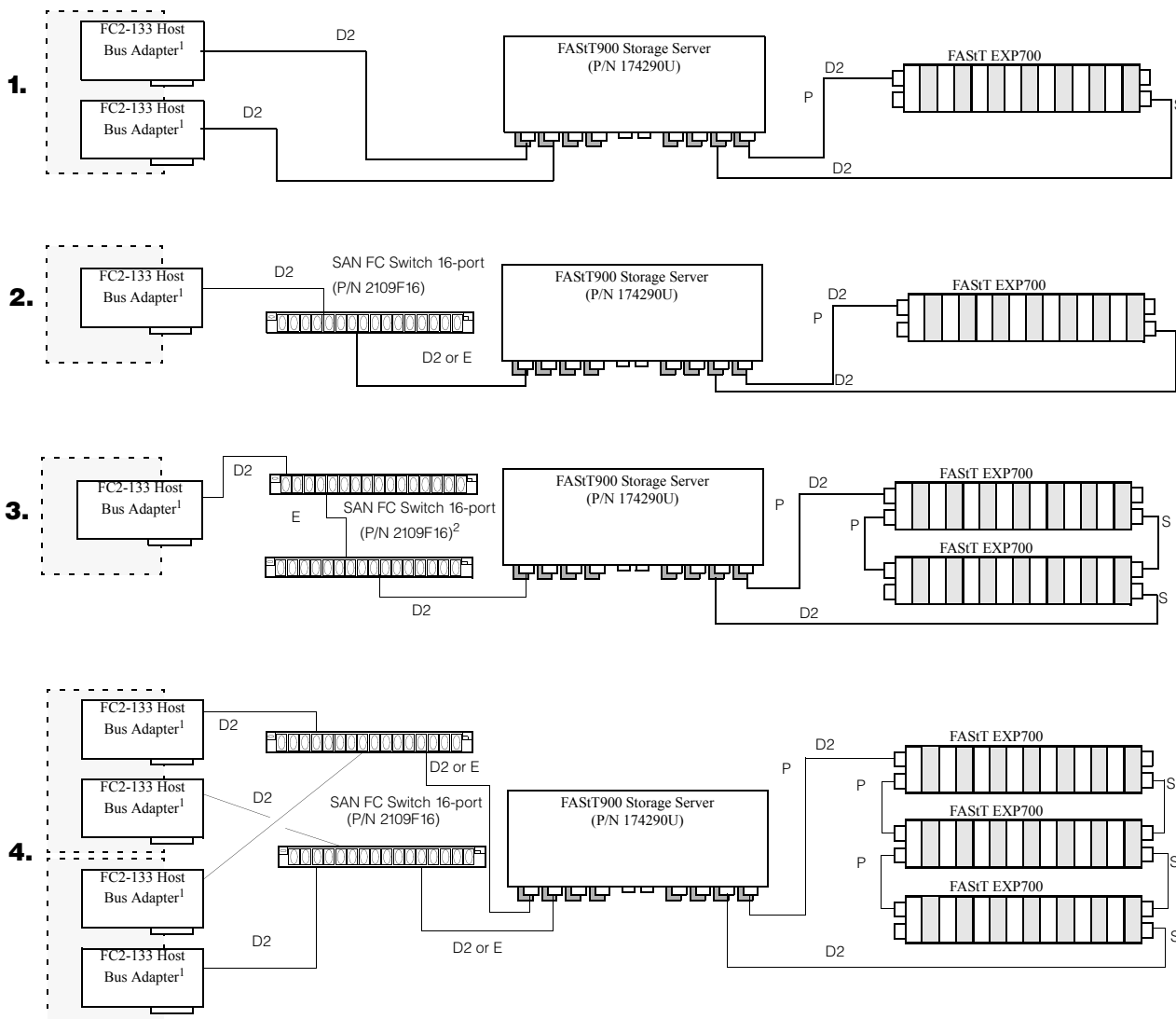
1. FC2-133 Host Bus Adapter (P/N 24P0960) includes an integrated short-wave SFF Module, supporting short-wave connections only.
2. Buffering the long-wave optic cable expanse with a second switch or hub at the remote storage location is required to requalify the signal.

- P = primary path, S = secondary (redundant) path.
- Shaded boxes represent separate hosts.
- Cable groups are represented by letters.
- A maximum of 224 external storage HDDs are supported through a maximum of eight enclosures in a redundant loop (cable pair). The maximum number of enclosures supported is 16. A maximum of two loops running in redundant mode are supported with four drive-side mini hubs.
- The number of servers that can be used in configurations with managed hubs or Fibre Channel switches are dependent on partitioning restrictions of the management system or cluster software.
- An optional short- or long-wave SFP Module is required for all FAST EXP700 storage connections. FAST700 and 2Gb Fibre Channel switch connections require SFP Modules. SFP Modules and adapter cables are not depicted in these diagrams. See device drawings at the end of this section for details.
- For specific requirements concerning connections, refer to the Fibre Device Ports Reference or Fibre Interconnection Guidelines.

Refer to the Supported Cable Groups chart following the FAST 200 configuration examples for cable type definitions.

Fibre / Fibre Configuration Examples FAST EXP700 with FAST900 Fibre Channel Storage Server

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.



1. FC2-133 Host Bus Adapter (P/N 24P0960) includes an integrated short-wave SFF Module, supporting short-wave connections only.
2. Buffering the long-wave optic cable expanse with a second switch or hub at the remote storage location is required to requalify the signal.

- P = primary path, S = secondary (redundant) path.
- Shaded boxes represent separate hosts.
- Cable groups are represented by letters.
- A maximum of 224 external storage HDDs are supported in a maximum of eight enclosures in a redundant loop (cable pair). The maximum number of enclosures supported is 16. A maximum of two loops running in redundant mode are supported with four drive-side mini hubs.
- The number of servers that can be used in configurations with managed hubs or Fibre Channel switches are dependent on partitioning restrictions of the management system or cluster software.
- An optional short- or long-wave SFP Module is required for all FAST EXP700 storage connections. FAST900 and 2Gb Fibre Channel switch connections require SFP Modules. SFP Modules are not depicted in these diagrams. See device drawings at the end of this section for details.
- For specific requirements concerning connections, refer to the Fibre Device Ports Reference or Fibre Interconnection Guidelines.

Refer to the Supported Cable Groups chart following the FAST 200 configuration examples for cable type definitions.

Fibre Interconnection Guidelines



Part Number	Description	00N6881 FASiT Host Adapter	00N6882 FASiT Mini Hub ¹	24P0960 FC2-133 Host Bus Adapter	19K1121 FASiT200 Redundant RAID Controller ¹	35421RU FASiT200 Storage Server ¹	35422RU FASiT200 HA Storage Server ¹	172260U FASiT600 Storage Server (US line cord)	35601RU FASiT600 EXP500 ¹	3534F08 TotalStorage SAN Switch F08 8-Port ²	2109F16 SAN Fibre Channel Switch, 16-port ^{2, 5}	17421RU FASiT700 FC Storage Server ²	19K1269 FASiT700 Mini Hub ²	17401RU FASiT700 EXP700 ²	174290U FASiT900 Fibre Channel Storage Server ²	19K1250 LC-SC Fibre Channel Adapter Cable ⁶		
00N6881	FASiT Host Adapter	-	S	-	S	S	S	S ⁹	-	S ⁸	S ⁸	S ⁸	S ⁸	-	S ⁸	-	H	
24P0960	FC2-133 Host Bus Adapter	-	S ⁹	-	S ⁹	S ⁹	S ⁹	S	-	S	S	S	S	-	S	-	S	H
3534F08	SAN Fibre Channel Switch, 8-port ^{2, 4}	S	E ⁹	S	E ⁹	E ⁹	E ⁹	E	-	E	E	E	E	-	E	-	E	H
2109F16	SAN Fibre Channel Switch, 16-Port ^{2, 5}	S	E ⁹	S	E ⁹	E ⁹	E ⁹	E	-	E	E	E	E	-	E	-	E	H
35421RU	FASiT200 Storage Server ¹	S	-	S ⁹	H	-	-	-	E	E	E	-	-	E	-	-	E	H
35422RU	FASiT200 HA Storage Server ¹	S	-	S ⁹	-	-	-	-	E	E	E	-	-	E	-	-	E	H
19K1121	FASiT200 Redundant RAID Controller ¹	S	-	S ⁹	-	H	-	-	E	-	-	-	-	-	-	-	-	H
172260U	FASiT600 Storage Server (US line cord) ^{2, 6}	S ⁹	-	S	-	-	-	-	-	E	E	-	-	E	-	-	E	H
35601RU	FASiT EXP500 Storage Expansion Unit ¹	-	E	-	E	E	E	-	-	-	-	E ⁸	E ⁸	-	E ⁸	-	E ⁸	H
17421RU	FASiT700 Fibre Channel Storage Server ²	S ⁹	-	S	-	-	-	-	E ⁹	E	E	-	H	E	-	-	E	H
19K1269	FASiT700 Mini Hub ²	S ⁹	-	S	-	-	-	-	E ⁹	E	E	H	-	E	H	-	E	H
17401RU	FASiT EXP700 Storage Expansion Unit ²	-	-	S	-	-	-	E	-	-	-	E	E	-	E	-	E	-
174290U	FASiT900 Storage Server (US line cord) ³	S ⁹	-	S	-	-	-	-	E ⁹	E	E	-	H	E	-	-	E	H
03K9307	FC Long-wave GBIC	-	H	-	H	H	H	-	H	-	-	-	-	-	-	-	-	H
03K9308	FC Short-wave GBIC	-	H	-	H	H	H	-	H	-	-	-	-	-	-	-	-	H
19K1250	LC-SC Fibre Channel Adapter Cable ⁷	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
19K1271	Short-wave SFP Module	-	-	-	-	-	-	H	-	H	H	H	H	H	H	H	H	H
19K1272	Long-wave SFP Module	-	-	-	-	-	-	H	-	H	H	H	H	H	H	H	H	H
48P7062	BladeCenter 2-port Fibre Channel Switch Module ¹⁰	-	E	-	E	E	E	E	-	-	-	E	E	-	E	-	E	H

S Short-wave connection only. See Fibre Device Ports Reference section for GBIC, SFP module or integrated optical port information.

E Either short-wave or long-wave connections allowed via the appropriate GBIC or SFP module. See Fibre Device Ports Reference section for GBIC, SFP module or integrated optical port information.

H Hardware connection: One of these devices installs directly into the other, e.g., the FASiT500 Mini Hub (P/N 00N6882) installs directly into the FASiT500 Storage Server (P/N 35521RU) to provide GBIC availability.

1. This device requires the use of GBICs. Purchase of GBICs may be needed in order to make connections to this device. See the Fibre Device Ports Reference section for GBIC or integrated optical port information.

2. This device requires a long- or short-wave SFP module. See Fibre Device Ports Reference for additional information.

3. This device requires a long- or short-wave SFP module. See Fibre Device Ports Reference for additional information. Additional options include FlashCopy Activation (P/N 24P7985), Remote Mirror Activation (P/N 24P7986), Upgrade from 16 to 64 Storage Partitions (P/N 24P7984) and Host Kits for AIX, Sun and HP servers (P/N 24P7981, 24P7982, 24P7983).

4. Additional related options include F08 Full Fabric Activation (P/N 18P5060), Performance Bundle Activation (P/N 18P4405), Fabric Manager Version 4.0 (F08) (P/N 17P7180) and F08 Advanced Security Activation (P/N 18P4411)

5. Additional related options include Remote Switch Activation (P/N 18P3579), Extended Fabric Activation (P/N 18P3580), F16 Performance Bundle Activation (P/N 18P3590), Fabric Manager Version 4.0 (F16) (P/N 17P7182) and F16 Advanced Security Activation (P/N 18P3596). Power cords for nonrack installation are available by country.

6. Additional options include FASiT600 Two EXP700 Attach (P/N 24P8066), FASiT600 1st EXP700 Attach (P/N 24P8149), FASiT600 2nd EXP700 Attach (P/N 24P8151), Intel Pack (P/N 24P8067), FASiT600 Linux/Intel Host Kit (P/N 24P8068), FASiT600 Novell NetWare Host Kit (P/N 24P8069), FASiT600 VMware Host Kit (P/N 24P8070), FASiT600 AIX Host Kit (P/N 24P8072), FASiT600 Sun Host Kit (P/N 24P8073), FASiT600 HP-UX Host Kit (P/N 24P8074), FASiT600 4-Storage Partition Activation (P/N 24P8075), FASiT600 8-Storage Partition Activation (P/N 24P8157), FASiT600 4 to 8-Storage Partition Upgrade (P/N 24P8154).

7. The LC-SC Fibre Channel Adapter Cable (P/N 19K1250) is designed to connect any 1Gb device or cable to any 2Gb device or cable. When 2Gb and 1Gb technology are combined in a configuration, the signal transfer automatically converts to the slower speed.

8. When connected to 2Gb devices or cable, LC-SC Fibre Channel Adapter Cable (P/N 19K1250) is required.

9. When connected to 1Gb devices or cable, LC-SC Fibre Channel Adapter Cable (P/N 19K1250) is required.

10. Compatible only with BladeCenter. Supports two SFP modules (either short- or long-wave).

Fibre Device Ports Reference

Part Number	Description	Total Connections Possible	Integrated Ports ³	Mini Hubs Possible	Mini Hubs Installed	GBIC or SFP Module Ports	GBICs or SFP Modules Included ³
00N6881	FAST Host Adapter	1	1	-	-	-	-
03K9307	FC Long-wave GBIC	1	-	-	-	-	-
03K9308	FC Short-wave GBIC	1	-	-	-	-	-
19K1121	FAST200 Redundant RAID Controller	2	-	-	-	2	-
3534F08	TotalStorage SAN Switch F08, 8-port ¹	8	-	-	-	8	4 ⁹
2109F16	SAN FC Switch, 16-Port ²	16	-	-	-	16	8 ¹⁰
35421RU	FAST200 Storage Server	2	-	-	-	2	-
35422RU	FAST200 HA Storage Server	4	-	-	-	4	-
172260U	FAST600 Storage Server (US line cord) ⁴	6	-	-	-	6	-
35601RU	FAST EXP500 Storage Expansion Unit	4	-	-	-	4	-
24P0960	FC2-133 Host Bus Adapter	1	1	-	-	-	-
17421RU	FAST700 FC Storage Server ⁵	12	-	8	4	12	-
19K1269	FAST700 Mini Hub ⁶	2	-	-	-	2	-
17401RU	FAST EXP700 Storage Expansion Unit	4	-	-	-	4	-
174290U	FAST900 Storage Server (US line cord) ⁷	12	-	8	4	12	-
19K1250	LC-SC FC Adapter Cable ⁸	1	1	-	-	-	-
19K1271	Short-wave SFP Module	1	-	-	-	-	-
19K1272	Long-wave SFP Module	1	-	-	-	-	-
48P7062	BladeCenter 2-port Fibre Channel Switch Module ¹¹	2	-	-	-	2	-

1. Additional related options include F08 Full Fabric Activation (P/N 18P5060), Performance Bundle Activation (P/N 18P4405), Fabric Manager Version 4.0 (F08) (P/N 17P7180) and F08 Advanced Security Activation (P/N 18P4411).

2. Additional related options include Remote Switch Activation (P/N 18P3579), Extended Fabric Activation (P/N 18P3580), F16 Performance Bundle Activation (P/N 18P3590), Fabric Manager Version 4.0 (F16) (P/N 17P7182) and F16 Advanced Security Activation (P/N 18P3596). Power cords for nonrack installation are available by country.

3. Standard GBICs, SFP Modules and integrated optical ports are short-wave.

4. Additional options include FAST600 Two EXP700 Attach (P/N 24P8066), FAST600 1st EXP700 Attach (P/N 24P8149), FAST600 2nd EXP700 Attach (P/N 24P8151), Intel Pack (P/N 24P8067), FAST600 Linux/Intel Host Kit (P/N 24P8068), FAST600 Novell NetWare Host Kit (P/N 24P8069), FAST600 VMware Host Kit (P/N 24P8070), FAST600 AIX Host Kit (P/N 24P8072), FAST600 Sun Host Kit (P/N 24P8073), FAST600 HP-UX Host Kit (P/N 24P8074), FAST600 4-Storage Partition Activation (P/N 24P8075), FAST600 8-Storage Partition Activation (P/N 24P8157), FAST600 4 to 8-Storage Partition Upgrade (P/N 24P8154).

5. FAST700 Storage Server supports up to eight nonredundant or four redundant host connections and two redundant storage drive loops.

6. Each FAST700 Mini Hub provides two SFP Module ports. The host-side mini hubs connect to one of two Fibre Channel controllers in the FAST700 or FAST900 Storage Servers. The drive side mini hubs each connect to both Fibre Channel controllers. Full redundancy requires connection to two drive-side and two host-side mini hubs. Drive-side mini hubs support connection to one port only.

7. FAST900 Storage Server supports up to eight nonredundant or four redundant host connections and two redundant storage drive loops. Additional options include FlashCopy Activation (P/N 24P7985), Remote Mirror Activation (24P7986), Upgrade from 16 to 64 Storage Partitions (P/N 24P7984) and Host Kits for AIX, Sun and HP servers (P/N 24P7981, 24P7982, 24P7983).

8. The LC-SC Fibre Channel Adapter Cable (P/N 19K1250) is designed to connect any 1Gb device or cable to any 2Gb device or cable. When 2Gb and 1Gb technology are combined in a configuration, the signal transfer automatically converts to the slower speed.

9. Four short-wave SFP modules are standard. Either short-wave or long-wave modules can populate the other four ports.

10. Eight short-wave SFP modules are standard. Either short-wave or long-wave modules can populate the other eight ports.

11. Compatible only with BladeCenter. Supports two SFP modules (either short- or long-wave).

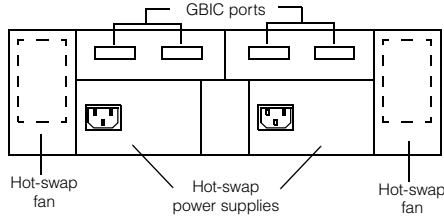


FAST Host Adapter (P/N 00N6881)



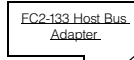
- PCI to FCAL 64/32-bit host adapter.
- Compatible with Cable Group D1.
- Integrated short-wave optical port, no GBIC required.
- Full Fibre Channel fabric support.

FAST EXP500 Storage Expansion Unit (P/N 35601RU)



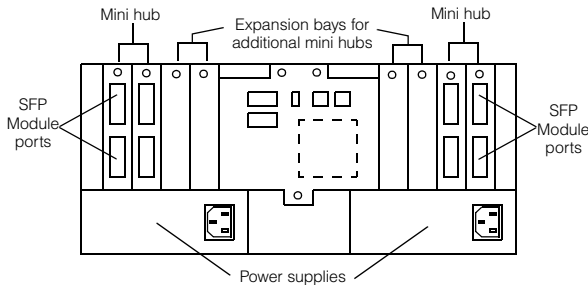
- Two hot-swap, 350w auto-ranging, redundant power supplies.
- Redundant fans - two hot-swap, dual-fan units.
- LED indicators on all critical components warn of faults, over-temperature, and other abnormalities.
- Ten drive bays - supports slim-high or half-high Fibre Channel hot-swap HDDs.
- Height is 3U (1U = 1.75in or 44.45mm).
- Requires optional GBICs for each connection. GBICs not included.

FC2-133 Host Bus Adapter (P/N 24P0960)



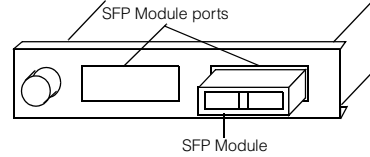
- PCI-X to FCAL 64-bit host adapter (133Mhz).
- Supported Attachments (use LC-LC cable in group D2): FAST700 Storage Server (P/N 17421RU).
- Integrated short-wave optical port, no SFP Module required.
- Full Fibre Channel fabric support.

FAST700 Storage Server (P/N 17421RU)



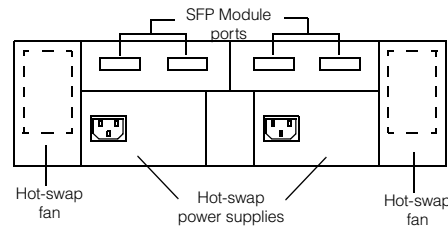
- Dual high-performance RAID controller cards — supports up to 390MB/sec of throughput.
- Operates at 1Gb or 2Gb (autosensing).
- Dual 175w auto-ranging, hot-swap redundant power supplies.
- Attach directly to FC2-133 Host Bus Adapter (P/N 24P0960) with short-wave cables and SFP Modules or indirectly through either the 8-port or 16-port 2Gb Fibre Channel Switch (P/N 3534F08, 2109F16) using cables from cable group D2 or E with corresponding SFP Modules.
- Height is 4U (1U = 1.75in or 44.45mm).
- For optimum performance no more than two FAST700 Storage Servers (P/N 17421RU) should be attached to a single Fibre Channel switch.
- Includes four FAST700 Mini Hubs (P/N 19K1269), two host-side and two storage drive-side.
- Each controller is equipped with 1GB of cache (2GB total).
- All connections to FAST700 Mini Hubs require the use of SFP Modules, which are not included.

FAST700 Mini Hub (P/N 19K1269)



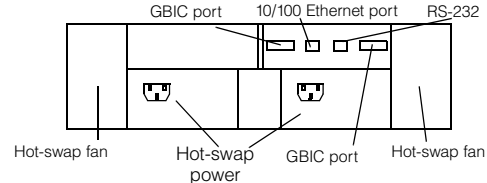
- Provides additional connections to the FAST Storage Server — supports complex clustering or advanced storage applications.
- All connections to FAST700 Mini Hubs require the use of SFP Modules. SFP Modules are not included.

FAST EXP700 Storage Expansion Unit (P/N 17401RU)



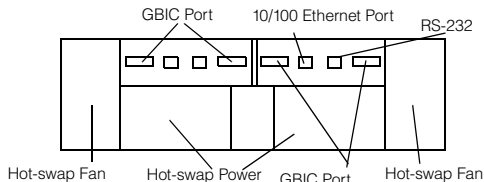
- Two hot-swap, 400w auto-ranging, redundant power supplies.
- Redundant fans - two hot-swap, dual-fan units.
- LED indicators on all critical components warn of faults, over-temperature, and other abnormalities.
- Fourteen drive bays - supports slim-high Fibre Channel hot-swap HDDs.
- Height is 3U (1U = 1.75in or 44.45mm).
- Requires optional SFP Modules for each connection. SFP Modules not included.

FAST200 Storage Server (P/N 35421RU)



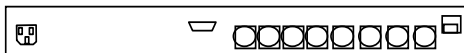
- Contains a single hot-plug RAID controller which provides a single host Fibre Channel arbitrated loop and a single storage Fibre Channel arbitrated loop.
- Can be upgraded to a FAST200 HA Storage Server through the addition of a FAST200 Redundant RAID Controller (P/N 19K1121).
- Integrated 10/100Mbps Ethernet connector and RS-232 service support port.
- Two hot-swap 350W auto-ranging, redundant power supplies.
- Redundant fans: two hot-swap, dual-fan units.
- LED indicators on all critical components warn of faults, over-temperature, and other abnormalities.
- Ten drive bays - supports slim-line or half-high Fibre Channel hot-swap HDDs.
- Height is 3U (1U=1.75in or 44.45mm).
- Supports long- and short-wave connections. Requires optional GBICs for each connection. GBICs not included.

FAST200 HA Storage Server (P/N 35422RU)



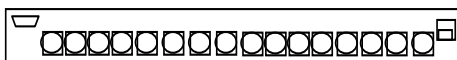
- Contains two hot-plug RAID controllers. Each controller provides a single host Fibre Channel arbitrated loop and a single storage Fibre Channel arbitrated loop.
- Integrated 10/100Mbps Ethernet connector and RS-232 service support port.
- Performance optimized for 60 HDDs - supports optional FAST EXP500 Storage Expansion Units (P/N 35601RU).
- Two hot-swap 350W auto-ranging, redundant power supplies.
- Redundant fans: two hot-swap, dual-fan units.
- LED indicators on all critical components warn of faults, over-temperature, and other abnormalities.
- Ten drive bays - supports slim-line or half-high Fibre Channel hot-swap HDDs.
- Height is 3U (1U=1.75in or 44.45mm).
- Supports long- and short-wave connections. Requires optional GBICs for each connection. GBICs not included.

SAN Fibre Channel Switch, 8-port (P/N 3534F08)



- Provides 2Gb per second port-to-port throughput with autosensing capability for connecting to 1Gb per second host servers, storage and switches with full operability.
- Contained in a 1U mechanical.
- Includes a comprehensive set of management tools that support a Web browser interface.
- Four short-wave SFP Modules (optical transceivers) are standard.
- Supports up to 192 ports in a single 42U rack (scalable to 239 switches maximum).
- Additional related options include F08 Full Fabric Activation (P/N 18P5060), Performance Bundle Activation (P/N 18P4405), Fabric Manager Version 4.0 (P/N 17P7180) and F08 Advanced Security Activation (P/N 18P4411).

SAN Fibre Channel Switch, 16-port (P/N 2109F16)



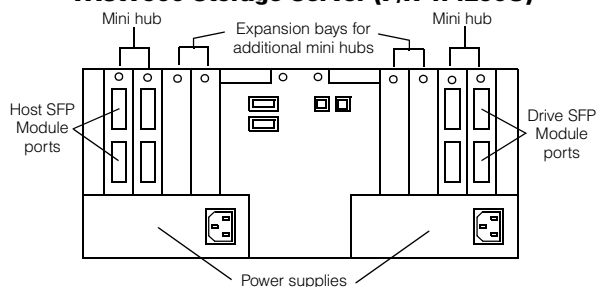
- Provides 2Gb per second port-to-port throughput with autosensing capability for connecting to 1Gb per second host servers, storage and switches with full operability.
- Contained in a 1U mechanical, requiring half the rack space of the 1Gb 16-port switch.
- Up to four Inter-Switch Links can be trunked for throughput of up to 8Gb per second.
- Includes a comprehensive set of management tools that support a Web browser interface.
- Eight short-wave SFP Modules (optical transceivers) are standard.
- Built-in redundancy with no single points of failure.
- Supports up to 384 ports in a single 42U rack (scalable to 239 switches maximum).
- Ships with one hot-swap 126W power supply, and supports an optional redundant power supply (P/N 18P3576).
- Additional related options include Remote Switch Activation (P/N 18P3579), Extended Fabric Activation (P/N 18P3580), F16 Performance Bundle Activation (P/N 18P3590), Fabric Manager Version 4.0 (F16) (P/N 18P7182) and F16 Advanced Security Activation (P/N 18P3596). Power cords for nonrack installation are available by country.

LC-SC Fibre Channel Adapter Cable (P/N 19K1250)



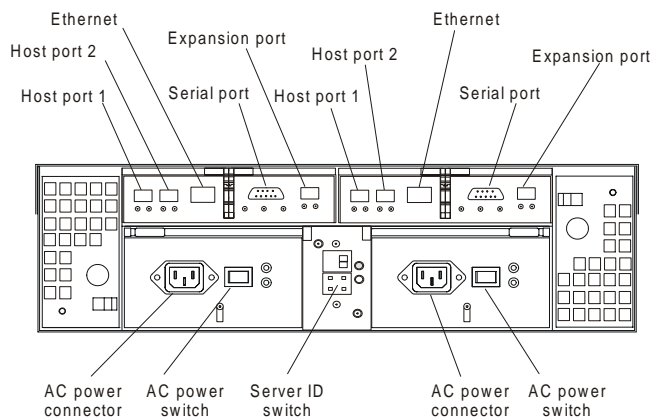
- Nine-inch adapter cable used to connect 1Gb cable or devices to 2Gb cable or devices.
- To plug into a FAST Host Adapter integrated GBIC (or any short-wave GBIC), remove the black caps from the 1Gb male SC connector (B).
- To attach LC-LC cable, remove the white caps from the 2Gb female LC connector (A) and insert the male connector of the LC-LC cable.

FAST900 Storage Server (P/N 174290U)



- Dual high-performance RAID controller cards supporting up to 772MB/sec of throughput.
- Operates at 1Gb or 2Gb (autosensing).
- Dual 175w auto-ranging, hot-swap, redundant power supplies.
- Attach directly to FC2-133 Host Bus Adapter (P/N 24P0960) with short-wave cables and SFP Modules or indirectly through the SAN Fibre Channel Switch, 16-port (P/N 2109F16) or TotalStorage SAN Switch F08, 8-port (P/N 3534F08) using LC-LC cables from cable group D2 or E with corresponding SFP Modules.
- Height is 4U (1U = 1.75in or 44.45mm).
- For optimum performance no more than two FAST900 Storage Servers (P/N 174290U) should be attached to a single Fibre Channel switch.
- Includes four FAST700 Mini Hubs (P/N 19K1269), two host-side and two storage drive-side.
- Each controller is equipped with 1GB of cache (2GB total).
- All connections to FAST700 Mini Hubs require the use of SFP Modules, which are not included.

FAST600 Storage Server (P/N 172260U)



- Compact 3U rack-mountable enclosure.
- Dual 2Gbps RAID controllers with 256MB cache (128MB per controller) supporting up to 400MB/s of throughput.
- Fourteen Fibre Channel HDD bays (over 2TB of storage capacity).
- Redundant hot-swap 390w power supplies and cooling fans.
- Supports two FAST EXP700 Expansion Units via EXP700 attachment features.
- Supports RAID types 0, 1, 3, 5, 10.
- Four host ports standard (two per controller), attaching to either Fibre Channel switched fabrics or host servers.
- Short and long-wave Fibre Channel host attachment.
- FAST Storage Manager v8.33 with upgrade capability for eight storage partitions.
- All host and expansion connections require SFP Modules (not included).



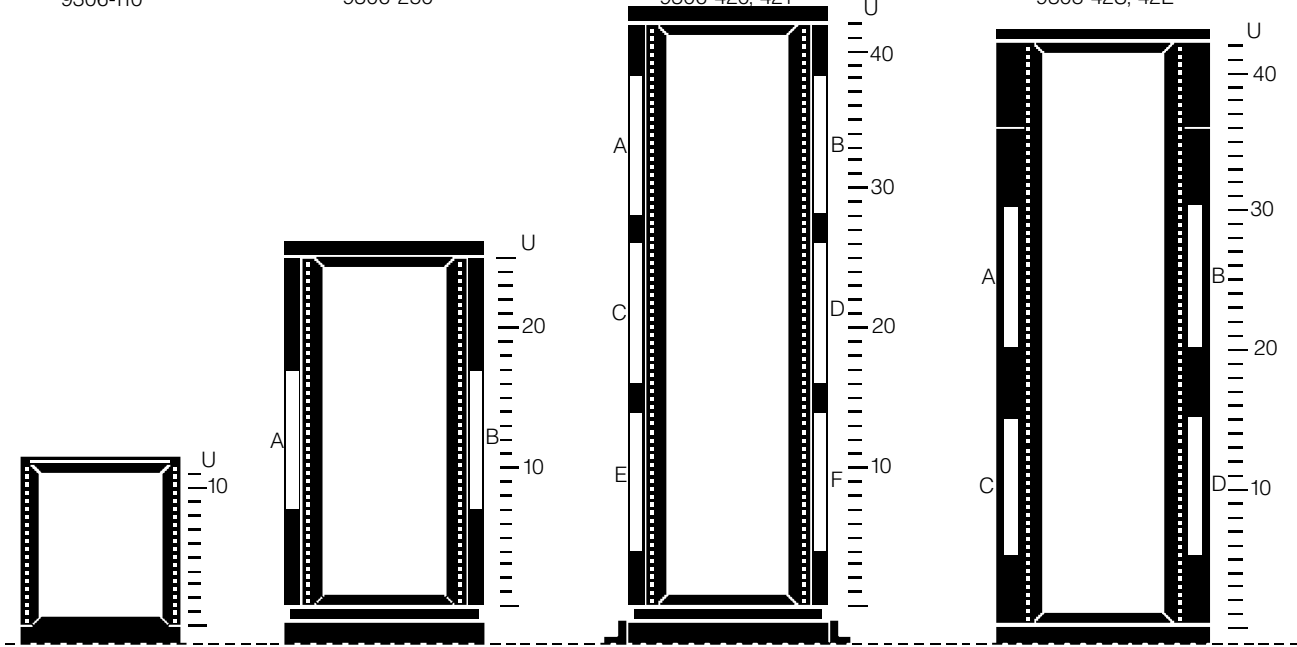
Rack Cabinets and Options

IBM NetBAY11
Standard Rack
9306-110

IBM NetBAY25
Standard Rack
9306-250

IBM NetBAY42
Standard Rack
9306-420, 421

IBM NetBAY42
Enterprise Rack
9308-42S, 42E



	IBM NetBAY11 Standard Rack	IBM NetBAY25 Standard Rack³	IBM NetBAY42 Standard Rack		IBM NetBAY42 Enterprise Rack	
Machine Type / Model	9306110	9306250	9306420	9306421	930842S	930842E
EIA Capacity ¹	11U	25U	42U	42U	42U	42U
Sidewall Compartments	0	2	6	6	4	4
Front Stabilizers	Std	Std	Std	Std	Std	Std
Side Stabilizers	NR	NR	Std	Std	NR	NR
Casters	Std	Std	Std	Std	Std	Std
Leveling Feet	NA	Std	Std	Std	Std	Std
Side Covers	Std	Std	Std	NR	Std	NR
Rack Attachment Kit ²	NA	NA	NR	Std	NR	Std
Glass Front Door	NA	NA	NA	NA	NA	NA
Perforated Front Door	Std	Std	Std	Std	Std	Std
Perforated Rear Door	NA	Std	Std	Std	Std	Std
Height (mm/in) ⁴	611 / 24.1	1360 / 53.5	2076 / 81.7	2076 / 81.7	2020 / 79.5	2020 / 79.5
Width (mm/in)	518 / 20.4	600 / 23.6	600 / 23.6	600 / 23.6	648 / 25.5	648 / 25.5
Depth (mm/in)	873 / 34.4	1000 / 39.4	1000 / 39.4	1000 / 39.4	1105 / 43.5	1105 / 43.5
Empty Weight (kg/lb)	34 / 75	80 / 177	117 / 258	92 / 202	261 / 575	234 / 516
Max Load (kg/lb)	182 / 401	385 / 849	646 / 1424	646 / 1424	667 / 1470	667 / 1470
Total Weight (kg/lb)	216 / 476	465 / 1026	763 / 1682	738 / 1626	928 / 2045	901 / 1986
Shippable Loaded ⁵	Yes	Yes	No	No	Yes	Yes

NR - Not Required

NA - Not Available

1U=1.75in (44.5mm)

1. Conforms to EIA 310 - D Standard 19in rack specification for a Type A cabinet with universal hole spacing.

2. Required to attach racks together to make a suite.

3. Display and keyboard may be placed on top of the NetBAY25.

4. Minimum clearance to the ceiling is 305mm / 12in.

5. 'Shippable loaded' means the cabinet is capable of being transported with equipment installed. Required packaging is provided. The integrator/ assembler is responsible for assuring the stability of the shipped configuration. Rack Integration Services are available from IBM.

Server System Rack Alternatives												
	Conversion Kits						Standard Racks ¹				Enterprise Racks ¹	
	09N4300 4Ux20D Tower-to-Rack Kit	59P4817 4U Extended Depth Tower-to-Rack Conversion Kit	59P4211 5Ux24D Tower-to-Rack Kit III	32P1474 7Ux26D Tower-to-Rack Kit	37L6859 8Ux24D Tower-to-Rack Kit	37L6860 8Ux24D Rack-to-Tower Kit	9306-110 NetBAY 11	9306-250 NetBAY25SR	9306-420 NetBAY42SR	9306-421 NetBAY 42SX	9308-42S NetBAY42ER	9308-42E NetBAY42EX
Servers												
xSeries 205 ²	X						X	X	X	X	X	X
xSeries 225 ²		X					X	X	X	X	X	X
xSeries 235			X				X	X	X	X	X	X
xSeries 255				X			X	X	X	X	X	X
xSeries 305 ³							X	X	X	X	X	X
eServer 325							X	X	X	X	X	X
xseries 335							X	X	X	X	X	X
xSeries 345 ⁴							X	X	X	X	X	X
xSeries 360							X	X	X	X	X	X
xSeries 382											X	X
xSeries 440							X	X	X	X	X	X
xSeries 445							X	X	X	X	X	X
xSeries 450							X	X	X	X	X	X
BladeCenter							X	X	X	X	X	X

1. See the first page of Rack Cabinets and Options section for additional information concerning IBM rack-supported devices.

2. Rack installation requires appropriate conversion kit.

3. Blank filler panels (P/N 94G6670) should be placed on the front of any unused rack space to aid proper airflow through the system units. If non-IBM racks are used, assure that both the front and rear doors offer a minimum of 45% open area uniformly distributed and in line with the installed servers. A clearance of at least 51mm (2in) must be maintained between the front door and the system unit's front bezel. The rear door must maintain the same or greater clearance. Nonrack installations are not supported.

4. If installed in older IBM racks, the server should not be installed behind a glass door that blocks air flow. Remove the glass door or replace with an optional perforated door. To order a rack extension kit for withdrawn IBM racks, visit the Options Continuation Program Website. See the Information Sources section for the URL.



IBM Rack-Mounted Units												
Description	Machine Type / Model	Size (U) ⁸	Depth (in) ⁹	Approx Weight (lbs)	Power (Watts) Typical/Max (All cords to same source)	Number of P/S and Line Cords basic/max	Standard Power Cords ¹⁰					
							6ft NEMA 5-15P P/N 6952301	9ft NEMA 5-15P P/N 6952300	9ft NEMA 6-15P P/N 1838574	5ft IEC 320-C14 P/N 36L8860	9ft IEC 320-C14 P/N 36L8886	14ft IEC 320-C14 P/N 36L8861
Server System Units:												
x205 ¹	8480	4	20	43	340/485	1/1	1					
x225 ²	8647	4	26	57	420/600	1/1	1					
x225 w/redundant power ²	8647	4	26	57	350/500	2/2	2					
x235 ³	8671	5	24	83	560/800	1/2	1					
x255 ⁴	8685	7	25	120	530/1000	2/2 ¹¹		2			2	
x305 ⁵	8673	1	17	28	140/200	1/1		1			1	
e325	8835	1	26	28	400/587	1/1		1			1	
x335 ⁵	8676	1	26	29	245/340	1/1		1			1	
x345 ⁶	8670	2	29	62	350/500	1/2		1			1	
x360	8686	3	28	62	520/740	1/3		2			2	
x382	8834	2	29	76	700/1000	2/2 ¹³					2	
x440 ⁷	8687	4	28	120	800/950	2/2			2		2	
x445 ⁷	8687	4	28	120	800/950	2/2			2		2	
x450 ⁷	8688	4	28	120	800/950	2/2			2		2	
BladeCenter w/2 power supplies	8677	7	28	134	1050/1500	2/2					2	
BladeCenter w/4 power supplies	8677	7	28	230	2100/3000	4/4					4	
I/O Units:												
RXE-100	86841RU	3	26	56	260/370	2/2		2			2	
Storage Units:												
EXP300	35311RU	3	21	90	285/360	2/2		2				
EXP400	17331RU	3	22	85	310/440	2/2		2			2	
FASTt200	35421RU	3	22	56	275/390	2/2		2				
FASTt200HA	35422RU	3	22	56	275/390	2/2		2				
FASTt600	172260U	3	24	46	390/557	2/2		2				
FASTt700	17421RU	4	24	85	140/200	2/2		2				
FASTt900	174290U	4	24	85	140/200	2/2		2				
FASTt EXP500	35601RU	3	22	61	245/350	2/2		2				
FASTt EXP700	17401RU	3	23	91	245/350	2/2		2			2	
FC Switch 8-port	3534F08	1	17	17	-/50	1/1		1				
FC Switch 16-port	2109F16	1	25	28	-/200	1/2					1	
Tape Units:												
NetBAY Tape Enclosure	0034B0X	4	18	39	320/457	1/1	1					
SDLT/LTO Modular Tape Library	4560SLX	5	31	70	300/430	1/1	1					
Other Options:												
1x4 Console Switch	09N4290	1	8	5	-/100	1/1		1		1		
2x8 Console Switch	09N4291	1	8	6	-/100	1/1		1		1		
Local Console Manager	1735L04	1	6	4	-/7	1/1				1		
Remote Console Manager	1735R16	1	11	8	-/40	1/1				1		
1U Flat Panel Console w/ Space Saver Keyboard	32P1031	1	24	28	-/100	1/1		1			1	
1U Flat Panel Console w/o keyboard	32P1032	1	24	26	-/100	1/1					1	
2U Flat Panel Console w/ Space Saver Keyboard	32P1702	2	27	33	-/100	1/1		1			1	
2U Flat Panel Console w/o keyboard	32P1703	2	27	31	-/100	1/1					1	

Power Supply Options						
Power Supply	Part Number	Usable with	Standard Power Cords			
			6ft NEMA 5-15P 6952301	9ft NEMA 5-15P 6952300	9ft IEC 320-C14 36L8886	9ft IEC C13/C20 74P4430
126w	18P3576	2109-F16			1	
350w	59P4057	x345			1	
514w	74P4965	x345		1	1	
370w	31P6108	x360, RXE-100		1	1	
370w	31P6133	x255 ¹¹				
560w	33P2753	x235 ¹²	2			
560w	02R1874	x235 ¹²	2			
660w	02R2015	x235 ¹²	2			
1200w	48P7052	BladeCenter ¹⁴			2	
1200w to 1400w Upgrade Kit	90P0197	BladeCenter ¹⁴				4
1800w	13N0570	BladeCenter ¹⁴				2

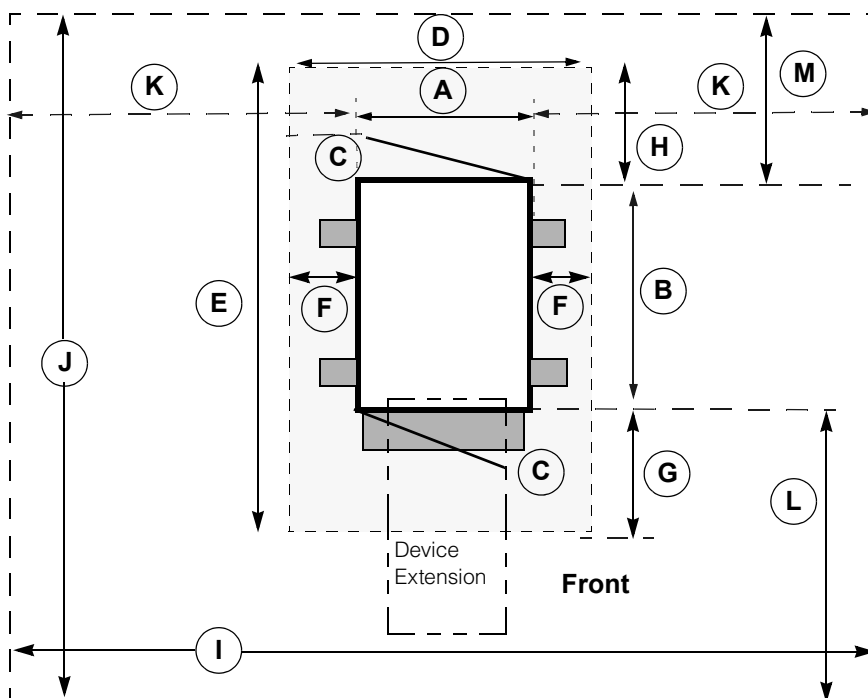
- Requires 4Ux20D Tower-to-Rack Kit (P/N 09N4300) to mount server unit into an EIA rack cabinet.
- Requires 4U Extended Depth Tower to Rack Conversion Kit (P/N 59P4817) to mount server unit into an EIA rack cabinet.
- Requires 5Ux24D Tower-to-Rack Kit III (P/N 59P4211) to mount server unit into an EIA rack cabinet. Models are available with both a single 560w power supply and two hot-swap 560w power supplies.
- Tower models require 7Ux26D Tower-to-Rack Kit (P/N 32P1474) to mount server unit into an EIA rack cabinet.
- To provide adequate cooling, blank filler panel kit (P/N 94G6670) should be placed on the front of any unused rack space. If non-IBM racks are to be used, assure that both front and rear doors offer a minimum of 48% open area uniformly distributed and in line with installed servers. A clearance of 51 to 64mm (2 to 2.5in) must be maintained between the front of the door and the system unit's front bezel. The rear door must maintain the same or greater clearance. Nonrack or NetBAY3 installations are not supported.
- If installed in older IBM racks, the server should not be installed behind a glass door that blocks air flow. Remove the glass door or replace with an optional perforated door. To order a rack extension kit for withdrawn IBM racks, visit the Options Continuation Program Website at www.pc.ibm.com/ww/ocp.
- Internal power supply logic limits low voltage (100-127VAC) to 550w per power supply. Thus, configurations requiring more power are not redundant for low voltage installations, e.g., configurations with more than two processors.
- 1U = 1.75in (44.45mm).
- The Rack Extension Kits (P/N 36L9703 or 36L9702) add eight inches to the rear of a 9306-900, 910 or 9306-200 for cable management and are recommended for systems greater than 24 inches in depth.
- Optional rack power cords: P/N 94G6667 - 14ft NEMA 5-15P; P/N 94G7448 - 14ft IEC 320-C14.
- Additional power cords are not required. This power supply option shares use of line cords provided with the base system. Should be ordered in pairs to maintain redundancy.
- Option includes two hot-swap power supplies and a power backplane. 33P2753 is compatible only with 400MHz FSB models; 02R1874 is compatible only with 533MHz FSB models with 2.67 or 2.8GHz processors; 02R2015 is required for 533MHz FSB models with 3.06GHz processors.
- Includes three N+1 redundant power supplies. Uses only two power cords.
- Refer to Appendix H eServer BladeCenter Power Upgrade Guidelines for important information that will help determine when a BladeCenter power module upgrade is necessary.

General rack placement rules and other information:

- Locate heaviest components at the bottom of the rack (i.e., UPS, then servers or storage, etc.).
- Do not extend more than one component on side rails at a time.
- Maximum of three UPSs (including no more than two APC 5000 UPSs) per rack.
- Utilize sidewall compartments for mounting PDUs and console switches prior to using EIA space.
- When mounting components in a rack, consider user and service requirements.
- When selecting length of power, console and storage cables, consider extension of cable management arms and overall cable routing.
- BTUs = Watts x 3.41.



Rack Options		
Part Number	Description	Information
28L4707	Netfinity Rack Keyboard Tray	Supports keyboards in racks, also used with Flat Panel Monitor Rack Mount Kit II
28L3644	Space Saver II Keyboard	1U, includes TrackPoint IV, requires Rack Keyboard Tray (P/N 28L4707)
94G7444	Monitor Compartment	
633147N	E54 Color Monitor	9U, requires Monitor Compartment (P/N 94G7444)
63324HN	E74 Color Monitor	10U, requires Monitor Compartment (P/N 94G7444)
32P1702	NetBAY 2U Flat Panel Monitor Console Kit with Space Saver Keyboard (US)	2U, built-in 15in Flat Panel Monitor (15in viewable image), includes SpaceSaver Keyboard-US English (P/N 28L3644)
32P1703	NetBAY 2U Flat Panel Monitor Console Kit without keyboard	2U, built-in 15in Flat Panel Monitor (15in viewable image), space for SpaceSaver Keyboard
32P1031	NetBAY1U Flat Panel Monitor Console Kit with Space Saver Keyboard (US)	1U, built-in 15in Flat Panel Monitor (15in viewable image), includes SpaceSaver Keyboard - US English (P/N 28L3644)
32P1032	NetBAY 1U Flat Panel Monitor Console Kit without keyboard	1U, built-in 15in Flat Panel Monitor (15in viewable image), space for SpaceSaver Keyboard
09N4290	NetBAY 1 x 4 Console Switch	1U, mounts in sidewall compartments, EIA space or Monitor Compartment; supports one to four servers, one console
09N4291	NetBAY 2 x 8 Console Switch	1U, mounts in sidewall compartments, EIA space or Monitor Compartment; supports one to eight servers, two consoles (only one console when installed in the Monitor Compartment)
09N4293	Console Cable Set - 7ft	Connects servers to console switch
94G7447	Console Cable Set - 12ft	Connects servers to console switch
1735L04	Local Console Manager	1U, mounts in sidewall compartments, EIA space or behind 1U Console Kit; supports one to 64 servers, one local console
1735R16	Remote Console Manager	1U, mounts in sidewall compartments or EIA space; supports one to 256 servers, one local console and two remote consoles
32P1636	Short KVM Conversion Option	Converts the console signals of servers without cable management arms (not on slides) so they can be chained to connect to a Local or Remote Console Manager using Cat5 cable
32P1652	Long KVM Conversion Option	Converts the console signals of servers with cable management arms (on slides) so they can be chained to connect to a Local or Remote Console Manager using Cat5 cable
32P1637	C2T Conversion Option	Converts the console signals of a chain of C2T-capable servers so they can be connected to a Local or Remote Console Manager using Cat5 cable
94G6666	100-120v Power Distribution Unit	1U, 100-120V, 12A, mounts in sidewall compartment or EIA space, eight NEMA 5-15R outlets, requires one L5-15R wall receptacle
37L6865	NetBAY Server Dual-cord PDU (US)	1U, 100-240V, 15/10A, mounts in sidewall compartment or EIA space, four IEC 320-C13 outlets, requires two NEMA L5-20R or L6-20R wall receptacles
37L6886	NetBAY 3-phase Front-end PDU (US)	1U, input: 200-250V, 30A, three-phase service, mounts in sidewall compartment, output: three single-phase 115-145V, shared 41A, IEC 320-C19 outlets, requires one NEMA L21-30R wall receptacle
32P1761	DPI 100-127 PDU with Fixed NEMA L5-15P line cord	1U, 100-127v, 12a, single-phase, mounts in sidewall compartment or EIA space, six NEMA 5-15R outlets, requires one L5-15R wall receptacle
32P1736	DPI Universal Rack PDU with NEMA L5-20P and L6-20P (US line cords)	1U, 100-240v, 15a, single-phase, mounts in sidewall compartment or EIA space, seven IEC 320-C13 outlets, requires one NEMA L5-20R or L6-20R wall receptacle
32P1751	DPI 30a/125v Front-end PDU with NEMA L5-30P	1U, 100-127v, 24a, single-phase, mounts in sidewall compartment or EIA space, three IEC 320-C19 outlets, requires one NEMA L5-30R wall receptacle
32P1766	DPI 30a/250v Front-end PDU with NEMA L6-30P	1U, 200-250v, 24a, single-phase, mounts in sidewall compartment or EIA space, three IEC 320-C19 outlets, requires one NEMA L6-30R wall receptacle
32P1767	DPI 60a/250v Front-end PDU with IEC 309 2P+Gnd	1U, 200-250v, 48a, single-phase, mounts in sidewall compartment or EIA space, three IEC 320-C19 outlets, requires one 60a IEC 309 2P+G wall receptacle
32P1020	APC 2U Smart-UPS 1400RMB	2U, 120V, 9.5A, six NEMA 5-15R outlets, requires one NEMA L5-15R wall receptacle
2130R30	UPS3000XLV (US)	2U, 120v, 24a, six IEC C13 outlets, 1 NEMA L5-20R outlet, requires one NEMA L5-20R wall receptacle
2130R31	UPS3000XHV (US)	2U, 200-240v, 14.25a, seven IEC C13 outlets, 1 IEC C19 outlet, requires one NEMA L6-20R wall receptacle
32P1692	UPS Extended Run Battery Pack	2U, up to four may be attached to the UPS3000XLV or XHV to extend run time when using the batteries
37L6861	APC Smart-UPS 5000RMB	5U, 208V, 18.75A, eight IEC 320-C13 outlets, two IEC 320-C19 outlets, requires one NEMA L6-30R wall receptacle; ships standard with two IEC 320-C19 to C20 cables to support PDUs
94G6670	Blank Filler Panel Kit	Consists of one 5U, one 3U, and two 1U blank filler panels
94G7442	Fixed Shelf	Supports up to 100lbs
94G6667	Rack Power Cord -Type A14	IEC 320-C13 to NEMA 5-15P (14ft)
94G7448	Rack Power Cord -Type C12	IEC 320-C13 to IEC 320-C14 (14ft)

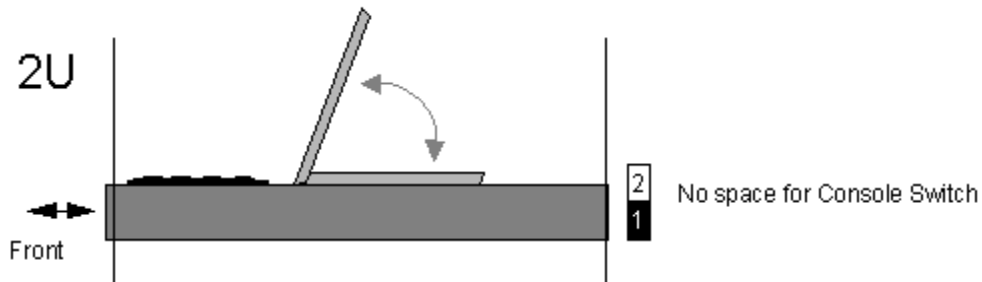
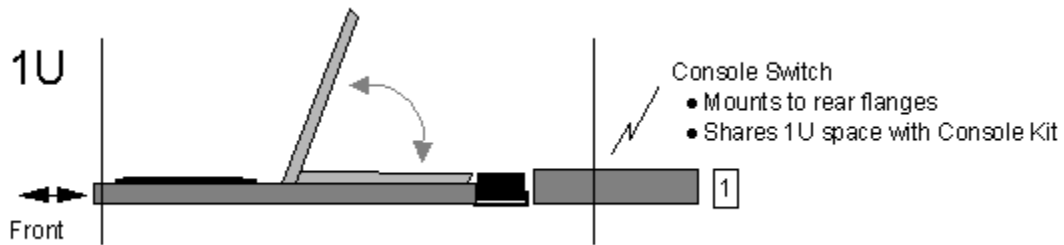
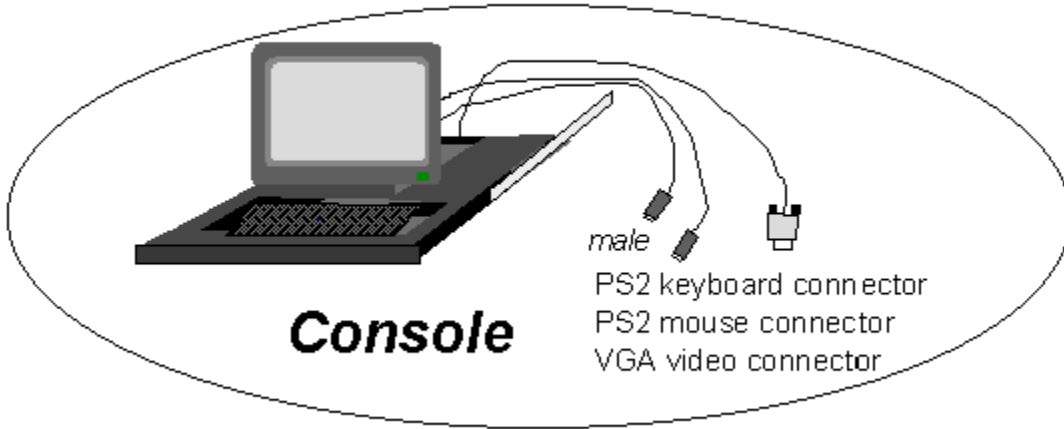


	9306-110 (inches)	9306-xxx (inches)	9308-xxx (inches)	Description
Box Footprint				
A	20.4	236	25.5	Width of rack
B	34.4	39.4	43.5	Depth of rack (not including front stabilizer)
C	21	24	26	Front and rear door clearance (when required)
Operational Clearance				
D	24.4	276	29.5	Width of Operational Clearance area
E	74.4	93.4	110	Depth of Operational Clearance area
F	2	2	2	Left/Right sides of rack to Operational Clearance area
G	30	36	36	Front of rack to Operational Clearance area
H	10	24	26	Rear of rack to Operational Clearance area
Service Clearance				
I	26	95.6	97.5	Width of Service Clearance area
J	78.3	129.4	133.5	Depth of Service Clearance area
K	2.8	36	36	Left/Right sides of rack to Service Clearance area
L	36	60	60	Front of rack to Service Clearance area
M	30	30	30	Rear of rack to Service Clearance area

Rack Console Options

A console consisting of a keyboard, monitor and pointing device is required by each server for system maintenance and support. The console may be local or remote and may be dedicated to a single server or shared across a large array of servers, which requires the use of one or more console switching devices.

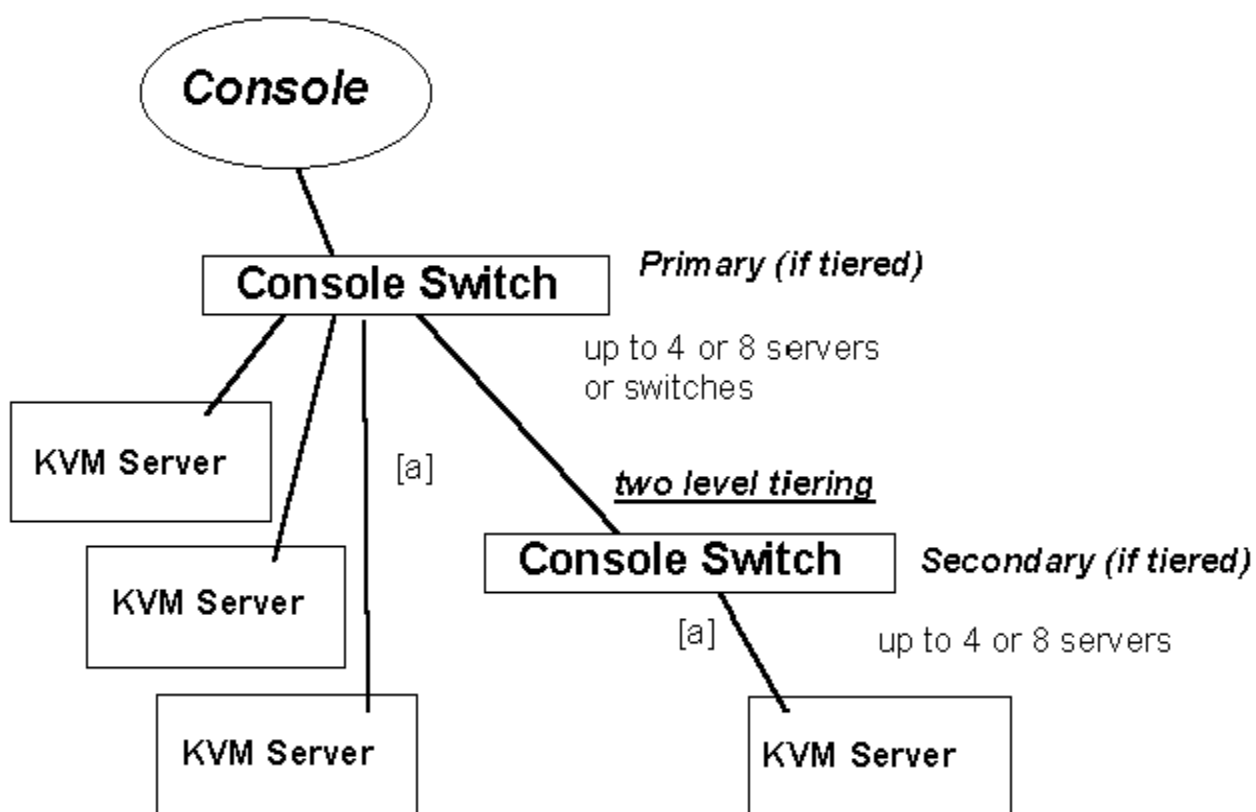
Flat Panel Monitor Console Kits



Multi-server Console Switching

1. Standard PS/2 Keyboard - Video - Mouse (KVM)
2. IBM C2T Interconnect Cable Chaining Technology
3. IBM Advanced Connectivity Technology (ACT)

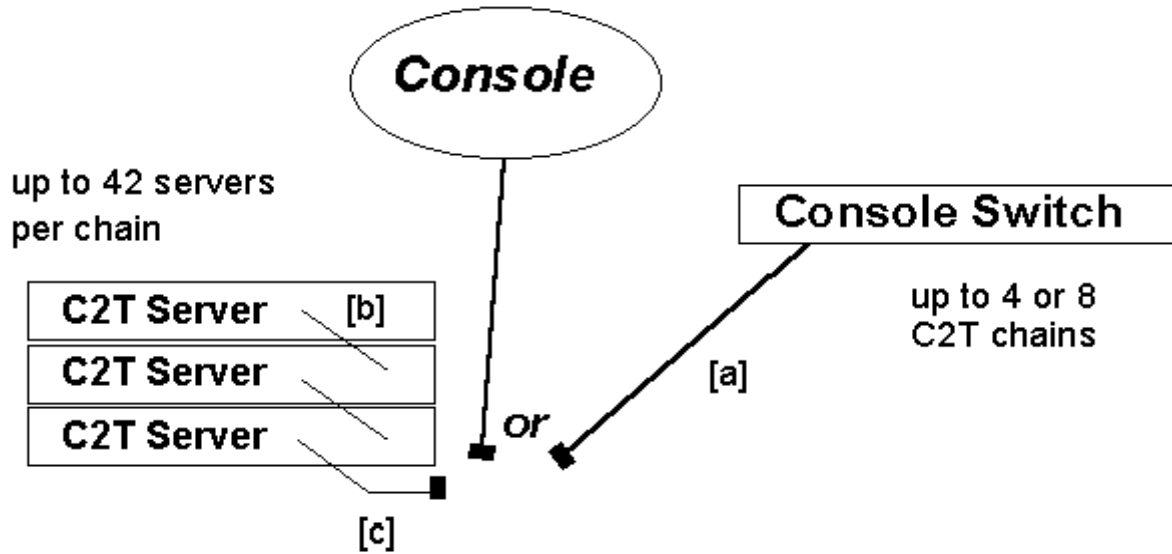
1. PS2 KVM Switching up to 64 servers



Refer to the cable labeling key in the Cable Options table appearing later in this section.

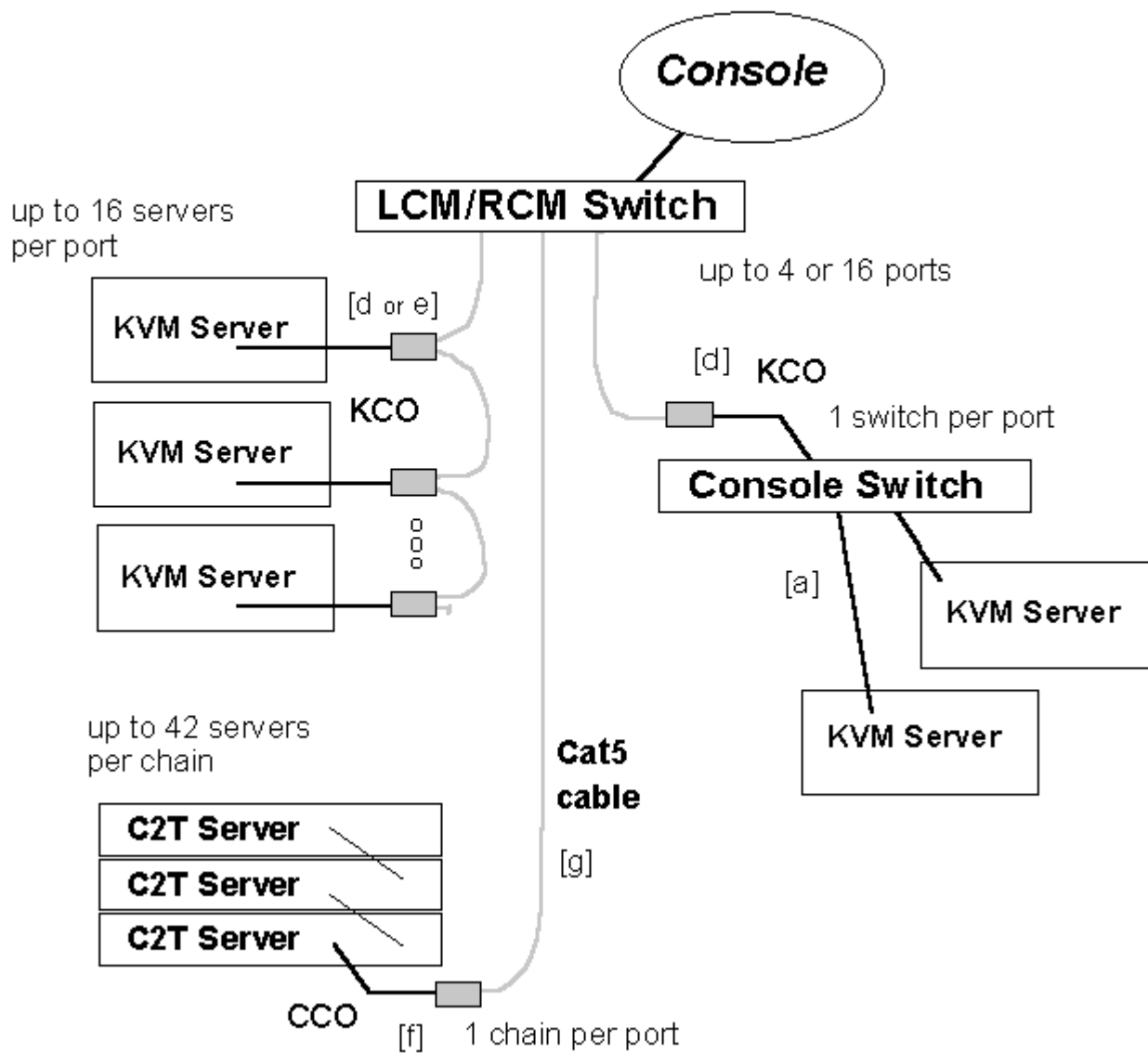
2. C2T Chaining

up to 336 servers



Refer to the cable labeling key in the Cable Options table appearing later in this section.

3. Advanced Connectivity Technology (ACT)





Switch Options																			
Part Number	Description	Type of switch	Ports				Capacity						Standard Parts						
			Type	Qty	Type	Qty	max KVM servers	max USB servers	C2T chains	ACT chains	KVM switches	max KVM servers	local consoles	remote consoles	1U blank filler panel	1.8m Cat5 cable	Cat5 terminator	EIA mounting brackets	side-wall mounting brackets
09N4290	1x4 Console Switch	KVM	PS2	4	PS2	1	4	-	4	0	4	16	1	0	-	-	-	-	1
09N4291	2x8 Console Switch	KVM	PS2	8	PS2	2	8	-	8	0	8	64	2	0	1	-	-	-	1
1735L04	Local Console Manager	ACT	Cat5	4	PS2	1	64	64	64	4	4	32	1	0	1	1	4	1	1
1735R16	Remote Console Manager	ACT	Cat5	16	PS2 LAN	1 1	256	256	256	16	16	128	1	2	1	1	16	1	1

Switch Placement Rules					
Mounting Locations		1x4	2x8	LCM	RCM
monitor shelf \ switch bay		yes	yes	no	no
3U Console \ switch bay		yes	yes	yes	yes
1U Console \ switch bay		yes	yes	yes	no
with (above) 2U console		yes	yes	yes	yes
side-wall compartment		yes	yes	yes	yes
U compartment (EIA space)		no	yes	yes	yes

Cable Options															
Label	Part Number	Description	2.1m KVM cable (PS2 male to PS2 male)	3.8m KVM cable (PS2 male to PS2 male)	260mm C2T chaining cable ⁴ (C2T male to C2T male)	2m C2T chaining cable ⁵ (C2T male to C2T male)	2m C2T breakout cable (C2T male to PS2 female)	250mm KCO cable (PS2 male to RJ45)	1.5m KCO cable (PS2 male to RJ45)	114mm CCO cable (C2T male to RJ45)	1.5m UCO cable (USB, DB15 to RJ45)	150mm Cat5 cable (RJ45 to RJ45)	350mm Cat5 cable (RJ45 to RJ45)	1.8m Cat5 cable (RJ45 to RJ45)	Usage
[a]	09N4293	Console Cable Set - 7ft	1	-	-	-	-	-	-	-	-	-	-	-	servers with PS2 KVM ports ¹
[a]	94G7447	Console Cable Set - 12ft	-	1	-	-	-	-	-	-	-	-	-	-	servers with PS2 KVM ports ¹
[b]	with server	C2T Interconnect chaining cable	-	-	1	-	-	-	-	-	-	-	-	-	(included with x335) ²
[c]	06P4792	C2T Interconnect Cable Kit	-	-	-	1	1	-	-	-	-	-	-	-	x335
[d]	32P1636	short KVM Conversion Option kit	-	-	-	-	-	4	-	-	-	4	-	-	(x305, Console Switch) ³
[e]	32P1652	long KVM Conversion Option kit	-	-	-	-	-	-	4	-	-	-	4	-	servers with cable management arms
[f]	32P1637	C2T Interconnect Conversion Option kit	-	-	-	-	-	-	-	1	-	-	-	1	x330, x335
[g]	73P5832	USB Conversion Option Kit	-	-	-	-	-	-	-	-	4	-	4	-	e325, x382
[h]	-	Cat5 cable	provided with option or by customer												

1. PS2 KVM connectors: keyboard 5-pin DIN, mouse 5-pin DIN, video HD-15 VGA.
 2. C2T Interconnect ports use special connectors.
 3. ACT conversion options convert from PS2 KVM or C2T Interconnect to Cat5 RJ45 connectors.
 4. Short C2T Interconnect chaining cable included standard with the C2T-capable servers.
 5. C2T Interconnect Cable Kit (P/N 06P4792) includes a long C2T chaining cable for use when interconnected servers are farther than three EIA units apart.

Note: KVM switches may be interconnected to form a two-level tier for attaching up to 16, 32 or 64 servers.

xSeries Rack Power Configurator

Rack Power Products

Distributed Power Interface Power Distribution Units

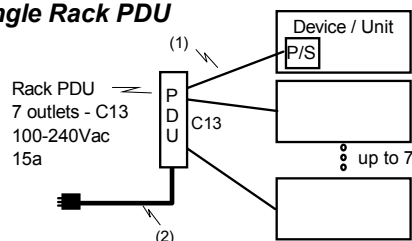
- DPI 100-127v NEMA PDU
- DPI Universal Rack PDU
- DPI Single-phase Front-end PDUs

NetBAY Power Distribution Units

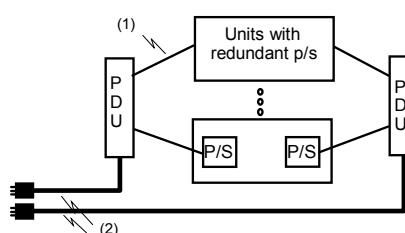
- NetBAY Rack PDU
- NetBAY Server Dual-cord PDU
- NetBAY Single-phase Front-end PDUs
- NetBAY Three-phase Front-end PDU

Possible Power Configurations

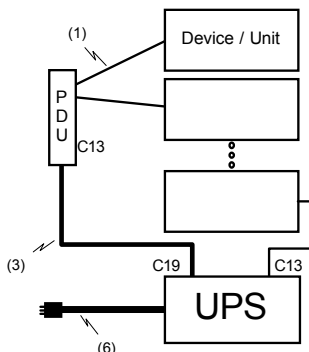
Single Rack PDU



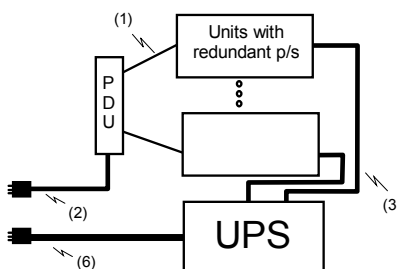
Redundant Power Distribution



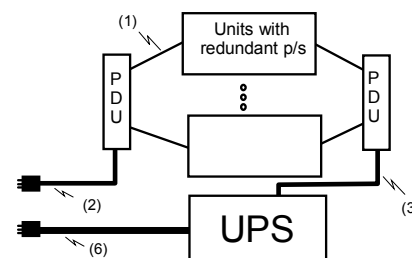
PDU used as UPS back-end



Redundant Power Distribution with PDU and UPS



Redundant Power Distribution with PDU and UPS with PDU



Notes (reference both this and the following page):

- (1) Each device usually comes with a power cord. The PDU requires the power cord to have an IEC 320-C14 plug. Order 94G7448 (14ft) if appropriate cord is not provided with the device.
- (2) Each PDU and UPS comes with a country-specific power cord.
- (3) Internal rack power cable is provided with APC SmartUPS 5000 UPS.
- (4) NetBAY: Three 1m internal rack power cables are provided with front-end PDU.
- (5) DPI: One 2m internal rack power cable provided with rack PDU.
- (6) Line cord provided with front-end PDU.
- (7) UPS comes with a country-specific power cord or a terminal block.
- (8) P/S = Power Supply.
- (9) Includes L5-20P to L5-15R adapter cable.

Customers are responsible for providing a dedicated circuit for each line cord protected with an appropriate circuit breaker.

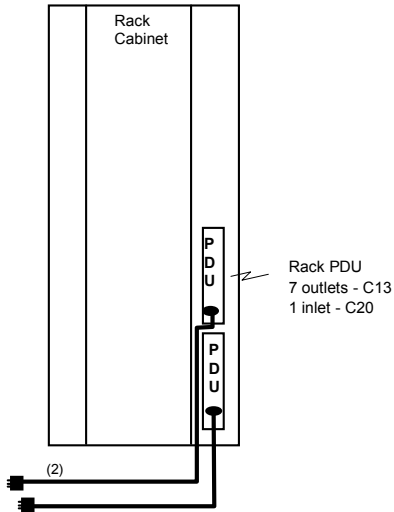
Outlets

Outlets	C19	C13	5-15R
NEMA PDU	0	0	6
Rack PDU	0	7	0
Server PDU	0	4	0
Front-end PDU	3	0	0

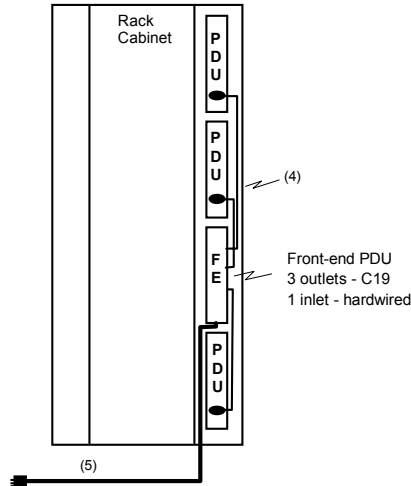
Outlets	US models				EMEA models		
	C19	C13	5-15R	L5-20R	C19	C13	L5-20R
APC1400RM	0	0	6	0	0	4	0
APC 2U 1400RM	0	0	6	0	0	4	0
APC3000RM	0	0	8	0	1	8	0
IBM 3000X LV	0	6	0	1 (8)	0	6	1 (8)
IBM 3000X HV	1	7	0	0	1	7	0
APC5000RM	2	8	0	0	2	8	0

Typical Rack Power Configurations

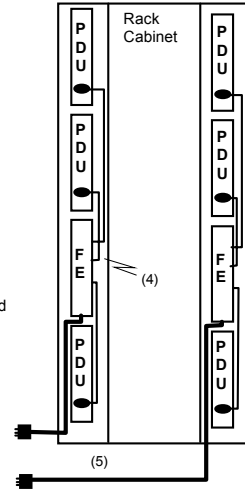
Simple: two Rack PDUs (two circuits, 14 outlets)



Simple: three Rack PDUs and one Front-end PDU (single circuit, 21 outlets)



Redundant: six Rack PDUs and two Front-end PDUs (dual circuit, 42 outlets)



Notes: Refer to notes on previous page.

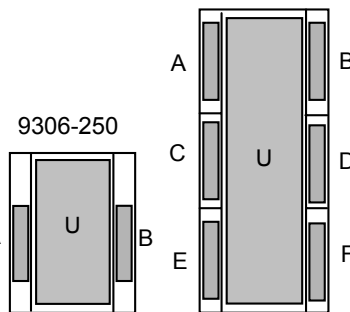
Rack Rules and PDU Capacities

- NetBAY and DPI PDUs cannot be mixed in the same side-wall compartment.
- DPI Rack PDUs can be cabled to NetBAY Front-end PDUs.

PDUs/Rack	Standard		Enterprise		
	9306-250 2-bay	9306-420,421 2-bay	9308 2-bay	9308 3-bay	9308 4-bay
Rack PDUs	4	8	8	8	12
Dual-cord PDUs	3	3	3	3	3
Front-end PDUs	2	4	2	4	4
Total PDUs	4	12	8	12	16

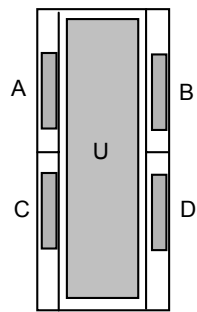
Standard Racks

9306-420, 421

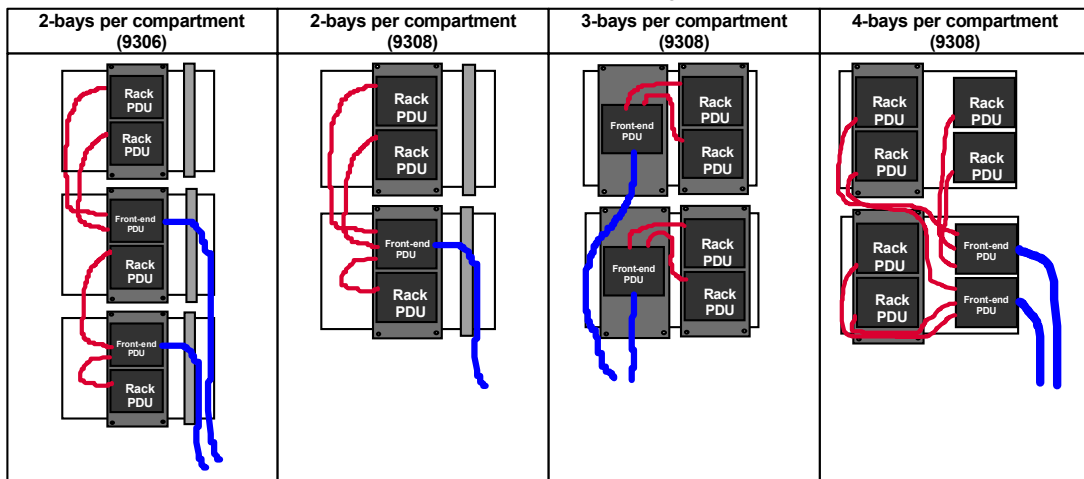


Enterprise Racks

9308-42P, X, S, E



Side-wall Compartment Configurations



Country-Specific Considerations: USA, Canada, parts of Latin America, Taiwan

Power Cables:

- (1) Device to Rack PDU power cable
IEC C13 to C14, 10/15a cable
typical: 36L8896 (2.8m)
requirement: C14 plug, long enough to reach available option: 94G7448 (14ft)
14ft (4.3m)
- (2) Rack PDU to wall line cord
IEC C19 to country-specific connector, 16/20a, 14ft (4.3m)
- (3) Rack PDU to UPS power cable
IEC C19 to C20, 16/20a
00N7700 (2m)
provided with 37L6861 APC SJ-500RMB
- (4) Rack PDU to Front-end PDU power cable
IEC C19 to C20, 16/20a
00N7698 (1m) provided with the NetBAY Front-end PDUs
- (5) Front-end PDU to wall line cord
special to country-specific connector, 30/32a, 60/63a, 8.2ft (2.5m)

(2) Line Cords: Rack PDU

(5) Line Cords: Front-end PDU

DPI PDUs			
Part Number	Plug Type	Source Circuit (single phase 50/60Hz)	PDU Output (single phase 50/60Hz)
32P1761	NEMA L5-15P	100-127Vac, 15a	six 100-127Vac, NEMA 5-15R receptacles, shared 12a
32P1736	NEMA L5-20P	100-127Vac, 20a	seven 100-127Vac, shared 15a
	NEMA L6-20P	200-240Vac, 20a	seven 200-240Vac, shared 15a

Part Number	Plug Type	Source Circuit (50/60Hz)	PDU Output (single phase 50/60Hz)
32P1751	NEMA L5-30P	100-127Vac, 30a, single-phase	three 100-127Vac, 20a each, shared 24a
32P1766	NEMA L6-30P	200-240Vac, 30a, single-phase line-to-line with ground	three 200-240Vac, 20a each, shared 24a
32P1767	IEC 309-2P+G	200-240Vac, 60a, single-phase line-to-line with ground	three 200-240Vac, 20a each, shared 48a

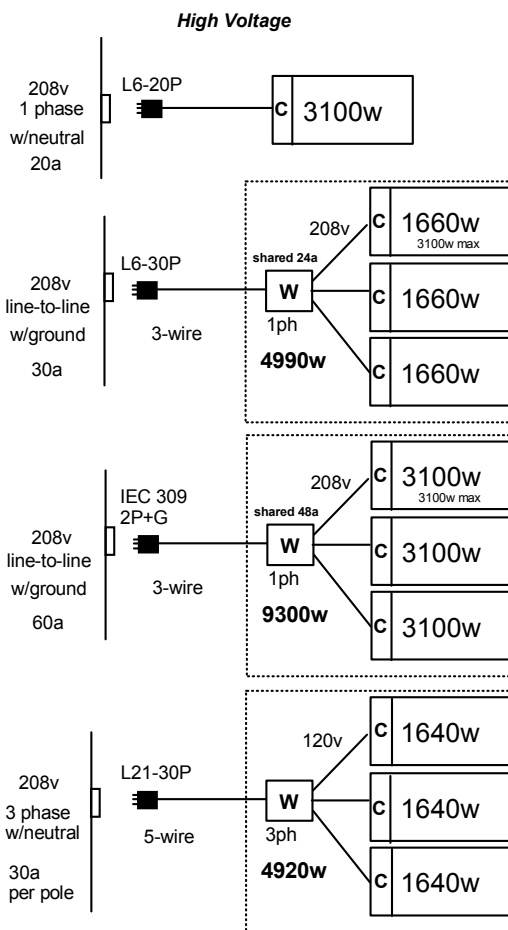
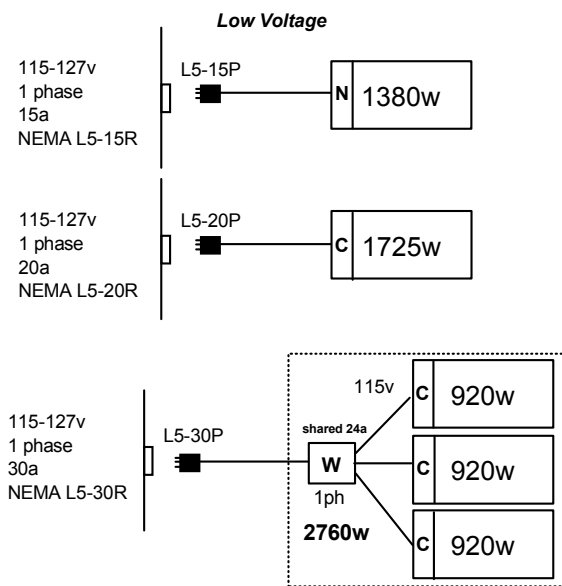
NetBAY PDUs			
Part Number	Plug Type	Source Circuit (single phase 50/60Hz)	PDU Output (single phase 50/60Hz)
37L6866	NEMA L5-20P	100-127Vac, 20a	seven 100-127Vac, shared 15a
	NEMA L6-20P	200-240Vac, 20a	seven 200-240Vac, shared 15a

Part Number	Plug Type	Source Circuit (50/60Hz)	PDU Output (single phase 50/60Hz)
37L6883	NEMA L5-30P	100-127Vac, 30a, single-phase	three 100-127Vac, 20a each, shared 24a
37L6884	NEMA L6-30P	200-240Vac, 30a, single-phase line-to-line with ground	three 200-240Vac, 20a each, shared 24a
73P6790	IEC 309-2P+G	200-240Vac, 60a, single-phase line-to-line with ground	three 200-240Vac, 20a each, shared 48a
37L6886	NEMA L21-30P	200-250Vac, 30a, three-phase Y-connection with neutral	three 100-127Vac (115-145), 20a each, shared 41a

Power Load Capacity

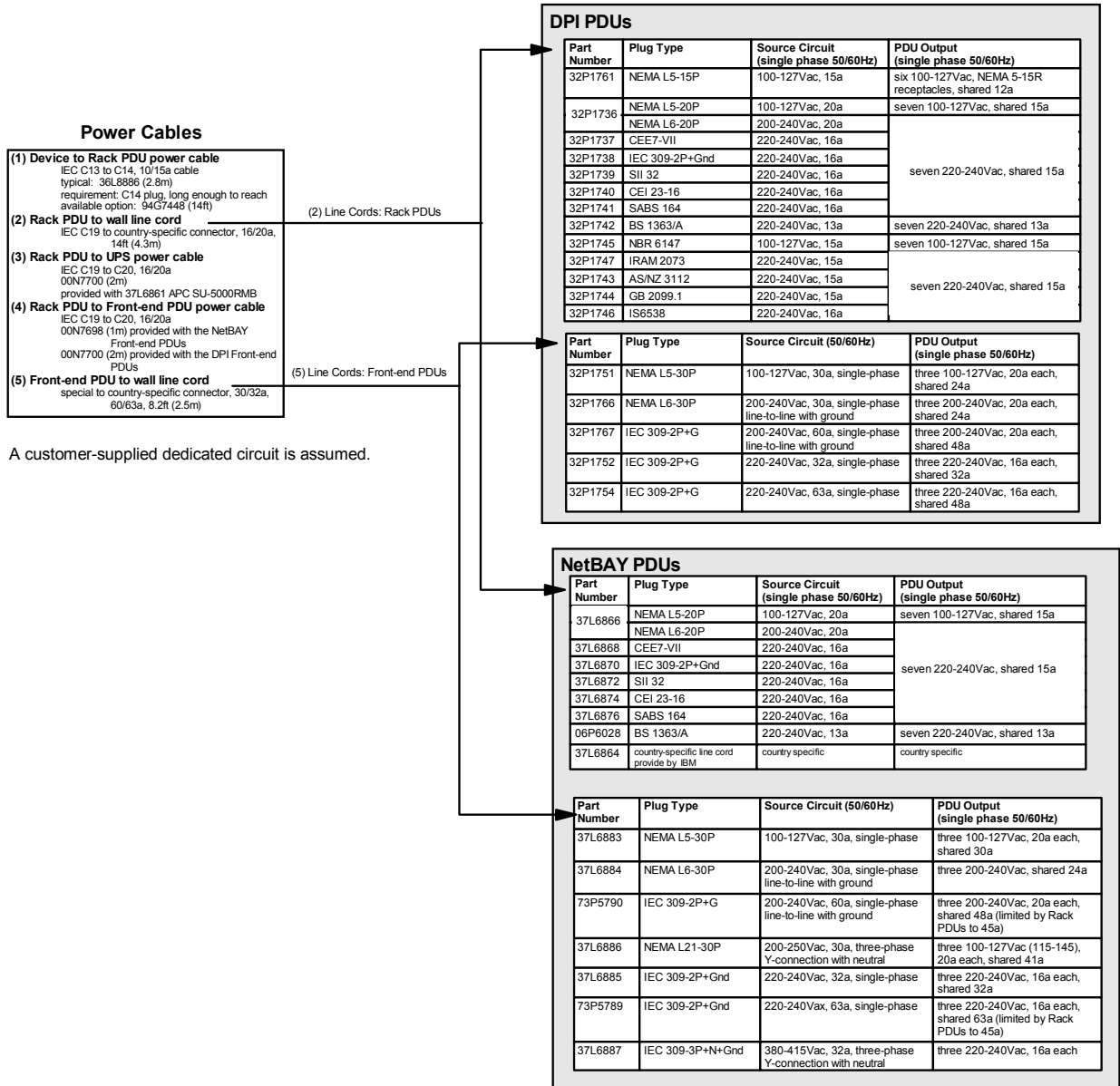
Notes:

- N = NEMA PDU with a 12a circuit breaker
- C = Rack PDU with a 15a circuit breaker
- W = FE PDU with a 20a fuse per outlet
- Max leakage current > 3.5ma
- A customer-supplied dedicated circuit is assumed.
- Actual power values (watts) may vary based on actual source voltage.





Country-Specific Considerations: Europe, Mid-East, Africa, Asia Pacific, parts of Latin America



Country-Specific Considerations: Europe, Mid-East, Africa, Asia Pacific, parts of Latin America

Power Load Capacity

Notes:

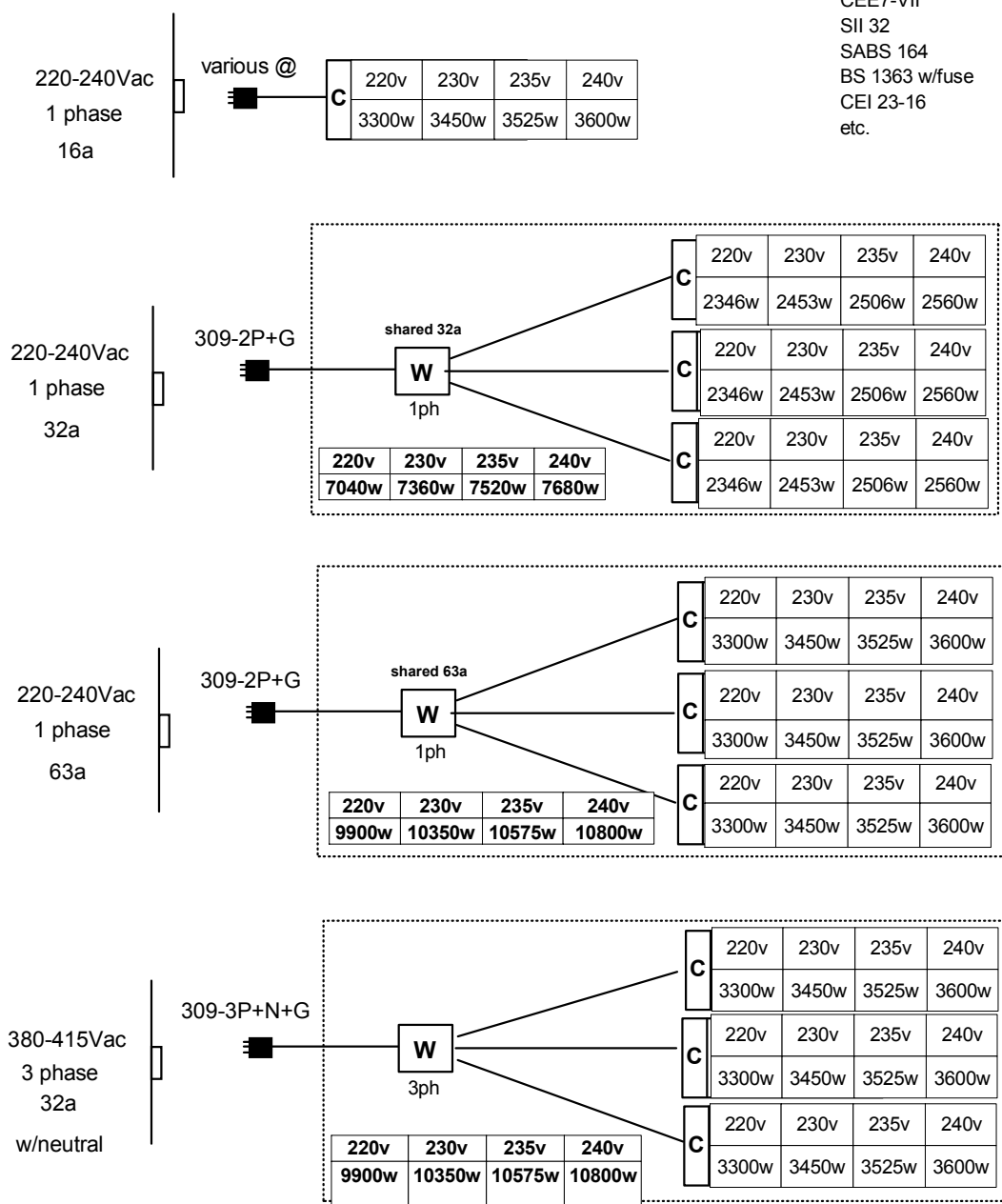
C = Rack PDU with a 15a circuit breaker

W = FE PDU with a 20a fuse per outlet

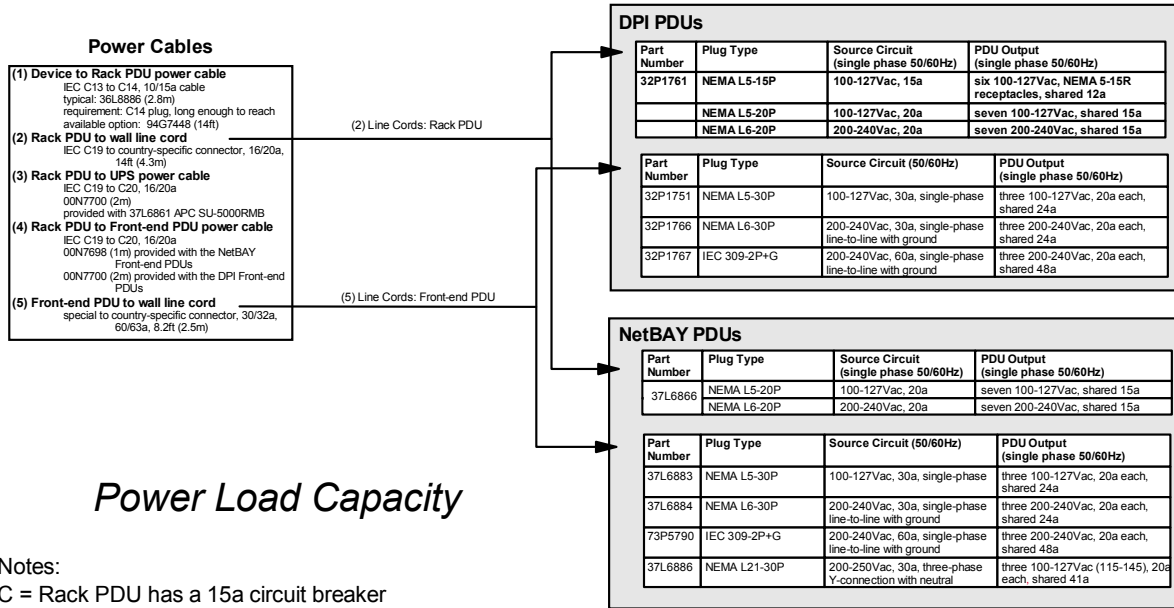
Actual power values (watts) may vary based on actual source voltage.

A customer-supplied dedicated circuit is assumed.

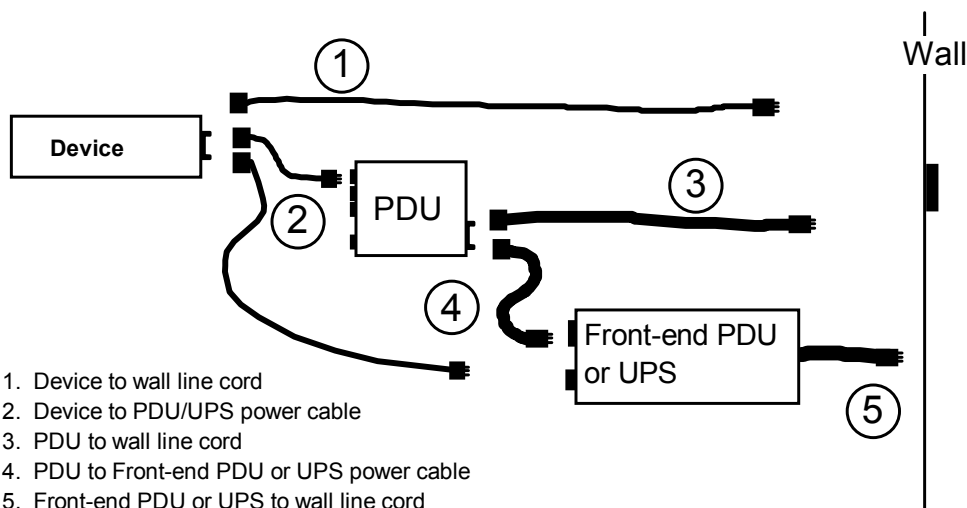
@ country specific:
IEC 309-2P+G
CEE7-VII
SII 32
SABS 164
BS 1363 w/fuse
CEI 23-16
etc.



Country-Specific Considerations: Japan



Rack PDU Power Cables



PDU Power Cord Plug Types

A	B	C	D	E	
IEC 320-C13/C14 250Vac/10a WW - intra-rack	IEC 320-C19/C20 250Vac/16a WW - intra-rack	IEC 309 2P+G 32a single-phase	IEC 309 2P+G 60a/62a single-phase	IEC 309 3P+N+G 32a three-phase	
F	G	H	I	J	K
NEMA 5-15P 125Vac/15a North America	NEMA L5-20P 125Vac/20a single-phase North America	NEMA L5-30P 125Vac/30a single-phase North America	NEMA L6-20P 250Vac/20a single-phase North America	NEMA L6-30P 250Vac/30a single-phase North America	NEMA L21-30P 250Vac/30a three-phase North America
N	O	P	Q	R	S
CEE7-VII 250Vac/16a Europe (other)	IEC 309 2P+G 250Vac/16a Denmark	SI32 250Vac/16a Israel	CEI 23-16 250Vac/16a Italy	SABS 164 250Vac/16a South Africa	BS 1363/A w/ fuse 250Vac/13a UK
T	W				
AS/NZ 3112 250Vac/15a Australia / New Zealand	special Burndy connector 				

Note: Match letters with Key columns in the following chart to identify power cables with these plug types.

PDU Power Cables



	Option Part Number	Cable Part Number	Plug Type	Key	Plug Type	Key	Rating (a/v)	Cable Length (m/ft)	Country / Comments
Rack PDUs									
DPI 100-127v NEMA PDU (US)	32P1761	---	hardwired	--	NEMA L5-15P		15a/125v	2.8m/9ft	US, Canada, Mexico; includes one 00N7700
DPI Universal Rack PDU (US)	32P1736	12J5117	IEC 320 C19	B	NEMA L5-20P	G	18a/125v	4.3m/14ft	US, Canada, Mexico; includes one 00N7700
		14F1553	IEC 320 C19	B	NEMA L6-20P	I	18a/250v	4.3m/14ft	
DPI Universal Rack PDU (Argentina)	32P1747	36L8885	IEC 320 C19	B	IRAM 2073	L	15a/250v	4.3m/14ft	Argentina; includes one 00N7700
DPI Universal Rack PDU (Brazil)	32P1745	49P2115	IEC 320 C19	B	NBR 6147	M	15a/125v	4.3m/14ft	Brazil; includes one 00N7700
DPI Universal Rack PDU (Europe)	32P1737	14F1554	IEC 320 C19	B	CEET-VII	N	16a/250v	4.3m/14ft	Europe (other); includes one 00N7700
DPI Universal Rack PDU (Denmark)	32P1738	36L8823	IEC 320 C19	B	IEC 309 2P+Gnd	O	16a/250v	4.3m/14ft	Denmark; includes one 00N7700
DPI Universal Rack PDU (Israel)	32P1739	14F1561	IEC 320 C19	B	SI 32	P	16a/250v	4.3m/14ft	Israel; includes one 00N7700
DPI Universal Rack PDU (Italy)	32P1740	14F1560	IEC 320 C19	B	CEI 23-16	Q	16a/250v	4.3m/14ft	Italy; includes one 00N7700
DPI Universal Rack PDU (South Africa)	32P1741	14F1557	IEC 320 C19	B	SABS 164	R	16a/250v	4.3m/14ft	South Africa; includes one 00N7700
DPI Universal Rack PDU (UK)	32P1742	12J5988	IEC 320 C19	B	BS 1363/A w/fuse	S	13a/250v	4.3m/14ft	UK; includes one 00N7700
DPI Universal Rack PDU (Australia/NZ)	32P1743	14F1559	IEC 320 C19	B	AS/NZ 3112	T	15a/250v	4.3m/14ft	Australia/New Zealand; includes one 00N7700
DPI Universal Rack PDU (China)	32P1744	01K9852	IEC 320 C19	B	GB 2099.1	U	15a/250v	4.3m/14ft	China; includes one 00N7700
DPI Universal Rack PDU (India)	32P1746	49P2083	IEC 320 C19	B	IS6538	V	16a/250v	4.3m/14ft	India; includes one 00N7700
NetBAY Rack PDU	37L6864	---	---	---	---	---	---	---	without line cord; PDU has C20 inlet
NetBAY Rack PDU (US)	37L6866	12J5117	IEC 320 C19	B	NEMA L5-20P	G	18a/125v	4.3m/14ft	US, Canada, Mexico
		14F1553	IEC 320 C19	B	NEMA L6-20P	I	18a/250v	4.3m/14ft	
NetBAY Rack PDU (Europe)	37L6868	14F1554	IEC 320 C19	B	CEET-VII	N	16a/250v	4.3m/14ft	Europe (other)
NetBAY Rack PDU (Denmark)	37L6870	36L8823	IEC 320 C19	B	IEC 309 2P+Gnd	O	16a/250v	4.3m/14ft	Denmark/Switzerland
NetBAY Rack PDU (Israel)	37L6872	14F1561	IEC 320 C19	B	SI 32	P	16a/250v	4.3m/14ft	Israel
NetBAY Rack PDU (Italy)	37L6874	14F1560	IEC 320 C19	B	CEI 23-16	Q	16a/250v	4.3m/14ft	Italy
NetBAY Rack PDU (South Africa)	37L6876	14F1557	IEC 320 C19	B	SABS 164	R	16a/250v	4.3m/14ft	South Africa
NetBAY Rack PDU (UK)	06P6028	12J5988	IEC 320 C19	B	BS 1363/A	S	13a/250v	4.3m/14ft	UK
NetBAY Rack PDU (Australia/NZ)	24P7884	14F1559	IEC 320 C19	B	AS/NZ 3112	T	15a/250v	4.3m/14ft	Australia/New Zealand
Front-end PDUs									
DPI Single-phase 30a Front-end PDU - LV (US)	32P1751	74P4314	Burndy	W	NEMA L5-30P	H	30a/125v	2.8m/9ft	US, Canada, Mexico
DPI Single-phase 30a Front-end PDU - HV (US)	32P1766	74P4312	Burndy	W	NEMA L6-30P	J	30a/208v	2.8m/9ft	US, Canada, Mexico
DPI Single-phase 60a Front-end PDU - HV (US)	32P1767	74P4313	Burndy	W	IEC 309 2P+Gnd	D	60a/208v	2.8m/9ft	US, Canada, Mexico
DPI Single-phase 32a Front-end PDU - HV (I)	32P1752	74P4315	Burndy	W	IEC 309 2P+Gnd	C	32a/250v	2.8m/9ft	International
DPI Single-phase 63a Front-end PDU - HV (I)	32P1754	74P4311	Burndy	W	IEC 309 2P+Gnd	D	63a/250v	2.8m/9ft	International
NetBAY Single-phase 30a Front-end PDU - LV (US)	37L6883	00N7722	Molex special	--	NEMA L5-30P	H	20a/127v	2.5m/8ft	US, Canada, Mexico; includes three 00N7698
NetBAY Single-phase 30a Front-end PDU - HV (US)	37L6884	00N7723	Molex special	--	NEMA L6-30P	J	20a/240v	2.5m/8ft	US, Canada, Mexico; includes three 00N7698
NetBAY Single-phase 60a Front-end PDU - HV (US)	73P5790	74P4317	Molex special	--	IEC 309 2P+Gnd	D	60a/250v	2.5m/8ft	US, Canada, Mexico; includes three 00N7698
NetBAY Three-phase Front-end PDU - LV (US)	37L6886	00N7720	Molex special	--	NEMA L21-30P	E	20a/208v	2.5m/8ft	US, Canada, Mexico; includes three 00N7698
NetBAY Single-phase 32a Front-end PDU - HV (I)	37L6885	49P2046	Molex special	--	IEC 309 2P+Gnd	C	16a/240v	2.5m/8ft	International; includes three 00N7698
NetBAY Single-phase 63a Front-end PDU - HV (I)	73P5789	74P4318	Molex special	--	IEC 309 2P+Gnd	D	63a/250v	2.5m/8ft	International; includes three 00N7698
NetBAY Three-phase Front-end PDU - HV (I)	37L6887	00N7721	Molex special	--	IEC 309 3P+N+G	E	26a/415v	2.5m/8ft	International; includes three 00N7698
Power Cables									
Rack Power Cable Type A14 option	94G6667	13F9961	IEC 320 C13	A	NEMA 5-15P	C	10a/125v	4.3m/14ft	US, Canada, Mexico
Rack Power Cable Type C12 option	94G7448	36L8861	IEC 320 C13	A	IEC 320-C14	A	10a/250v	4.3m/14ft	Worldwide
		24P7469	36L8860	IEC 320 C13	A	IEC 320-C14	A	10a/250v	
1m IEC power cable	---	00N7698	IEC 320 C19	B	IEC 320-C20	B	16a/250v	1m/3.3ft	Worldwide
2m IEC power cable	---	00N7700	IEC 320 C19	B	IEC 320-C20	B	16a/250v	2m/6.5ft	Worldwide
Power Cord Extension option	24P7864	11F0114	NEMA L6-30R	J	NEMA L6-30P	J		1.8m/6ft	US, Canada, Mexico
Power Cord Extension option	24P7887	21H7693	IEC 309 2P+G	C,D	IEC 309 2P+G	C,D		1.8m/6ft	International
Power Cord Extension option	24P7888	88G4764	IEC 309 3P+N+G	E	IEC 309 3P+N+G	E		1.8m/6ft	International

Note: US = United States, I = International, LV = Low Voltage (100-127Vac), HV = High Voltage (200-250Vac)
 NEMA = National Electrical Manufacturers Association, IEC = International Electrotechnical Commission
 (Use letters in Key columns to match plug types on the following PDU Power Cord Plug Types chart.)

Appendix A: Tape Drive Attributes

LEGEND

FH = Full-high - approximate height 81mm/3.2in
 HH = Half-high - approximate height 41mm/1.6in
 SL = Slim-line - approximate height 25mm/1in

Part Number	Description	SCSI Interface (bit)	Form Factor	Max storage (GB)-Native/Compressed ²	MB/sec - Native/Compressed ²	Termination Included	Internal Cables	Data/Cleaning Cartridges Included	Ext Tape Enclosures ¹
Tape Drives									
48P7042	20/40GB TR7 Internal IDE Tape Drive	-	89mm (3.5in) SL or 133mm (5.25in) HH	20/40	2/4	-	-	1/1	-
00N7991	20/40GB DDS/4 4mm Internal Tape Drive	16 Ultra2 LVD	89mm (3.5in) HH or 133mm (5.25in) HH	20/40	2.75/5.5	Y ⁹	34in LVD	1/1	3510020 ⁴ , 3551001 ³ , 0034B0X
00N8016	100/200GB LTO Tape Drive	16 Ultra2 LVD	133mm (5.25in) FH	100/200	15/30	Y ⁹	34in LVD	1/1	3551001 ³ , 3503B1X, 0034B0X
24P2396	100/200GB LTO Half-High Tape Drive ^{14, 15}	16 Ultra2 LVD	133mm (5.25in) HH	100/200	8/16	Y ⁹	34in LVD	1/1	3551001 ³ , 3510020 ⁴ , 0034B0X
24P2398	40/80GB Half-High DLTVS Internal SCSI Tape Drive ¹⁵	16 Ultra2 LVD	133mm (5.25in) HH	40/80	3/6	Y ⁹	34in LVD	1/1	3551001 ³ , 3510020 ⁴ , 0034B0X
59P6736	160/320GB SDLT Tape Drive	16 Ultra2 LVD	133mm (5.25in) FH	160/320	16/32	Y ¹⁰	34in LVD	1/1	0034B0X, 3503B1X
59P6746	VXA-2 80/160GB Tape Drive	16 Ultra2 LVD	133mm (5.25in) HH	80/160	6/12	Y ¹⁰	34in LVD	1/1	0034B0X, 3510020 ⁴
59P6744	LTO FH Generation-2 Tape Drive Option	16 Ultra2 LVD	133mm (5.25in) FH	200/400	35/70	Y ¹⁰	34in LVD	1/1	0034B0X, 3503B1X
Associated Options									
00N7956	68-pin External Multimode LVD/SE SCSI Terminator	16 LVD/SE	External	-	-	Y	-	-	3510020
Tape Autoloaders									
00N7992	120/240GB DDS/4 Tape Autoloader	16 Ultra2 LVD	133mm (5.25in) FH	120/240	3/6	Y ⁹	-	5/1	3551001, 3503B1X, 0034B0X
360716X	3607 Series 1760GB/1.8TB SDLTpro Tape Autoloader	16 Ultra2 LVD	2U Rack	1.76TB/3.52TB	11/22	Y	-	1/1	-
360726X	3607 Series 1.6TB/3.2TB LTO Tape Autoloader	16 Ultra2 LVD	2U Rack	1.6TB/3.2TB	15/30	Y	-	1/1	-
External Tape Enclosures									
0034B0X	NetBAY Tape Enclosure (Rack Mount) ⁵	16 Ultra2 LVD	4U Rack	-	-	N	-	1/1	-
3510020	External Half High SCSI Storage Enclosure ⁶	16 Ultra2 LVD	Desktop	-	-	N	16-bit	-	-
3503B1X	Full-High SCSI Tape Enclosure ⁷	16 Ultra2 LVD	Desktop or 3U Rack	-	-	Y	16-bit	-	-
External Tape Libraries⁸									
3570C2x	Magstar MP 3570 Tape Subsystem	HVD	6U Rack	100/300	22/6 or 7/15	Y	-	1/1	-
4560SLX	SDLT/LTO Modular Tape Library	16 Ultra2 LVD	5U Rack	4.16TB/8.32TB (all SDLT); 3TB/6TB (all LTO) ¹²	16/32 (all SDLT); 15/30 (all LTO) ¹³	Y	-	0/0 ¹⁴	-

1. To determine cable requirements, note the tape drive's SCSI interface, the appropriate SCSI controller from the system configurator section and the desired enclosure then refer to Appendix D: Cables - Storage Units - Controllers. For installation of an internal tape drive into a server, see the appropriate system section.

2. Data compression typically provides a 2X improvement in capacity and transfer rate, but since data compression is affected by many factors, actual improvements may be more or less than 2X.

3. LVD support for LVD tape drives installed in a NetMEDIA Storage Expansion Unit EL (P/N 3551001) is provided by replacing one or both of the internal four-drop single-ended terminated cables with FRU #71P9209, which includes a VHDCI external connector and four-drop terminated LVD SCSI internal cable.

4. Requires 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956).

5. NetBAY Tape Enclosure (P/N 0034B0X) is a 4U rack-mounted enclosure that supports four full-high or six half-high tape drives. The backplate includes six 0.8mm VHDCI external connectors for attachment of up to six servers. Internal connection of tape drives requires the single-drop terminated LVD SCSI cable that ships with the tape drive, which also provides termination for the SCSI bus. A single 320w power supply with a low voltage power cord is standard. An external SCSI storage cable is not provided. Refer to Appendix D: Cables - Storage - Controllers to select a supported cable.

6. Black desktop tape enclosure that supports a single 133mm (5.25in) half-high (HH) tape drive. Internal and external connectors are 68-pin high-density supporting LVD. Requires 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956). External cables are not included. Refer to Appendix D: Cables - Storage Units - Controllers to select a supported cable.



7. Black desktop or 3U rack tape enclosure supports a single 133mm (5.25in) full-high LVD tape device including DLT tape drives. Requires a fixed shelf if installed in a rack (allow additional 1U for fixed shelf). Includes a 90w power supply, cooling fan, external terminator, power cord (country-specific), and 2m 68-pin to 0.8mm external cable.
8. Tape library attributes and prerequisites are located in Appendix B: Tape Library Attributes.
9. Termination requires installing the 34in single-drop, terminated LVD SCSI cable provided with the option. When installed in a NetMEDIA Storage Expansion Unit, termination is also provided by the standard cables shipped with the enclosure.
10. Termination requires installing the 34in single-drop, terminated LVD SCSI cable provided with the option.
11. 4560 Automation Tape Enclosure Library supports either LTO or SDLT (or both if the application software supports mixed media and the drives and magazines are matched). Up to eight units can be stacked. Two magazines and two drive sleds can be installed in each unit. An external LVD SCSI cable with 0.8mm VHDCI connectors at each end ships standard with the library unit. A single 300w power supply with an IEC 320-C13 to NEMA 5-15P low voltage power cord is standard.
12. Data transfer speed is rated separately for LTO and SDLT media. Compressed speed may be less than the maximum rate provided.
13. LTO and SDLT data cartridges are not provided standard. Cleaning cartridges are shipped standard with LTO and SDLT drive sleds.
14. This tape drive must be shipped separately as an option and installed at a customer site. Factory or vendor installation prior to shipping is not supported.
15. Supported only in new builds of External Half-High SCSI Storage Enclosure (P/N 3510020), indicated by AI Header J1PJK on the outside box label of the tape enclosure.

Appendix B: Tape Library Attributes

SCSI Interface and Cable Legend

M: Male - External
 68: 16-bit, 68-pin High Density connector
 0.8: 16-bit, 68-pin Very High Density Connection Interface (VHDCI) 0.8mm connector
 SE: Single-ended SCSI
 HVD: High Voltage Differential SCSI
 LVD: Low Voltage Differential SCSI

Part Number	Description	SCSI Interface	Form Factor	Terminator Included	Ext Cables Incl (length)	SCSI Controllers Incl	Data Cartridges std/max	Cleaning Cartridges std	Cartridge Mags std/max	Qty of drives - std/max	Max storage-Native/Compressed	MB/sec - Native/Compr ¹
4560 Automation Tape Enclosure Library												
4560SLX	SDLT / LTO Modular Tape Library (5U rack) ²	LVD	5U Rack	Y	M0.8-M0.8 (4m)	N	0/30 (LTO only); 0/26 (SDLT only)	-	0/2	0/2	4.16TB/8.32TB (all SDLT); 3TB/6TB (all LTO) ⁹	16/32 (all SDLT); 15/30 (all LTO) ⁹
59P6657	Modular Fibre Channel Option ³	LVD	-	-	M0.8-M0.8 (0.5m)	-	-	-	-	-	-	-
59P6658	Modular LTO Drive Upgrade Option ⁴	LVD	-	-	Jumper (0.5m)	N	-	1	-	-	-	15/30 ⁹
59P6659	Modular LTO Cartridge Magazine Option ⁵	LVD	-	-	-	-	0/15	-	-	-	3TB/6TB ⁹	-
59P6660	Modular SDLT Drive Upgrade Option ⁴	LVD	-	-	Jumper (0.5m)	N	-	1	-	-	-	16/32 ⁹
59P6661	Modular SDLT Cartridge Magazine Option ⁶	LVD	-	-	-	-	0/13	-	-	-	4.16TB/8.32TB ⁹	-
59P6662	Modular Elevator Link Option ⁷	LVD	-	-	-	-	-	-	-	-	-	-
59P6663	Modular Elevator Link Extension Option ⁸	LVD	-	-	-	-	-	-	-	-	-	-
08L9120	LTO Data Cartridge	LVD	-	-	-	-	-	-	-	-	100GB/200GB	-
35L1119	SDLT Data Cartridge	LVD	-	-	-	-	-	-	-	-	160GB/320GB	-
Magstar Tape Systems												
3570C21	Magstar MP 3570 Tape Subsystem ¹⁰	HVD	6U Rack	Y	(4.5m)	Y	1/20	1	2/2	1/2	100GB/300GB	7/15
3570C22	Magstar MP 3570 Tape Subsystem ¹⁰	HVD	6U Rack	Y	(4.5m)	Y	1/20	1	2/2	2/2 ¹⁵	100GB/300GB	7/15
08L6517	3570 Adapter Card Kit ¹¹	HVD	-	Y	(4.5m)	Y	-	-	-	-	-	-
08L6480	Second "C" Drive for C21 ¹²	HVD	-	-	-	N	-	-	-	-	-	7/15
Magstar MP Media¹³												
05H2462	Magstar MP Fast Access Linear Tape Cartridge, B-format ¹⁴	-	-	-	-	-	-	-	-	-	-	-
05H2463	Magstar MP Cleaning Cartridge	-	-	-	-	-	-	-	-	-	-	-
08L6187	Magstar MP Fast Access Linear Tape Cartridge, C-format	-	-	-	-	-	-	-	-	-	-	-

1. Transfer rates are for single SCSI channel configurations. Tape libraries utilizing split library or dual host configurations may obtain higher rates. Data compression typically provides a 2X improvement in capacity and transfer rate, but since data compression is affected by many factors, actual improvements may be more or less than 2X.
 2. SDLT/LTO Tape Library supports either LTO or SDLT (or both if the application software supports mixed media and the drives and magazines are matched). Up to eight units can be stacked. Two magazines and two drive sleds can be installed in each unit. An external LVD SCSI cable with 0.8mm VHDCI connectors at each end ships standard with the library unit. A single 300w power supply with an IEC 320-C13 to NEMA 5-15P low voltage power cord is standard. Attaches to a single host server using a SCSI connection or to either a Fibre Channel switch or single server through a Fibre Channel connection if a Modular Fibre Channel Option is installed.
 3. Ships with external LVD SCSI cable with 0.8mm VHDCI connector for connection to the tape drive. Requires a short- or long-wave SFP Module (P/N 19K1271, 2) for connection to Fibre Channel cable. Supports three to four drive sleds (or two layers) only. Fibre Channel attachment includes either a single server using a FC2-133 Host Bus Adapter or a Fibre Channel switch.
 4. Ships with external LVD SCSI cable. Supported configurations are none, one or two drives. When a drive sled is not installed, the library unit must be cabled to another unit that contains at least one drive upgrade option. The Modular LTO Drive Upgrade Option includes one LTO Cleaning Cartridge (P/N 08L9124) and the Modular SDLT Drive Upgrade Option includes one SDLT Cleaning Cartridge (P/N 19P4357).
 5. One or two magazines are supported. Up to 15 tape data cartridges (P/N 08L9120) are supported in each magazine.
 6. One or two magazines are supported. Up to 13 tape data cartridges (P/N 35L1119) are supported in each magazine.
 7. Required to connect two library units.
 8. Required to connect each additional library unit (from three through eight).
 9. Data transfer speed and capacity are rated separately for LTO and SDLT media. Compressed speed and data capacity may be less than the maximum indicated.
 10. Includes rack mounting hardware and two power cords (120V and 250V). Models B22 and C22 include an additional two power cords.
 11. Required for Dual Host or Split Library configurations with 3570B2x or 3570C2x containing two drives.
 12. Required for either dual host or split library operation. Should be installed by qualified service personnel.
 13. Magstar MP Media can be ordered by calling 888-IBM-MEDIA or 888-426-6334 in the US, Canada, or Puerto Rico.
 14. B-format tape cartridges can be used in either Magstar MP 3570 Model B or C tape drives.
 15. The two tape drives are daisy-chained on the same SCSI bus with an included 0.5m SCSI cable. Dual Host and Split Library configurations require 3570 Adapter Card Kit (P/N 08L6517).



Appendix C: UPS Runtime Estimate (minutes)

Servers	# Pwr Cords Std/Max	Watts Load Typ/Max¹
xSeries 205 ²	1/1	340/485
xSeries 225 (single power supply) ²	1/1	420/600
xSeries 225 (redundant power supplies) ²	2/2	350/500
xSeries 235 ²	1/2	560/800
xSeries 255 (two power supplies) ²	2/2	370/530
xSeries 255 (four power supplies) ²	2/2	530/1000
xseries 305 ²	1/1	140/200
xSeries 335 ²	1/1	245/340
xSeries 345 ²	1/2	350/500
xSeries 360 ²	2/3	520/740
xSeries 440 ²	2/2	800/950
xSeries 445 ²	2/2	800/950
xSeries 450 ²	2/2	800/950
Other Devices		
RXE-100 (8684-1RX) ²	2/2	260/370
EXP300 Storage Expansion Unit (35311RU) ²	2/2	285/360
FAST200 Storage Server (35421RU) ²	2/2	275/390
FAST200 HA Storage Server (35422RU) ²	2/2	275/390
FAST600 Storage Server (172260U) ²	2/2	390/557
FAST700 Storage Server (17421RU) ²	2/2	275/390
FAST900 Storage Server (174290U) ²	2/2	275/390
FAST EXP500 Storage Expansion Unit (35601RU) ²	2/2	245/350
FAST EXP700 Storage Expansion Unit (17401RU) ²	2/2	245/350
TotalStorage SAN Switch F08, 8-port (3534F08)	1/1	50/n/a
SAN Fibre Channel Switch, 16-port (2109F16)	1/2	200/n/a
Magstar MP 3570 Tape Subsystem (C2x)	1/1	140/200
NetBAY Tape Enclosure (0034B0X)	1/1	320/457
SDLT/LTO Modular Tape Library (4560SLX)	1/1	300/430

1. This table represents general guidelines for selecting the appropriate UPS based on minimum and typical runtime estimates. A 'maximum configuration' load will result in 'minimum' UPS runtime. 'Typical' loads are based on a production system running at approximately 70% of maximum capacity (based on the power delivered to the device from the power source, i.e., 70% of the value provided as a maximum equals the rating of the power supply). The 'typical' loads represent a more likely configuration; therefore, they provide a more likely estimate of runtime. The values listed as typical generally are equal to the rating of the power supply. Since power supplies operate at 70% of load, the system power supplies are actually operating at 70% of the values listed, though the power required from the source is what is listed. Customer environments are unique and are unlikely to be precisely represented by any of the specific entries in the table.

2. Power-Factor Corrected (PFC) power supply.

	Tower				Rack Mounted		
INT'L P/N	SU-700iNET 94G4073	SU-1000iNET 94G4074	SU-1400iNET 94G4075	SU-2200iNET 94G4076	2U SU-1400RMiB 32P1022 ⁶	SU-3000RMiB 94G6677	SU-5000RMiB 37L6862
US P/N	SU-700NET 94G3134	SU-1000NET 94G3135	SU-1400NET 94G3136	Not Available	2U SU-1400RMB 32P1020	SU-3000RMB 94G6676	SU-5000RMB 37L6861
UPS Attributes							
Communications Links to Servers	1	1	1	1	1	3	3
Color	black	black	black	white	black	black	black
EIA Height	-	-	-	-	2U	3U	5U
Int'l Models							
50 or 60Hz, single phase, VAC: ^{2,3}	220-240(xxx)	220-240(xxx)	220-240(xxx)	220-240(xxx)	220-240(xxx)	220-240(xxx)	220-240(xxx)
10-Amp, IEC 320-C13 (Device) receptacles	4	4	4	8	4	8	8
16-Amp, IEC 320-C19 (PDU) receptacles	-	-	-	1	-	1	2
Line Cord Receptacle (IEC 320-)	C14	C14	C20	C20	C14	C20	TB ⁵
US Models							
50 or 60Hz, single phase, VAC: ²	120 (120)	120 (120)	120 (120)	-	120 (120)	120 (120)	200-220 (208)
Receptacles (NEMA 5-15R)	4	6	6	-	6	8	-
10-Amp, IEC 320-C13 (Device) receptacles	-	-	-	-	-	-	8
16-Amp, IEC 320-C19 (PDU) receptacles	-	-	-	-	-	-	2 ⁴
Line Cord Length, NEMA Plug	6ft, 5-15P	6ft, 5-15P	6ft, 5-15P	-	6ft, L5-15P	6ft, L5-30P	8ft, L6-30P

1. Data provided by APC.

2. How-to-Read example for 200-240(208): Input VAC is 200-240 as is the UPS output when electric service is active. When electric service is interrupted and the UPS is on battery, the UPS output is 208 VAC.

3. Battery output may be set to 220, 225, 230, or 240 VAC.

4. Two PDU jumper cables ship with the UPS for attachment from the IEC 320-C19 receptacles to Power Distribution Units (PDUs) with C20 inlets.

5. SU-5000RMiB (P/N 37L6862) contains a Terminal Block (TB) for direct attachment to an electrical source by qualified personnel.

6. Two IEC power cables are provided to attach devices to the UPS outlets, which are 1.8m long with IEC 320-C13 / C14 connectors.



Total Configuration Runtime Estimator (time in minutes) ¹								
	Tower				Rack Mount			
Int'l Part Number	SU-700iNET 94G4073	SU-1000iNET 94G4074	SU-1400iNET 94G4075	SU-2200iNET 94G4076	SU-1400RMiB 94G6675	2U SU-1400RMiB 32P1022	SU-3000RMiB 94G6677	SU-5000RMiB 37L6862
United States Part Number	SU-700NET 94G3134	SU-1000NET 94G3135	SU-1400NET 94G3136	Not Available	SU-1400RMB 94G6674	2U SU-1400RMB 32P1020	SU-3000RMB 94G6676	SU-5000RMB 37L6861
Total Load (Watts)	Runtime Minutes	Runtime Minutes	Runtime Minutes	Runtime Minutes	Runtime Minutes	Runtime Minutes	Runtime Minutes	Runtime Minutes
200	22	38	62	130	45	45	104	240
250	17	28	43	104	34	34	84	200
300	12	22	34	85	25	25	70	166
350	9	18	29	71	22	22	58	145
400	7	14	23	65	18	18	52	125
450	5	12	20	52	15	15	45	110
500	-	11	18	43	13	13	38	97
550	-	9	16	38	11	11	35	87
600	-	8	13	34	10	10	31	76
650	-	7	12	31	9	9	29	68
700	-	6	11	28	8	8	26	63
750	-	-	10	25	8	8	24	59
800	-	-	9	23	7	7	22	55
850	-	-	8	21	7	7	20	51
900	-	-	7	19	6	6	18	47
950	-	-	6	18	5	5	17	43
1000	-	-	-	17	-	-	16	39
1100	-	-	-	15	-	-	14	34
1200	-	-	-	13	-	-	12	31
1300	-	-	-	11	-	-	10	28
1400	-	-	-	9	-	-	9	25
1500	-	-	-	9	-	-	8	22
1600	-	-	-	8	-	-	8	20
1700	-	-	-	-	-	-	7	18
1800	-	-	-	-	-	-	-	17
1900	-	-	-	-	-	-	-	14
2000	-	-	-	-	-	-	-	12
2100	-	-	-	-	-	-	-	11
2200	-	-	-	-	-	-	-	11
2300	-	-	-	-	-	-	-	10
2400	-	-	-	-	-	-	-	10
2500	-	-	-	-	-	-	-	9
2600	-	-	-	-	-	-	-	9
2700	-	-	-	-	-	-	-	8
2800	-	-	-	-	-	-	-	8

1. Data provided by APC.

Steps:

1. Identify the devices contained in the configuration.
2. Sum the load (watts) of all devices in the configuration. Use either Maximum Load for minimum runtime or Typical Load for typical runtime.
3. Find the Total Configuration Load in the table above.
4. Select the most appropriate UPS model to achieve the desired runtime.

Tower or Rack Mount			
International Part Number	UPS3000XLV 32P1681	UPS3000XHV various	UPS Extend Run Battery Pack 32P1692
United States Part Number	UPS3000XLV 2130R30	UPS3000XHV 2130R31	UPS Extend Run Battery Pack 32P1692
UPS Attributes			
Communications Links to Servers	Serial/USB/Enet	Serial/USB/Enet	-
Color	black	black	black
EIA Height	2U	2U	2U
Int'l Models			
50 or 60Hz, single phase, VAC:	120(120) ²	220-240(xxx) ^{2,3}	-
10-Amp, IEC 320-C13 (Device) receptacles	6	7	-
16-Amp, IEC 320-C19 (PDU) receptacles	-	1 ⁵	-
Receptacles (NEMA L5-20R)	1 ⁷	-	-
Line Cord Length, NEMA Plug	9ft, L5-30P	-	-
Line Cord Receptacle (IEC 320-)	-	C20	-
US Models			
50 or 60Hz, single phase, VAC:	120(120) ²	200-240(208) ²	-
Receptacles (NEMA 5-15R)	-	-	-
Receptacles (NEMA L5-20R)	1 ⁷	-	-
10-Amp, IEC 320-C13 (Device) receptacles	6 ⁴	7 ⁴	-
16-Amp, IEC 320-C19 (PDU) receptacles	-	1 ⁵	-
Line Cord Length, NEMA Plug	9ft, L5-30P	-	-
Line Cord Receptacle (IEC 320-)	-	C20 ⁶	-

1. Data provided by APC.
2. How-to-Read example for 200-240(208): Input VAC is 200-240 as is the UPS output when electric service is active. When electric service is interrupted and the UPS is on battery, the UPS output is 208 VAC.
3. Battery output may be set to 220, 225, 230, or 240 VAC.
4. Four IEC power cables are provided to attach devices to the UPS outlets, which are 2m long with IEC 320-C13 / C14 connectors.
5. One 2m PDU jumper cable ships with the UPS for attachment from the IEC 320-C19 receptacles to a Power Distribution Units (PDUs) with C20 inlets.
6. US line cord is 8ft (2.5m) long with NEMA L6-20P power plug.
7. Includes L5-20P to L5-15R adapter cable.

Steps:

1. Identify the devices contained in the configuration.
2. Sum the load (watts) of all devices in the configuration. Use either Maximum Load for minimum runtime or Typical Load for typical runtime.
3. Find the Total Configuration Load in the table above.
4. Select the most appropriate UPS model to achieve the desired runtime.

NOTE: If the Total Configuration Load is greater than the entries above, split the load across two or more UPS units.



Total Configuration Runtime Estimator (time in minutes)¹					
	Number of Battery Packs				
	Internal Only	+1	+2	+3	+4
Total Load (Watts)	Runtime Hours / Minutes	Runtime Hours / Minutes	Runtime Hours / Minutes	Runtime Hours / Minutes	Runtime Hours / Minutes
200	1 / 45	7 / 5	13 / 32	19 / 50	24 / 16
250	1 / 15	5 / 48	11 / 57	17 / 36	20 / 56
300	1 / 9	3 / 58	9 / 42	14 / 36	17 / 36
350	60	3 / 24	8 / 43	13 / 15	16 / 42
400	50	2 / 50	6 / 55	10 / 55	15 / 3
450	45.5	2 / 41	5 / 59	9 / 50	14 / 0
500	41.8	2 / 37	5 / 12	8 / 53	12 / 32
550	39	2 / 33	4 / 36	8 / 0	11 / 7
600	35.5	2 / 24	3 / 37	6 / 29	8 / 55
650	33.8	2 / 19	3 / 14	5 / 51	8 / 19
700	30.6	2 / 12	3 / 1	5 / 10	7 / 51
750	28	2 / 7	2 / 52	4 / 47	7 / 30
800	23.7	1 / 54	2 / 42	3 / 57	6 / 7
850	21.9	1 / 48	2 / 38	3 / 29	5 / 23
900	20	1 / 40	2 / 34	3 / 13	4 / 58
950	18.1	1 / 30	2 / 30	3 / 0	4 / 36
1000	15.5	1 / 20	2 / 21	2 / 52	3 / 46
1100	14.4	1 / 8	2 / 15	2 / 50	3 / 35
1200	13	1 / 1	2 / 8	2 / 43	3 / 9
1300	12.3	57.5	2 / 4	2 / 39	3 / 0
1400	10.9	53	1 / 54	2 / 32	2 / 49
1500	10	51.4	1 / 48	2 / 28	2 / 45
1600	8.4	48	1 / 35	2 / 19	2 / 39
1700	7.7	46.3	1 / 30	2 / 13	2 / 37
1800	6.85	42	1 / 15	2 / 0	2 / 30
1900	6.5	39.7	1 / 6	1 / 54	2 / 24
2000	6.2	37	1 / 2	1 / 48	2 / 18
2100	5.7	32.4	58	1 / 37	2 / 9
2200	5.5	30.8	56.3	1 / 33	2 / 75
2300	5.1	28.9	53.9	1 / 25	2 / 3
2400	4.9	28.2	53	1 / 21	1 / 59
2500	4.45	26.9	50.7	1 / 13	1 / 50
2600	4.2	26	49.4	1 / 9	1 / 46
2700	4	25.1	48.3	1 / 6	1 / 42
2800	3.8	24.2	47	1 / 2.5	1 / 39
2850	3.6	23.4	46	1 / 0	1 / 36

1. Data provided by APC.

Steps:

1. Identify the devices contained in the configuration.
2. Sum the load (watts) of all devices in the configuration. Use either Maximum Load for minimum runtime or Typical Load for typical runtime.
3. Find the Total Configuration Load in the table above.
4. Select the most appropriate battery pack column to achieve the desired runtime.

NOTE: If the Total Configuration Load is greater than the entries above, split the load across two or more UPS units.



Appendix D: SCSI Cables - Storage Units - Controllers

F: Female - External M: Male - External I: Internal 68: 16-bit, 68-pin High Density connector 50: 8-bit, 50-pin Centronix Connector 08: 16-bit, 68-pin Very High Density Connection Interface (VHDCI) 0.8mm connector 16: 16-bit, 68-pin connector 8: 8-bit, 50-pin connector			Instructions: Identify Desired Controller Row and Storage Unit Column. The intersection of row and column contains the cable group letter which supports the connection. Go to the cable group under the corresponding storage unit for specific support. Read all Notes for row, column, and any cable group footnotes.										
			Storage Unit		35311RU	3510020	3503B1X	3551001	0034B0X	360716X	360726X	4560SLX	
			Max MB/sec. ¹		160	-	-	-	80	80	80	80	
			LVDS		X	-	X	-	X	X	X	X	
			Connector Type		F0.8	F68	F68	F0.8	F0.8	F68	F68	F0.8	
Description	Part Number	Max/Channel (MB/sec) ¹	LVDS	Connector Type/Max	Note #	2, 3	4, 5	4	2, 4	2, 4	3	3	2, 3
RAID Storage Controllers													
ServeRAID-4H Ultra160 SCSI Controller	37L6889	160	X	F0.8/4	6	A	-	-	-	-	-	-	-
ServeRAID-4Mx Ultra160 SCSI Adapter	06P5736	160	X	F0.8/2	6	A	-	-	-	-	-	-	-
ServeRAID-4Lx Ultra160 SCSI Adapter II	06P5740	160	X	F0.8/1	6	A	-	-	-	-	-	-	-
ServeRAID-5i Controller	25P3492	160	X	F0.8/1	7	A	B	A	A	A	-	-	-
ServeRAID-6i Controller	71P8595	320	X	F0.8/0	7	A	B	A	A	A	-	-	-
ServeRAID-6M Controller (256MB Cache)	02R0988	320	X	F0.8/2	6	A	-	-	-	-	-	-	-
ServeRAID-6M Controller (128MB Cache)	32P0033	320	X	F0.8/2	6	A	-	-	-	-	-	-	-
Ultra320 SCSI Controller													
Single Channel Ultra320 SCSI Controller	71P8594	320	X	F0.8/1		-	B	B	A	A	B	B	A
xSeries 225	Onboard	320	X	F0.8/1	11	A ¹²	B	-	-	-	B	-	-
xSeries 235	Onboard	320	X	F0.8/1	11	A ¹²	B	B	A	A	B	B	-
xSeries 345	Onboard	320	X	F0.8/1		A ¹²	B	B	A	A	B	B	A
xSeries 382	Onboard	320	X	F0.8/1		A	-	-	-	-	-	-	-
xSeries 445	Onboard	320	X	F0.8/1		-	B	B	-	A	B	B	A
xSeries 450	Onboard	320	X	F0.8/1		-	-	B	A	A	B	B	A
Ultra160 SCSI Controllers													
PCI Wide Ultra160 SCSI Adapter	19K4646	160	X	F0.8/1	-	-	B	B	A	A	B	B	A
xSeries 255	Onboard	160	X	F0.8/1	11	-	-	B	A	A	B	B	-
xSeries 440	Onboard	160	X	F0.8/1		-	-	B	A	A	-	B	A
No Onboard External Port¹⁰													
xSeries 205	Onboard	-	-	n/a		-	-	-	-	-	-	-	-
xSeries 305	PCI adapter	-	-	n/a		-	-	-	-	-	-	B	-
xSeries 335	Onboard	-	-	n/a		-	-	-	-	-	-	B	-
xSeries 360	Onboard	-	-	n/a		-	-	-	-	-	-	B	-
Cable Group A (M0.8-M0.8)													
Netfinity 2m Ultra2 SCSI Cable	03K9310	-	X	M0.8-M0.8	8	X ⁹	-	X ¹⁴	X ¹⁴	X ¹⁴	-	-	X ¹³
Netfinity 4.2m Ultra2 SCSI Cable	03K9311	-	X	M0.8-M0.8	8	X ⁹	-	X ¹⁴	X ¹⁴	X ¹⁴	-	-	X ¹³
Netfinity 20m Ultra2 SCSI Cable	37L7101	-	X	M0.8-M0.8	6	X ⁹	-	-	-	-	-	-	-
Cable Group B (M68-M0.8)													
2m External 0.8mm SCSI Cable	01K8027	-	-	M68-M0.8	-	-	X ¹⁴	-	X ¹⁴	-	X ¹³	X ¹³	-
Cable Group G (Other)													
68-pin External Multimode LVD/SE SCSI Terminator	00N7956	-	-	M68		-	-	-	-	-	-	-	-



1. Maximum supported speeds may be limited by installation of lower speed devices, controllers or cable lengths greater than two meters.
2. Rack installation cable management requires devices to have a minimum cable length of two meters. Cable length requirements will vary based on placement within a single or multiple rack suite.
3. Maximum speeds may be limited by the installed devices or SCSI controller.
4. Daisy chaining tape enclosures is not supported at this time.
5. Requires 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956).
6. Maximum speeds may be limited by the enclosure or its installed devices.
7. ServeRAID-5i or 6i neither cable internally nor have their own external connector. In systems with an external SCSI connector cabled to channel B of the integrated storage controller. ServeRAID-5i or 6i can attach through the integrated controller to external SCSI HDDs (EXP300). ServeRAID-5i or 6i support some tape drives when installed in an available internal media bay connected to channel B of a dual-channel integrated controller or installed in a supported external tape enclosure. When the RAID controller is configured, channel B is designated as a standard SCSI channel in order to support the tape drives.
8. Supports attachment to Ultra2 or single-ended SCSI controllers with operational speeds of up to Ultra2. Controller, storage unit, cable length or storage device limitations may apply (see Max MB/sec row and column above).
9. EXP300 (P/N 35311RU) includes a single 2M Ultra2 SCSI cable similar to Netfinity 2M Ultra2 SCSI Cable (P/N 03K9310).
10. No external SCSI port is available on these systems. A supported optional controller must be installed. See the systems section to determine which controllers and external storage units are supported then refer back to this table for cable requirements using the controller row.
11. Requires External SCSI Interface Kit (P/N 32P8164) or Ultra320 External SCSI Connector Cable Option (24P7973) to enable the external 0.8mm VHDCI port.
12. Support for EXP300 connected to the external SCSI port requires installation of ServeRAID-5i (P/N 25P3492) and availability of one channel of the integrated Ultra320 controller.
13. External storage cable is included standard with the enclosure.
14. External storage cable is not included standard with the enclosure.

Appendix E: Internal Cabling Overview

System	IDE Connections				SCSI Connections										Media	Int RAID	
	IDE connector # ¹	connects to (as shipped)	std cable (IDE)	additional connectivity (IDE)	# standard SCSI controllers	standard SCSI controller type	onboard	# channels	channel name (letter)	internal (I) or external (E) connectors	type of connector	intended or standard connection	int SCSI cable (16-bit LVD)	terminated			optional connectivity (SCSI) ¹³
x205 IDE	1	CD-ROM	2-drop	1 optical, IDE tape or IDE HDD	-	-	-	-	-	-	-	-	-	-	-	19K4646 ⁶	N/A
	2	IDE HDD	2-drop	1 HDD	-	-	-	-	-	-	-	-	-	-	-	-	-
x205 NH/S SCSI	1	CD-ROM	2-drop	1 optical	1	U160	Y	1	A	I	68-pin	1 NH/S SCSI HDD or open bay	5-drop	Y	3 NH/S HDDs, 1 HH tape ⁴	std ⁷	Y ⁹
x205 H/S SCSI	1	CD-ROM	2-drop	1 optical	1	U160	Y	1	A	I	68-pin	H/S backplane	2-drop	N ³	-	19K4646 ⁸	Y ¹⁰
x225 NH/S SCSI	1	CD-ROM	2-drop	1 optical or IDE tape	1	U320	Y	2	A	I	68-pin	1 NH/S SCSI HDD	4-drop	Y	3 NH/S HDDs	-	Y ¹¹
	-	-	-	-	-	-	-	-	B	I	68-pin	media bay ¹⁹	-	-	HH tape	std w/ option	-
	-	-	-	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device ¹⁹	-	-	-	-	-
x225 H/S SCSI	1	CD-ROM	2-drop	1 optical or IDE tape	1	U320	Y	2	A	I	68-pin	H/S backplane	1-drop	N ³	-	-	Y ¹¹
	-	-	-	-	-	-	-	-	B	I	68-pin	media bay ¹⁹	-	-	HH tape	std w/ option	-
	-	-	-	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device ¹⁹	-	-	-	-	-
x235	1	CD-ROM	2-drop	1 optical	1	U320	Y	2	A	I	68-pin	H/S backplane	1 drop	N ³	-	-	N ²²
	-	-	-	-	-	-	-	-	B	I	68-pin	media bays ²⁰	1 drop	Y ²¹	HH or FH tape or U320 3-pack Kit	std w/ option	Y ²³
	-	-	-	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device ²⁰	-	-	-	-	-
x255	1	CD-ROM	2-drop	1 optical	1	U160	Y	2	A	I	68-pin	H/S backplane	1-drop	N ⁶	HH or FH tape, 6-pack kit ²⁴	std w/ option	Y ²⁵
	-	-	-	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device	-	-	-	-	-
x305 IDE	1	CD-ROM	1-drop	-	-	-	-	-	-	-	-	-	-	-	-	-	N/A
	2	IDE-HDD	2-drop	1 IDE HDD	-	-	-	-	-	-	-	-	-	-	-	-	-
x305 SCSI	1	CD-ROM	1-drop	-	1	U160	N	1	A	I	68-pin	HDD or open bay	2-drop	Y	1 NH/S HDD	-	Y





System	IDE Connections				SCSI Connections										Media	Int RAID			
	1	2	3	4	1	2	3	4	5	6	7	8	9	10			11	12	13
x335 IDE	1	CD-ROM	1-drop	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N/A
	2	IDE HDD	2-drop	1 IDE HDD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
x335 H/S SCSI	1	CD-ROM	1-drop	-	1	U320	Y	1	A	I	68-pin	H/S backplane	1-drop	N ³	-	-	-	Y	
x343 (NEBS)	1	CD-ROM	1-drop	-	1	U160	Y	2	A	I	68-pin	1 NH/S SCSI HDD	2-drop	Y	-	-	-	-	
	-	-	-	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device	-	-	-	-	-	-	
x345	1	CD-ROM	1-drop	-	1	U320	Y	2	A	I	68-pin	H/S backplane	1-drop	N ³	-	-	-	Y ²⁶	
	-	-	-	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device	-	-	-	-	-	-	
x360	1	CD-ROM	1-drop ¹⁴	-	1	U160	Y	1	A	I	Integrated	H/S backplane ¹⁵	-	-	-	-	-	Y ¹⁶	
x382	1	DVD-CD/RW	1-drop	-	1	U320	Y	2	A	I	68-pin	H/S backplane	1-drop	N ³	-	-	-	Y	
	-	-	-	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device	-	-	-	-	-	-	
x440	1	CD-ROM	n/a ¹⁷	-	1	U160	Y	2	A	I	68-pin	H/S backplane	1-drop	N ³	-	-	-	Y ¹⁸	
	2	FDD	n/a ¹⁷	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device	-	-	-	-	-	-	
x445	1	DVD-ROM	n/a ¹⁷	-	1	U320	Y	2	A	I	68-pin	H/S backplane	1-drop	N ³	-	-	-	Y ¹⁸	
	2	FDD or optical	n/a ¹⁷	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device	-	-	-	-	-	-	
x450	1	DVD-CD/RW	n/a ¹⁷	-	1	U320	Y	2	A	I	68-pin	H/S backplane	1-drop	N ³	-	-	-	N ²⁷	
	2	FDD or optical	n/a ¹⁷	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device	-	-	-	-	-	-	

1. IDE controllers have two channels, generally with one connector per channel. Standard IDE cables include two drops. Some IDE devices, e.g., a slim-line CD-ROM, use a single-drop ribbon cable, which is soldered to a backplane instead of using a connector at the device end of the cable.

2. The term drop refers to a device connector on a cable. The connector that attaches to the controller is not counted as a drop.

3. Termination is provided by the hot-swap backplane.

4. Attaching a SCSI tape drive to the same SCSI bus as the HDDs may reduce performance. Slim-line tape drives may be supported in bay four (see the system Tape Options section).

5. An additional cable to connect SCSI devices installable in internal removable media bays to the standard SCSI storage controller may be required when the standard SCSI cable is used to connect an optional RAID adapter. The necessary cable is provided in the option specified in this column, or if a tape drive is the media device being connected, a 34in terminated SCSI cable is now provided with the tape option.

6. If installing an IDE tape drive, the standard IDE cable is used (maximum number of IDE optical drives or HDDs is reduced by one because only two IDE connectors are provided on each of the two IDE cables). If installing an internal SCSI device, a supported SCSI storage controller is required. The single-channel Ultra160 SCSI adapter (P/N 19K4646) includes a 16-bit five-drop terminated multimode SCSI cable and a 0.8mm VHDCI external connector. Single channel Ultra320 SCSI Controller (P/N 71P8594) provides a single channel with one 68-pin internal connector, a four-drop multimode terminated LVD SCSI cable and one external 0.8mm VHDCI connector.

7. If installing an IDE tape drive, the second connector of the standard IDE cable can be used. If installing a SCSI device, one connector of the five-drop SCSI cable can be used, which may adversely affect performance for the entire SCSI bus. Installing the tape drive on an independent bus requires an optional controller (P/N 19K4646 or 71P8594) unless the HDDs are attached to a RAID controller.

8. Half-high SCSI devices installed in the media bay require an additional storage controller (P/N 19K4646 or 71P8594), which provides a single SCSI and a five-drop terminated cable.

9. In nonhot-swap models, SCSI RAID adapters are connected to one end of the standard SCSI cable. When the standard cable is used to attach to the RAID adapter, media bay attachment to the standard SCSI controller for SCSI devices in nonhot-swap models of x205 require the one-drop terminated LVD cable provided with the tape drive.

10. SCSI RAID adapters are generally connected to the hot-swap backplane using the standard cable that connects the integrated storage controller. When the standard cable is used for RAID attachment, media bay attachment requires the one-drop terminated LVD cable provided with the tape drive.

11. In xSeries 225, the standard cable connecting either the hot-swap backplane or the nonhot-swap HDDs is used to connect the HDDs to ServeRAID-4H, -4Mx or -4Lx. If ServeRAID-5i is installed, a cable is not required and both channels of the integrated controller are managed by the adapter.

12. Attachment of SCSI devices in either (or both) of the two available media bays requires a supported optional SCSI storage controller (P/N 19K4646 or 71P8594) in non-RAID configurations. Two half-high or one full-high device may be installed. A two-drop SCSI cable is included with the server, which can be used to attach one or two internal tape options to the integrated controller when a ServeRAID adapter is used to support the hot-swap backplane.

13. Attachment of tape or optical drives to RAID adapters is not supported.

14. The standard slim-line CD-ROM docks directly into a media interposer card that is routed through the lightpath card before terminating at the planar.

15. The hot-swap backplane is connected to the integrated controller through a SCSI bus integrated into the system planar.

16. Internal RAID configurations are supported by connecting an internal connector on the RAID controller to a connector on the planar located between slot one and the memory card using a dedicated RAID cable provided with the system. (Route cable underneath PCI adapters.) Note: If the hot-swap backplane is attached to a RAID adapter, a full-length adapter cannot be installed in slot one.

17. Ships with a slim-line UltraBay 2000 optical drive installed in bay 4 (lower right of four bays). Bay three (lower left bay) supports either an UltraBay 2000 floppy disk drive (FDD) or optical drive. FDDs can be installed in bay three only, but optical devices can be installed in either bay. If only one optical device is installed, it must be located in bay four. If two are installed, the standard FDD is removed and the second device is installed in bay three configured as slave.

18. If the hot-swap backplane is attached to a RAID adapter, the standard SCSI cable is replaced by a longer cable shipped with the system.

19. Channel B may be connected to a supported tape drive installed in the media bay if ServeRAID-5i is installed and channel B is designated to support SCSI during the setup or if RAID is not implemented (cable shipped with tape drive is used). If channel B is available, a 0.8mm VHDCI external SCSI port can be enabled by installing External SCSI Interface Kit (P/N 32P8164). The external port is then operated as a SCSI channel supporting external tape storage or as a RAID channel supporting external HDD storage.

- 20. This channel may be connected to either a supported tape drive or the Ultra320 3-pack Kit (P/N 33P2751) installed in the media bays. If no internal connection is established, the 0.8mm VHDCI external SCSI port can be enabled by installing External SCSI Interface Kit (P/N 32P8164).
- 21. Termination is provided by the one-drop cable included with the tape option or by the optional hot-swap backplane when the Ultra320 3-pack Kit is installed, which includes a nonterminated cable.
- 22. Optional 30in nonterminated Single-drop Internal LVD Ultra160 SCSI Cable (P/N 71P8995) is required to connect the hot-swap backplane to ServeRAID-4H, -4Mx or -4Lx. ServeRAID-5i does not require a cable.
- 23. If the optional Ultra320 3-pack Kit (P/N 33P2751) is installed in the media bays, the cable that ships with the option is used to connect to ServeRAID-4H, -4Mx or -4Lx or to the integrated controller if ServeRAID 5i is installed.
- 24. An optional 6-pack Ultra320 Hot-swap Expansion Kit (P/N 32P8163) can be installed above the standard six hot-swap HDD bays and a full-high or half-high tape drive can be installed in the available media bays.
- 25. SCSI RAID adapters are generally connected to the hot-swap backplane using the standard cable that connects the integrated storage controller. When the standard cable is used for RAID attachment, media bay attachment requires the 34in terminated SCSI cable provided standard with tape drive options. Attachment of optional 6-pack Ultra320 Hot-swap Expansion Kit (P/N 32P8163) connects to a RAID adapter using the cable that ships with the option.
- 26. If ServeRAID-5i is installed, the standard cable that connects the backplane to the integrated controller remains connected. If ServeRAID-4Mx or -4Lx support the internal HDD backplane, then optional 30in nonterminated Single-drop Internal LVD Ultra160 SCSI Cable (P/N 71P8995) is required.
- 27. Attachment of PCI RAID controllers to the internal hot-swap backplane is not supported. Mirroring of the internal HDDs is supported through the integrated controller (HDDs must be matched).

For additional information, refer to the Internal SCSI Cabling and Tape Options sections for each system or to Appendix D: SCSI Cables - Storage Units - Controllers.



Appendix F: System Management Overview

IBM system management solutions allow you to run your business-critical applications using innovative hardware technology that prevents most outages and recovers rapidly from the few that do occur. This technology makes xSeries simpler to service and easier to manage.

This section shows the available range of standard and optional system management processors and describes the features and configuration process for each. This section further demonstrates how these service processors can be interconnected to form a communication network for alerting and monitoring a wide range of system functions and hardware conditions.

Key to abbreviations	
ASMP	Advanced System Management Processor
ISMP	Integrated System Management Processor
ASMA	Advanced System Management PCI Adapter (P/N 01K7209)
RSA	Remote Supervisor Adapter (P/N 09N7585)
ASMIC	Advanced System Management Interconnect Cable Kit (P/N 03K9309)

General Notes:

All descriptions of features and compatibility of ISMP described here require the use of firmware version 1.02 or newer. As of January 1, 2002, all ISMPs ship standard with firmware version 1.02. Firmware updates may be found on the IBM Web site at the URL www.pc.ibm.com/qtechinfo/MIGR-4WEP53.html.

An advanced system management interconnect network is configured with at least one focal point (generally an ASMA or RSA in a server) that provides Ethernet LAN and serial connections for management and alerting, which are shared between all the members of an interconnect network.

Up to 24 ISMPs and/or RSAs may be interconnected in a single ASM interconnect network (including standard and optional processors).

Up to 12 ASMPs and/or ASMAs may be interconnected in a single ASM interconnect network (including standard and optional processors). Up to 12 additional ISMPs and/or RSAs may be added to an ASM interconnect network containing 12 or less ASMPs and/or ASMAs.

An ASM interconnect network may contain an aggregate connection length of no more than 91.4m (300ft).

A customer-supplied Cat5 Ethernet cable is required for each interconnection.

Connecting servers that do not have two external RS-485 ports as an ASM interconnect network requires Advanced System Management Interconnect Cable Kit (P/N 03K9309). RSA and ASMA do not include this option when shipped standard with a system.

System Management support by server

xSeries Server	Onboard		PCI Adapter		Cabling
	ASMP ¹	ISMP ¹	ASMA ^{2, 3, 4}	RSA ^{3, 5, 6}	ASMIC ⁷
x200 ⁸	-	-	-	-	-
x205	-	-	-	optional ⁹	-
x220	-	-	-	optional ⁹	-
x225	-	-	-	optional ⁹	-
x230	standard ^{10, 11}	-	optional ^{11, 12}	-	optional ¹³
x232	-	standard ^{14, 15}	-	optional ^{16, 17}	-
x235	-	standard ^{14, 18}	-	optional ^{16, 17}	-
x240	standard ^{10, 11}	-	optional ^{11, 12}	-	optional ¹³
x250	standard ^{14, 15}	-	optional ^{19, 20}	-	-
x255	-	standard ^{14, 18}	-	optional ^{16, 17}	-
x300 ⁸	-	-	-	-	-
x305	-	-	-	optional ⁹	-
x330	standard ^{14, 15}	-	optional ^{19, 20, 21}	optional ^{22, 23, 24}	-
x335	-	standard ^{18, 28}	-	optional ²⁸	-
x340	standard ^{10, 11}	-	optional ^{11, 12}	-	optional ¹³
x342	-	standard ^{14, 15}	-	optional ^{16, 17}	-
x345	-	standard ^{14, 18}	-	optional ^{16, 17}	-
x350	standard ^{14, 15}	-	optional ^{19, 20}	-	-
x360	-	-	-	standard ²⁵	optional ²⁶
x370	-	-	standard ²⁷	-	optional ²⁶
x440	-	-	-	standard ²⁵	optional ²⁶

1. This service processor is integrated into the system planar (onboard).
2. This adapter cannot be the remote management focal point in an interconnect network containing an RSA or ISMP. The ASM PCI adapter is only used as the focal point when an RSA or ISMP is not present (or not functioning) in the network. The focal point must be the latest generation of service processor connected within the network.
3. Adds alternate Ethernet LAN and serial connections for support when the operating system is not available.
4. Advanced System Management PCI Adapter (P/N 01K7209) includes the following: adapter card, dual serial cable, ASM interconnect dual pigtail cable, ASM interconnect single pigtail cable, internal ASM interconnect knockout cable, AC adapter and power cord, power cable with C13 connector for UPS attachment, and a 1ft Cat5 cable. When ASMA is supplied standard (e.g., with xSeries 370), the optional ASM Interconnect Cable Kit (P/N 03K9309) is required in order to enable ASM interconnect.
5. RSA provides ASM Web interface using HTTP protocol; SNMP, DNS, PPP and DHCP network support; E-mail alerting; full remote graphical console redirection; blue-screen error information capture for Windows NT and 2000; and network flashing of host firmware for system BIOS and Advanced System Management firmware.
6. Remote Supervisor Adapter (P/N 09N7585) includes the following: adapter card, 20-pin ribbon cable, AC power adapter, power cable, power cable for UPS attachment, single pigtail cable, two RS-485 terminators and 1ft Cat5 cable. When RSA is shipped standard with a system (e.g., xSeries 360), optional ASM Interconnect Cable Kit (P/N 03K9309) is required to enable ASM interconnect.
7. Advanced System Management Interconnect Cable Kit (P/N 03K9309) includes an internal ASM interconnect knockout cable, an ASM interconnect single pigtail cable and an RS-485 terminator.
8. These xSeries servers support system management with IBM Director only, without ASM interconnect support.
9. This configuration is shown in interconnect scenario 4, appearing later in this section.
10. This configuration is shown in interconnect scenario 8, appearing later in this section.
11. Connecting xSeries 230, 240 or 340 servers in an ASM interconnect network requires Advanced System Management Interconnect Cable Kit (P/N 03K9309).
12. This configuration is shown in interconnect scenario 9, appearing later in this section.
13. Advanced System Management Interconnect Cable Kit is not required for servers with built-in RS-485 interconnect ports or for servers configured with optional Advanced System Management PCI Adapter (P/N 01K7209) or Remote Supervisor Adapter (P/N 09N7585).
14. This configuration is shown in interconnect scenario 1, appearing later in this section.
15. The system includes two external integrated RS-485 ports located on the rear of the chassis, which precludes the requirement for the ASMIC kit option.
16. This configuration is shown in interconnect scenario 5, appearing later in this section.
17. When RSA is installed in an xSeries 232, 235, 255, 342 or 345, the onboard service processor is managed by RSA. All signaling and power are transmitted through the 20-pin ribbon cable, and an external Cat5 connection between the RSA and the integrated RS-485 port on the chassis is not installed. Connection of the external power supply is not required.
18. The standard ISMP in x235, x255, x335 and x345 has enhanced functionality, described on the System Management Functional Comparison appearing later in this section.
19. This configuration is shown in interconnect scenario 6, appearing later in this section.
20. When ASMA is installed in this system, the optional adapter serves only as an Ethernet and interconnect gateway. The onboard ASM processor will provide all service processor data.
21. Supported only in machine type 8654 models of x330 systems.
22. This configuration is shown in interconnect scenario 7, appearing later in this section.
23. When installing in xSeries 330 machine type 8654 models, do not connect the 20-pin cable. Power is supplied through the external AC power supply that is provided with the option. When installing in xSeries 330 machine type 8674 or 8675 models, connect the 20-pin ribbon cable to provide the adapter with power. The AC power supply is not required.
24. When RSA is installed in this system, the optional adapter serves only as an Ethernet and interconnect gateway. The onboard ASM processor will provide all service processor data.
25. This configuration is shown in interconnect scenario 3, appearing later in this section.
26. Required to connect the standard adapter to other servers in an interconnect network.
27. This configuration is shown in interconnect scenario 2, appearing later in this section.



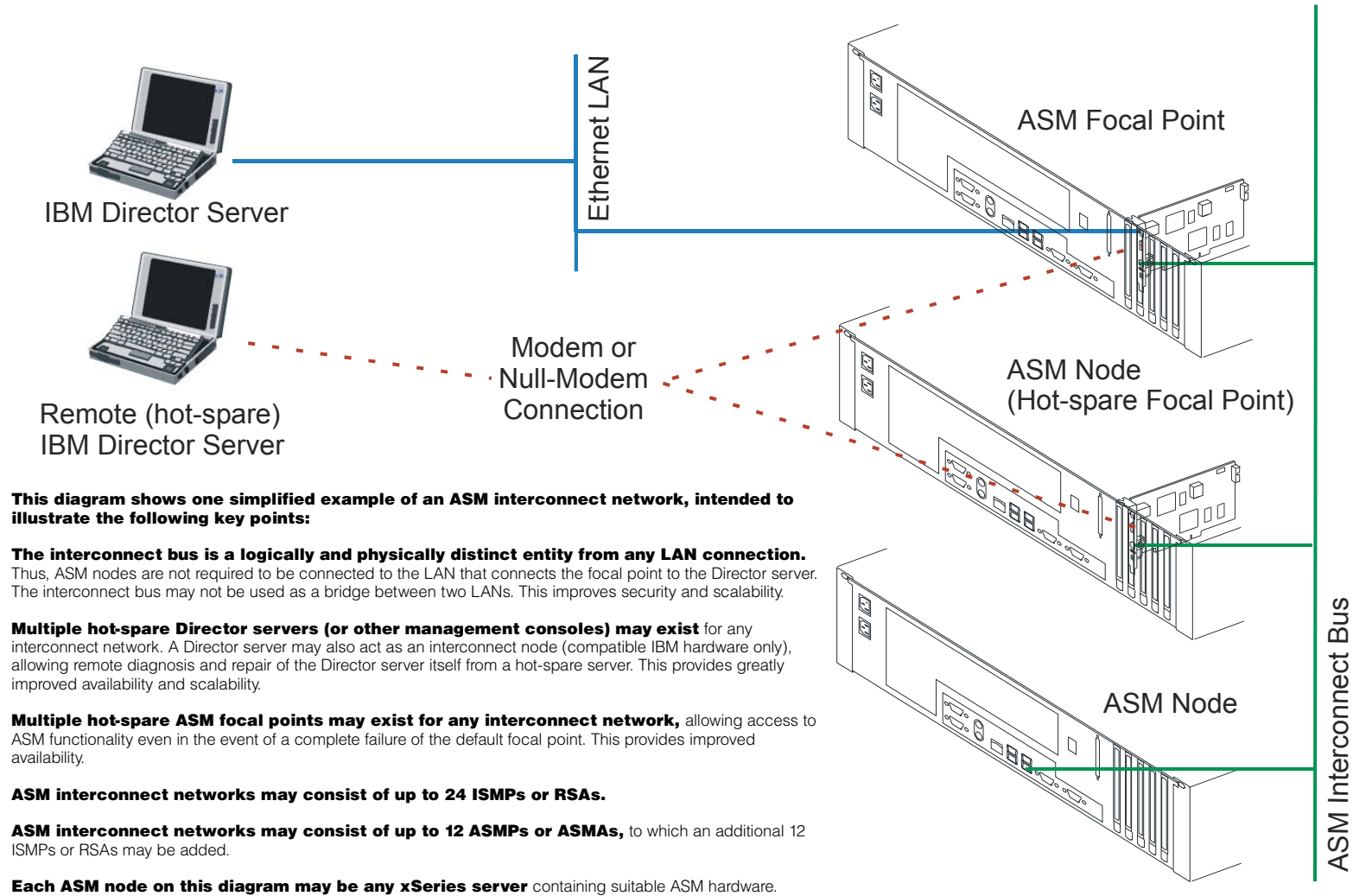
28. xSeries 335 includes new interconnect cabling options available through the C2T Interconnect cable chaining connection. One integrated RS-485 port is available for connecting the integrated ISMP to an optional RSA when that system is used as a system management interconnect network focal point. Interconnect network connections are then established through the cable chaining connection for additional x335 systems. The external AC power supply provided with RSA is not required. See Rack Cabinets and Options or system sections for additional information regarding console connectivity.

System Management Functional Comparison

Feature/Function	Onboard		PCI Adapter	
	ASMP	ISMP ¹	ASMA ²	RSA ^{2, 3, 4}
Monitoring & Alerting				
Automatic server shutdown/restart	yes	yes	yes	yes
Environmental monitors (temperature, voltage)	yes	yes	yes	yes
Interface with Light Path Diagnostics	yes	yes	yes	yes ⁵
PFA on system components (fans, power supplies, memory, etc.)	yes	yes ⁶	yes	yes
Post, loader, OS timeouts	yes	yes	yes	yes
Alert Mechanisms				
Pager (numeric/alphanumeric) ⁷	yes	no	yes	yes
Alert on LAN ²⁸	no	yes ¹¹	no	no
Director via LAN	yes ¹⁰	yes ¹⁰	yes	yes
Director via serial ⁹	yes	no	yes	yes
E-mail	no	no	no	yes
Generate SNMP traps	yes ¹⁰	yes ¹⁰	yes	yes
Management				
Remote BIOS and SP firmware update ¹²	yes	yes ¹³	yes	yes ¹⁴
Remote GUI-mode control	no	no	no	yes ^{5, 15}
Remote text-mode control	yes	no	no	yes
Remote POST and diagnostics ¹²	yes	no	yes	yes ^{16, 17}
View status logs	yes	no	yes	yes
View vital product data	yes	no	yes	yes
Capture Windows blue screens	no	no	no	yes ¹⁵
View SP configuration	no	no	yes	yes
Set SP configuration	no	no	no	yes ¹⁴
Save and restore SP configuration	no	no	no	yes ¹⁵
Restart SP	no	no	yes	yes
Connectivity & Cabling				
IBM Director ¹⁸	yes	yes	yes	yes
ANSI terminal ⁹	yes	no	yes	yes
Telnet	yes ¹⁹	no	yes	yes
Web interface	yes ¹⁹	no	yes	yes
10/100 Ethernet	yes ²⁰	yes ¹¹	yes	yes
DHCP	no	no	no	yes
DNS	no	no	no	yes
PPP ⁷	no	no	no	yes
Dedicated serial port	yes	no	dual ²¹	yes
Shared serial port	yes	no	dual ²¹	no
Redundant external power	no	no	yes	yes

1. This table is correct only for ISMP firmware v1.02 or newer. Systems shipped after January 1, 2002 include v1.02 firmware. Firmware updates are available on the Web at the URL www.pc.ibm.com/qtechinfo/MIGR-4WEP53.html.
2. When either RSA or ASMA are integrated as a standard adapter in an xSeries server (e.g., x360 or x440), the two interconnect cables, external power supply and power cords provided with the optional packages are not included.
3. When an optional RSA (P/N 09N7585) is installed in a system with standard ISMP, the optional adapter manages the onboard service processor and assumes all communications functionality.
4. When an optional RSA (P/N 09N7585) is installed in a system with standard ASMP, the optional adapter serves only as an Ethernet and interconnect gateway. The onboard ASMP provides all service processor data. An external Cat5 connection is required.
5. Not available when RSA is added as an option to systems with standard ASMP (e.g., x330).
6. Performs monitoring capability only. Automated alerting available through IBM Director only.
7. Requires customer-supplied external modem.
8. Only available with IBM Director version 3.1 or newer.
9. Requires customer-supplied external modem or null-modem cable.
10. The specified alerting mechanisms may be configured, but sending such alerts to their destination requires connection through an RSA or ASMA either within the local machine or via the interconnect network.
11. This functionality is only available on xSeries 235 and 255 servers, which include ISMP upgraded with a dedicated gigabit Ethernet processor.
12. Requires an out-of-band connection such as a serial, Ethernet or ASM interconnect network (out-of-band connections bypass the NOS and are established even when the NOS is not functioning).
13. Only updates to the service processor firmware are possible. BIOS firmware updates are not available when using ISMP.
14. Only available through the Web interface, connected via Ethernet or PPP.
15. Only available through the Web or Telnet interface, via an Ethernet connection.
16. Not available via interconnect network.
17. Not available on systems without standard system management to which an optional RSA has been added (e.g., x220).
18. Connection to IBM Director allows use of all management and alerting functionality (except save and restore configuration file) via an active in-band, out-of-band or interconnect network connection.
19. Connection using Telnet, Web interface or Ethernet is available via an RSA or ASMA through the interconnect network.
20. Requires interconnection of integrated service processor to optional ASMA or RSA using an Interconnect Cable Kit (P/N 03K9309).
21. Requires the use of the included serial port splitter cable.

Sample ASM Interconnect Network Schematic



For more detailed information on specific system management capabilities and configurations, see the cabling scenarios and service processor comparison tables in this appendix.

Configuration

Interconnect hardware connections



1. Server with ASMP or ISMP and two integrated RS-485 ASM interconnect ports on the rear of the chassis

Key Features:

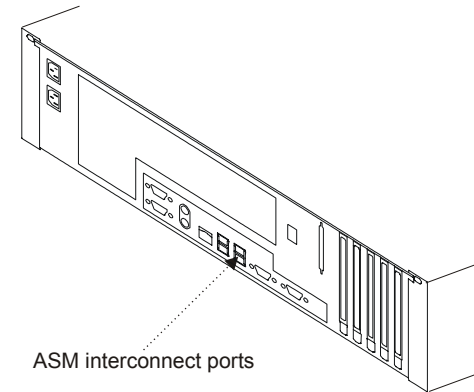
- Allows standard system management functionality, including remote flash update of BIOS and adapter microcode, remote hardware diagnostics, and monitoring and alerting of critical voltage and temperature thresholds.
- Remote BIOS update only available on ASMP.
- Only includes ISMP with firmware v1.02 or later.

Servers:

xSeries 232, 235, 250, 255, 330, 342, 345, 350

Instructions:

1. Attach customer-supplied Cat5 cables (for connection to one or two other ASM interconnect nodes) to the integrated RS-485 ports at the rear of the server. Unused RS-485 ports must be terminated with the supplied RS-485 terminator.



2. Server with standard ASMA

Key Features:

xSeries 370 ships standard with ASMA, which provides all basic system management functionality including remote management via Telnet or a Web interface.

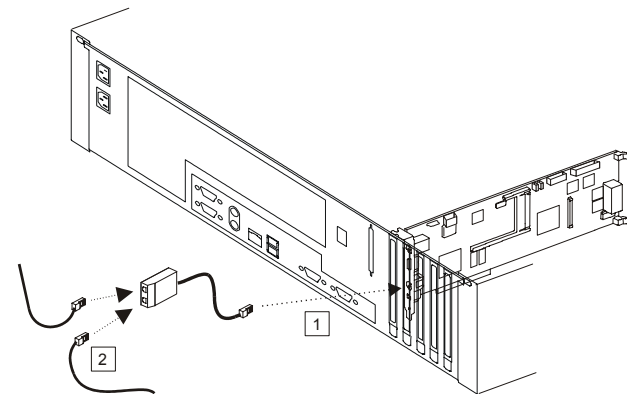
Requires purchase of ASM Interconnect Cable Kit (P/N 03K9309).

Servers:

xSeries 370

Instructions:

1. Insert pigtail cable into RS-485 interconnect port on adapter panel.
2. Attach customer-supplied Cat5 cables (for connection to one or two other ASM interconnect nodes) to the integrated RS-485 ports of the pigtail adapter. Unused RS-485 ports must be terminated with the supplied RS-485 terminator.



3. Server with standard RSA

Key Features:

xSeries 360 and 440 ship standard with RSA, which provides the latest generation of system management functionality. In addition to standard system management capabilities, RSA adds advanced features such as full remote operation of server NOS, advanced Ethernet features and system management access even in the event of a complete server NOS failure.

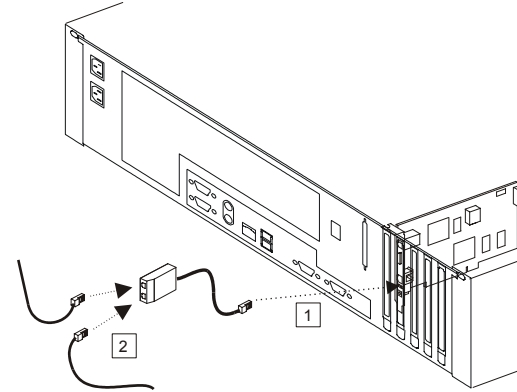
Requires purchase of ASM Interconnect Cable Kit (P/N 03K9309).

Servers

xSeries 360, 440

Instructions:

1. Insert pigtail cable into RS-485 ASM interconnect port on rear of adapter.
2. Attach customer-supplied Cat5 cables (for connection to one or two other ASM interconnect nodes) to the RS-485 ports of the pigtail adapter. Unused RS-485 ports must be terminated with the supplied RS-485 terminator.



4. Server with no standard service processor and optional RSA

Key Features:

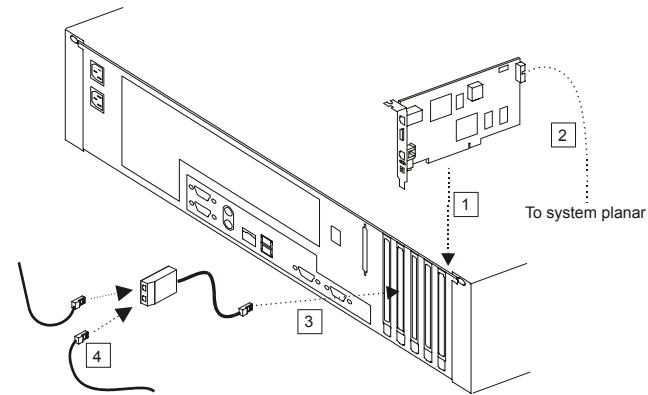
xSeries 220 ships standard without system management capability. To enable system management, an optional Remote Supervisor Adapter (P/N 09N7585) is required.

Servers:

xSeries 205, 220, 225

Instructions:

1. Insert RSA into PCI slot on system planar (see system I/O section for slot restrictions).
2. Connect 20-pin ribbon cable between system planar and RSA. xSeries 220 requires the external AC power supply.
3. Insert pigtail cable into RS-485 interconnect port on adapter panel.
4. Attach customer-supplied Cat5 cables (for connection to one or two other ASM interconnect nodes) to the RS-485 ports of the pigtail adapter. Unused RS-485 ports must be terminated with the supplied RS-485 terminator.



5. Server with ISMP plus optional RSA

Key Features:

Adding an RSA to a server containing an ISMP merges their functionality. The RSA manages the ISMP and handles communications.

Only applicable to ISMP with firmware v1.02 or later

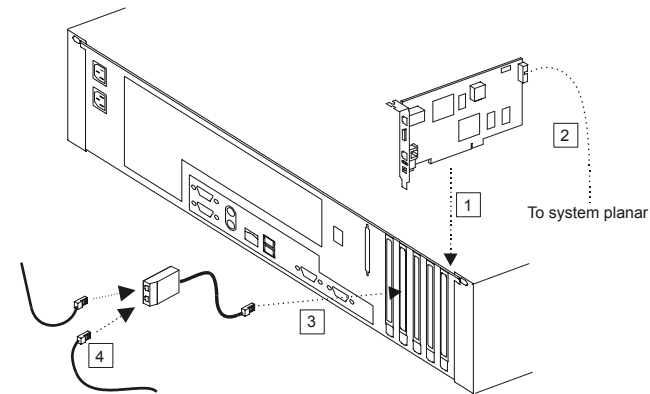
Servers

xSeries 232, 235, 255, 335 (see note below), 342, 345

Instructions:

1. Insert RSA into PCI connector on System Planar (see system I/O section for slot restrictions).
2. Connect 20-pin ribbon cable between system planar and RSA.
3. Insert pigtail cable into RS-485 port on adapter panel.
4. Attach customer-supplied Cat5 cables (for connection to one or two other ASM interconnect nodes) to the RS-485 ports of the pigtail adapter. Unused RS-485 ports must be terminated with the supplied RS-485 terminator.

Note: Refer to x335 I/O Options for more information on C2T Interconnect cable chaining technology connections supporting system management.



6. Server with standard ASMP and two integrated RS-485 ASM interconnect ports on the rear of the server chassis, into which an ASMA is installed

Key Features:

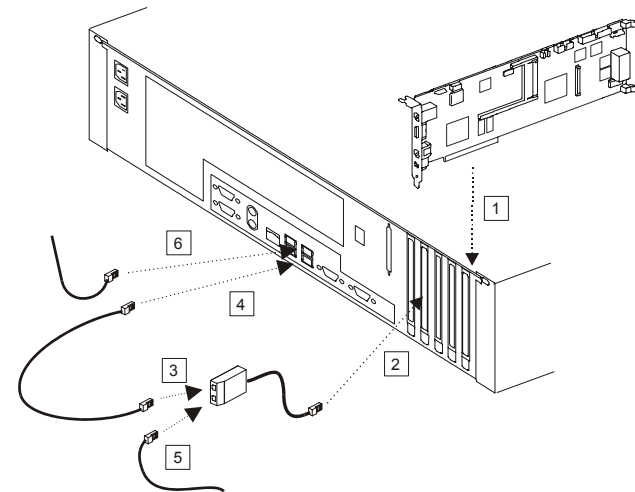
Adding an ASMA to a server containing an ASMP enables the ASMP to access the additional communication methods available on ASMA hardware. The ASMP retains full control of the system management role, with the ASMA acting as a gateway between system management and Ethernet. Requires purchase of optional ASM PCI Adapter (P/N 01K7209).

Servers:

xSeries 230, 330 (8654 models), 350

Instructions:

1. Install ASMA into PCI slot on system planar (see system I/O section for slot restrictions).
2. Plug the pigtail adapter into the RS-485 interconnect port of the ASMA.
3. Attach one end of the 1ft Cat5 cable (included with the ASMA option) to one of the RS-485 ports of the pigtail cable.
4. Attach the other end of the included 1ft Cat5 cable to one of the RS-485 ports built into the chassis.
5. Attach the customer-supplied Cat5 cable into the other RS-485 port of the pigtail cable.
6. If interconnection to a second ASM interconnect node is required, plug a second interconnect cable into the available integrated RS-485 port at the rear of the chassis. Otherwise, the second RS-485 port should be terminated using the supplied RS-485 terminator.
7. Connect the external AC power supply provided with the option.



7. Servers with standard ASMP and two integrated RS-485 ASM interconnect ports on the rear of the server chassis, into which an RSA is installed

Key Features:

Adding an RSA to a server containing an ASMP enables the ASMP to access the additional communication methods available on RSA hardware. The ASMP retains full control of the system management role, with the RSA acting as a gateway between system management and Ethernet.

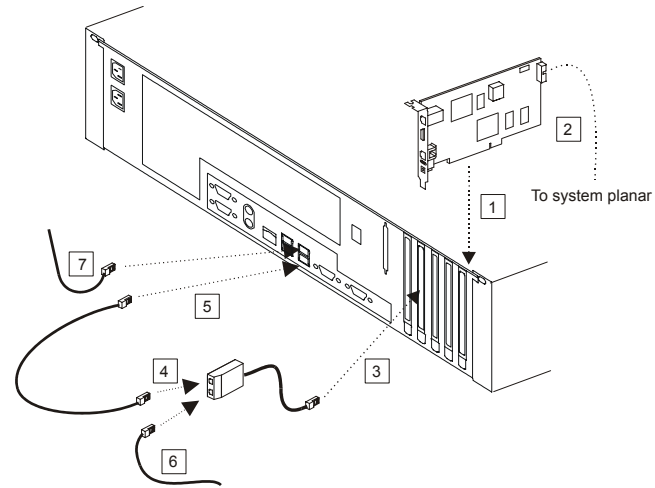
Requires purchase of optional Remote Supervisor Adapter (P/N 09N7585).

Servers:

xSeries 330 (except 8654 models)

Instructions:

1. Connect the RSA in a compatible PCI slot on the planar.
2. Connect 20-pin ribbon cable between system planar and RSA.
3. Plug the pigtail adapter into the RS-485 port of the RSA.
4. Attach one end of the 1ft Cat5 cable (included with the RSA option) to one of the RS-485 ports of the pigtail cable.
5. Attach the other end of the included 1ft Cat5 cable to one of the RS-485 ports built into the chassis.
6. Plug one ASM interconnect cable into the available RS-485 port of the pigtail cable.
7. If interconnection to a second ASM interconnect node is required, plug a second interconnect cable into the available integrated RS-485 port at the rear of the chassis. Otherwise, the second RS-485 port should be terminated using the supplied RS-485 terminator.



8. Server with ASMP and no standard RS-485 ports

Key Features:

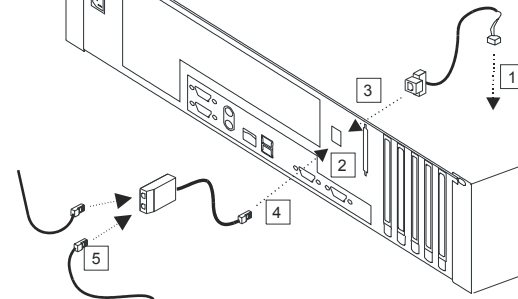
Enables basic ASM functionality for certain legacy systems.
Requires purchase of ASM Interconnect Cable Kit (P/N 03K9309).

Servers:

xSeries 230, 240, 340

Instructions:

1. Connect interconnect knockout cable to the ASMP connector on the system planar.
2. Create knockout space on rear of system chassis.
3. Fix knockout fitting into place.
4. Plug single pigtail cable into knockout cable port.
5. Attach customer-supplied Cat5 cables (for connection to one or two other ASM interconnect nodes) to the RS-485 ports of the pigtail adapter. Unused RS-485 ports must be terminated with the supplied RS-485 terminator.



9. Server with ASMP and no standard RS-485 ports, into which an optional ASMA is installed

Key Features:

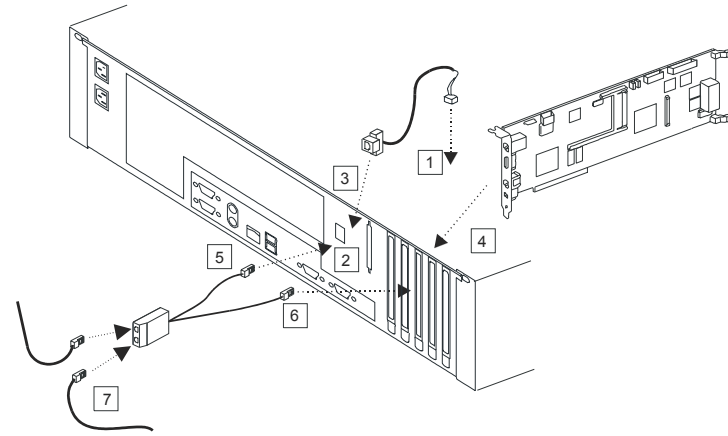
Enables basic ASM functionality for certain legacy systems.

Servers:

xSeries 230, 240, 340

Instructions:

1. Connect interconnect knockout cable to the ASMP connector on the system planar.
2. Create knockout space on rear of system chassis.
3. Fix knockout fitting into place.
4. Connect the ASMA to a compatible PCI slot on the planar.
5. Plug one pigtail cable into knockout cable port.
6. Plug other pigtail cable into the RS-485 port of ASMA.
7. Attach customer-supplied Cat5 cables (for connection to one or two other ASM interconnect nodes) to the RS-485 ports of the pigtail adapter. Unused RS-485 ports must be terminated with the supplied RS-485 terminator.
8. Connect the external AC power supply provided with the option.



Appendix G: xSeries I/O Option Attributes

I/O Option Attributes

Part Number	Description	Adapter Length	PCI Support ¹	Low-profile Enabled	Hot-Plug ²	PCI Voltage Key	MHz ¹
Storage Controllers							
37L6889	ServeRAID-4H Ultra160 SCSI Controller ³	Full	64-bit	-	X	Universal	33
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller ⁴	Full	64-bit	-	X	Universal	66
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller ⁵	Half	64-bit	-	X	Universal	66
25P3492	ServeRAID-5i Controller ⁶	Full	64-bit	X	-	Universal	66
71P8595	ServeRAID-6i Controller ⁷	Full	64-bit	-	-	3.3	133 ³⁰
02R0988	ServeRAID-6M Controller (256MB Cache) ⁸	Full	64-bit	-	-	3.3	133 ³⁰
32P0033	ServeRAID-6M Controller (128MB Cache) ⁹	Full	64-bit	-	-	3.3	133 ³⁰
71P8592	ATA133 RAID Controller ⁹	Half	32-bit	-	-	Universal	33
19K4646	PCI Wide Ultra160 SCSI Adapter ¹⁰	Half	32-bit	X	-	Universal	66
71P8594	Single Channel Ultra320 SCSI Controller ¹¹	Half	64-bit	X	-	Universal	133
Fibre Storage Controllers and Options¹²							
00N6881	Netfinity FAST Host Adapter	Half	64-bit	-	X	Universal	66
24P0960	FC2-133 Host Bus Adapter ²⁹	Half	64-bit	X	X	Universal	133 ³⁰
174290U	FAST900 Storage Server (US line cord)	-	-	-	-	-	-
17421RU	FAST700 Fibre Channel Storage Server	-	-	-	-	-	-
172260U	FAST600 Storage Server (US line cord, English pubs)	-	-	-	-	-	-
35421RU	FAST200 Storage Server	-	-	-	-	-	-
35422RU	FAST200 HA Storage Server	-	-	-	-	-	-
3534F08	TotalStorage SAN Switch F08, 8-port (2Gb)	-	-	-	-	-	-
2109F16	SAN Fibre Channel Switch, 16-Port (2Gb)	-	-	-	-	-	-
Networking¹³							
Ethernet¹³							
22P4501	Intel Pro/100S Desktop Adapter ¹⁴	Half	32-bit	-	-	Universal	33
22P4701	Intel Pro/100S Low Profile Desktop Adapter ¹⁴	Half	32-bit	X	-	Universal	33
22P6501	Pro/1000 T Desktop Adapter by Intel ¹⁵	Half	32-bit	-	-	Universal	33
22P6601	Intel Pro/1000 Low Profile Desktop Adapter ¹⁵	Half	32-bit	X	-	Universal	33
22P6901	Wireless LAN Adapter	Half	128-bit	X	-	Universal	33
06P3601	10/100 Ethernet Server Adapter ¹⁵	Half	32-bit	-	X	Universal	33
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals ¹⁵	Half	64-bit	-	X	Universal	133 ³⁰
31P9601	PRO/1000 MT Server Adapter by Intel ¹⁵	Half	64-bit	X	X	Universal	133 ³⁰
22P7801	NetXtreme 1000 SX Fiber Ethernet Adapter ²⁹	Half	64-bit	X	X	Universal	133 ³⁰
31P6301	NetXtreme 1000 T Ethernet Adapter (copper) ^{15, 29}	Half	64-bit	X	X	Universal	133 ³⁰
31P6401	NetXtreme 1000 T Dual Port Ethernet Adapter (copper) ^{15, 29}	Half	64-bit	X	X	Universal	133 ³⁰
Token Ring							
34L5001	16/4 Token-ring PCI Management Adapter ¹⁵	Half	32-bit	-	X	Universal	33
34L5201	High-Speed 100/16/4 Token-ring PCI Management Adapter ¹⁵	Half	32-bit	-	X	Universal	33
07P2701	16/4 Token-ring Low Profile PCI Management Adapter ¹⁵	Half	32-bit	X	X	Universal	33
System Management¹⁷							
03K9309	Advanced System Management Interconnect Cable Kit ¹⁸	-	-	-	-	-	-
09N7585	Remote Supervisor Adapter ¹⁹	Half	32-bit	-	-	Universal ³¹	33
59P2984	Remote Supervisor Adapter II ²⁰	Half	32-bit	-	-	Universal ³¹	33
Communications							
33L4618	V90 PCI Data/Fax Modem ²¹	Half	32-bit	-	-	5	33
19K4162	V90 PCI Data/Fax WinModem (Low Profile Enabled) ^{21, 29}	Half	32-bit	X	-	Universal	33
1519100	IXA Adapter ²²	Half	32-bit	-	-	Universal	-
22P5888	PCI Parallel Port Adapter (low profile)	Half	32-bit	-	-	5	33



Remote I/O Expansion							
8684-1RX	RXE-100 Remote Expansion Enclosure ²³	-	-	-	-	-	-
Related I/O Cables							
02R2068	Ultra320 Internal Single-drop 24in LVD SCSI Cable ²⁴						
32P8164	External SCSI Interface Kit ²⁵	-	-	-	-	-	-
24P7973	Ultra320 External SCSI Connector Cable Option ²⁵						
24P7929	Enabling Cable for External Ultra320 SCSI Port ²⁶						
10K3661	USB to Serial Adapter ^{27, 28}	-	-	-	-	-	-

1. Adapters rated at a lower frequency than the slots in which they are installed will reduce the bus to the frequency of the slowest adapter. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.
2. Hot-plug feature only supported in systems with Active PCI slots. For network operating system support, point your browser to www.pc.ibm.com/us/compat.
3. ServeRAID-4H Ultra160 SCSI Controller is powered by a 266MHz PowerPC 750 processor and provides 128MB of battery-backed ECC cache with two internal and four external Ultra160 connectors (a combination of four connectors may be utilized). External connectors are 0.8mm VHDCI.
4. ServeRAID-4Mx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor that provides 64MB of battery-backed ECC cache and two internal and two external Ultra160 connections (only two connectors may be used simultaneously). External connectors are 0.8mm VHDCI.
5. ServeRAID-4Lx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor and provides a single channel, 32MB of ECC cache and either one internal or one external Ultra160 connection. External connector is 0.8mm VHDCI.
6. ServeRAID-5i Controller (P/N 25P3492) supports both Ultra320 and Ultra160 HDDs in a dedicated or mixed environment, allowing each HDD to perform at rated capacity. The adapter installs into limited PCI slots and converts both channels of the integrated SCSI controller to RAID in conjunction with the LSI 1020/30 chipset. Both standard and the optional SCSI HDD backplanes as well as internal tape drives and external SCSI devices cable directly to the onboard controller connectors. Supports up to 528MB/s data transfers across the PCI bus with 128MB ECC SDRAM write-back cache with battery backup. Supports RAID levels 0, 1, 10, 5, 50 and 1E. The option includes brackets for installation in both low-profile and standard PCI slots. Internal and external tape drives are supported by ServeRAID-5i only when a second channel on the integrated controller is available and the RAID configuration designates the second channel as a conventional SCSI bus. See system sections for supported tape drives.
7. ServeRAID-6i Controller (P/N 71P8595) is a PCI-X adapter supporting both Ultra320 and Ultra160 HDDs in a dedicated or mixed environment, allowing each HDD to perform at rated capacity. The adapter installs into limited PCI slots and converts both channels of the integrated SCSI controller to RAID in conjunction with the LSI 1030 chipset. Both standard and the optional SCSI HDD backplanes as well as internal tape drives and external SCSI devices cabled directly to the onboard controller connectors. Supports up to 1,064MB/s data transfers across the PCI bus with 128MB ECC SDRAM write-back cache with battery backup. Supports RAID levels 0, 1, 10, 5, 50 and 1E. The option includes brackets for installation in both low-profile and standard PCI slots. Internal and external tape drives are supported by ServeRAID-6i only when a second channel on the integrated controller is available and the RAID configuration designates the second channel as a conventional SCSI bus. See system sections for supported tape drives.
8. ServeRAID-6M (P/Ns 02R0988, 32P0033) are PCI-X adapters powered by a 600MHz Intel xScale processor, providing 256MB or 128MB of ECC SDRAM battery-backed cache. The dual-channel Ultra320 controller includes two internal 68-pin connectors and two external 0.8mm VHDCI connectors, supporting up to 14 HDDs on each channel at data transfer rates of up to 1,064MB/s. Supports RAID levels 0, 1, 10, 1E0, 5, 50 and 5EE with both Ultra160 and Ultra320 HDDs.
9. ATA133 RAID controller (P/N 71P8592) supports RAID levels 0, 1 and 10 on up to four ATA66, 100 or 133 EIDE HDDs. The dual-channel IDE controller includes two internal 40-pin connectors, two 18in single-drop IDE cables (P/N 02R0719) and two 23in two-drop IDE cables (P/N 02R0721).
10. PCI Wide Ultra160 SCSI Adapter (P/N 19K4646) provides a single channel with one internal connector, a five-drop multi-mode terminated LVD SCSI cable and one external 0.8mm VHDCI connector. Only one of the two connectors may be utilized. Hardware is included in the option to support either low-profile or
11. Single Channel Ultra320 SCSI Controller (P/N 71P8594) provides a single channel with one 68-pin internal connector, a four-drop multimode terminated LVD SCSI cable and one external 0.8mm VHDCI connector. Only one of the two connectors may be utilized. Hardware is included in the option to support either low-profile (2U) or full-size (3U) installations.
12. See Fibre Channel Solutions Overview section for additional configuration information.
13. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. See individual system I/O Options sections for additional information on adapter driver compatibility.
14. For use of the Alert on LAN 2 features in the Desktop adapter, the system must be enabled with IBM-compatible Alert on LAN 2 hardware and software components. Use of the Wake on LAN function requires a PCI 2.2 compatible system that supports Wake on LAN and provides auxiliary 3.3v power through the PCI bus.
15. Use of the Wake on LAN function requires a PCI 2.2 compatible system that supports Wake on LAN and provides auxiliary power through the PCI bus.
16. Use of the Wake on LAN function requires a PCI 2.1 or 2.2-compatible system that supports Wake on LAN and provides auxiliary power through the 5v Wake on LAN cable provided with the adapter via a 3-pin header in the system planar.
17. Up to 24 Integrated System Management Processors or Remote Supervisors Adapters may be interconnected with an aggregate connection length of no more than 91.4m (300ft). This interconnect network of 24 devices may also include a maximum of 12 Advanced System Management Processors or advanced System Management PCI Adapters. A customer-supplied Cat5 cable is required for each interconnection.
18. When a standard Remote Supervisor Adapter or ASM PCI Adapter is installed in a dedicated PCI slot with an external connector, support for connection to other servers in an ASM interconnect network requires an optional Advanced System Management Interconnect Cable Kit (P/N 03K9309). Where applicable, direct connection to the RXE drawer management controller in an RXE-100 Remote Expansion Enclosure is supported through a standard Interconnect Management Cable Kit with 3.5m cable (8m optional cable is available). Support is provided through a single LAN or modem connection.
19. Remote Supervisor Adapter (P/N 09N7585) includes an adapter card, 20-pin ribbon cable, AC power adapter, power cable, power cable for UPS attachment, single pigtail cable, two RS-485 terminators and 1ft Cat5 cable.
20. Remote Supervisor Adapter II (P/N 59P2984) includes an internal 20-pin ribbon cable for connection to the system planar, an interconnect cable, a 56w AC power adapter, an intrack power cable and a country-specific wall power cord. External connectors include an RS230 (9-pin) serial port, 10/100 base T Ethernet port (RJ-45), interconnect port (RJ-11) and power connector. The interconnect cable includes a single RJ-11 connector and dual RJ-48 ports. Supports an interconnect network of up to 24 RSAs or ISMPs with aggregate cable connection length of 300ft (91.4m) or less. No more than 12 ASMPs are supported in an interconnect network. RJ-45 bus is self-terminating, i.e., terminators are not required for the interconnect bus.
21. Due to homologation variances, modem availability differs by country. 19K4162 is supported by Windows operating systems only.
22. Some xSeries servers support the IXA Adapter (P/N 1519100) for connection to iSeries models. Refer to system sections for PCI slot restrictions.
23. RXE-100 Remote Expansion Enclosure supports up to 12 additional PCI-X slots. Cable required for connection included with expansion unit, which attaches to a standard integrated RIO port located on the back of the system chassis. An optional longer cable is available. Refer to RXE-100 section for diagrams and supported options.
24. Required to connect RAID controllers to the hot-swap backplane in x235 or x345.
25. Required to enable external 0.8mm VHDCI connectors on some systems.
26. Required to enable external 68-pin high-density SCSI connector on some IntelliStation systems.
27. When supported, this option can be used for certain external device connections when only USB ports rather than serial or parallel ports are present on a system chassis.
28. Available only in the US.
29. The option includes brackets for installation in both low-profile and full-size PCI slots.
30. This adapter is designed using PCI-X technology.
31. Although the voltage key of this adapter is universal (compatible with 3.3 or 5v slots), the BIOS of each system limits installation to a specific PCI slot.



Appendix H: Technical Update

IBM @server BladeCenter power module upgrade guidelines

This *Technical Update* contains information that will help you determine whether you need to upgrade the power modules in your IBM® @server™ BladeCenter™ unit when installing IBM @server BladeCenter HS20 blade servers.

Attention: Nonredundant power is not supported in BladeCenter products. Power modules must always be present in power bays 1 and 2. When any blade server or option is in blade bay 7 through 14, power modules must be present in power bays 1 and 2, and power modules must be present in power bays 3 and 4.

If a power module fails or an ac power failure occurs, BladeCenter units configured for redundant power operation, as described in this document, will operate in a nonredundant mode, and the blower modules will run at full speed. You must replace the failing power module or restore ac power as soon as possible to regain redundant power operation and to reset the blower modules to their normal operating speed.

As of the date of this printing, three BladeCenter power-module options are available:

- IBM BladeCenter 1200W Power Supply Module (part number 48P7052)
- IBM BladeCenter 1200W to 1400W Power Supply Upgrade Kit (part number 90P0197)
- IBM BladeCenter 1800W Power Supply Module (part number 13N0570)

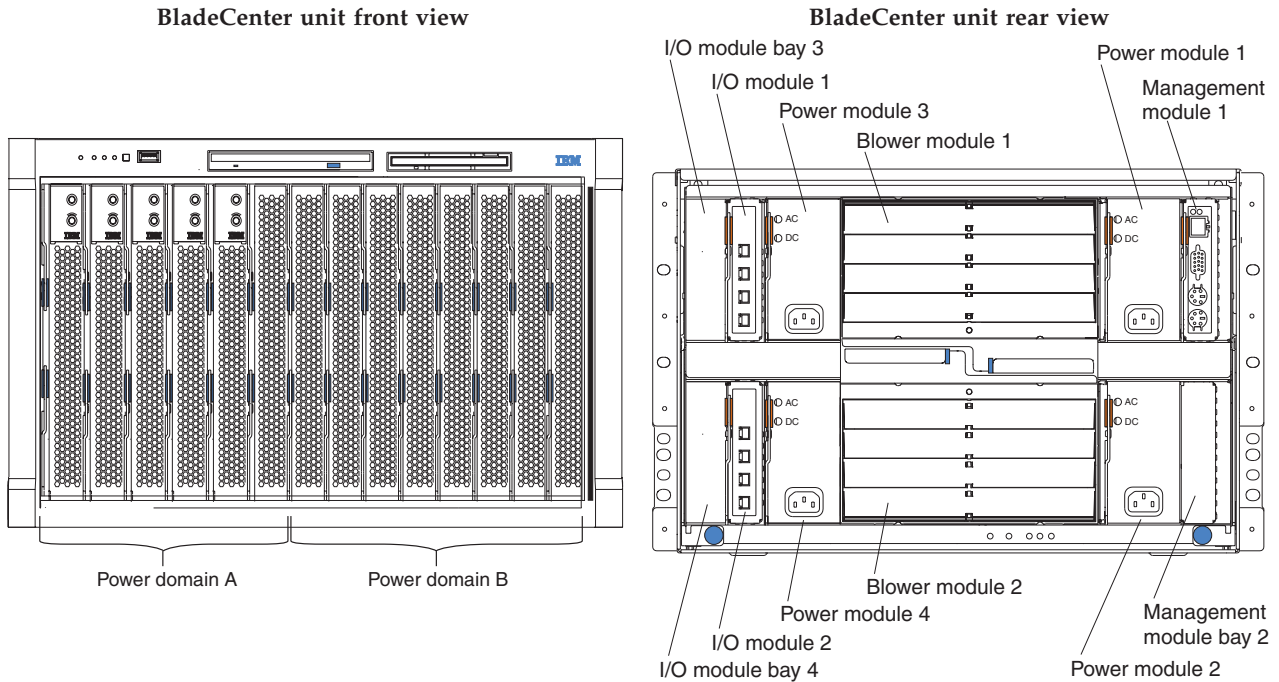
Go to <http://www.ibm.com/pc/compat/> for information about ordering these options.

Keep this *Technical Update* with your BladeCenter and blade server documentation for future reference.

BladeCenter power overview

Your BladeCenter unit is separated into two power domains. Power domain A supports all the BladeCenter modules and blade servers 1 through 6; power domain A uses power modules 1 and 2.

Power domain B supports blade servers 7 through 14 and uses power modules 3 and 4. To support blade servers in power domain B, a power-supply option (consisting of two power modules) must be installed.



Important:

1. The power modules must be installed in pairs in a domain and must match each other in capacity (wattage, amperage, and so on).
2. A power domain operating above the capacity of a single power module results in a nonredundant power condition.
3. In a pair of power modules, a power module that is not connected to 200-240 volt ac power source results in a nonredundant power condition.
4. To provide true redundant power, BladeCenter power modules 1 and 3 must be connected to a different 200-240 volt ac power source than power modules 2 and 4.

Table 1 lists the power requirement for each IBM *@server* BladeCenter blade server that is available as of the date of this printing, with one microprocessor or two. These power requirements assume that each blade server is fully configured (with four dual inline memory modules [DIMMs] and two IDE disk drives). Use the values in Table 1 and complete the upgrade calculation (see "Upgrade calculation" on page 3) to determine which power modules are needed to deliver full power redundancy for your configuration.

Table 1. Blade server power values

Blade servers with 4 DIMMs and 2 IDE drives	IBM power units
2.0 GHz/400 MHz @server BladeCenter HS20 blade server with 1 microprocessor (8678-21X)	0.9
2.0 GHz/400 MHz @server BladeCenter HS20 blade server with 2 microprocessors (8678-21X)	1.1
2.4 GHz/400 MHz @server BladeCenter HS20 blade server with 1 microprocessor (8678-41X)	0.9
2.4 GHz/400 MHz @server BladeCenter HS20 blade server with 2 microprocessors (8678-41X)	1.2
2.6 GHz/400 MHz @server BladeCenter HS20 blade server with 1 microprocessor (8678-51X)	1.0
2.6 GHz/400 MHz @server BladeCenter HS20 blade server with 2 microprocessors (8678-51X)	1.2
2.8 GHz/400 MHz @server BladeCenter HS20 blade server with 1 microprocessor (8678-61X)	1.0
2.8 GHz/400 MHz @server BladeCenter HS20 blade server with 2 microprocessors (8678-61X)	1.3
2.8 GHz/533 MHz @server BladeCenter HS20 blade server with 1 microprocessor (8832-21X)	1.0
2.8 GHz/533 MHz @server BladeCenter HS20 blade server with 2 microprocessors (8832-21X)	1.5
3.06 GHz/533 MHz @server BladeCenter HS20 blade server with 1 microprocessor (8832-31X)	1.2
3.06 GHz/533 MHz @server BladeCenter HS20 blade server with 2 microprocessors (8832-31X)	1.6
3.2 GHz/533 MHz @server BladeCenter HS20 blade server with 1 microprocessor (8832-G1X)	1.2
3.2 GHz/533 MHz @server BladeCenter HS20 blade server with 2 microprocessors (8832-G1X)	1.65
SCSI Storage Expansion Unit Option (48P7058)	0.4

Note: The IBM power unit values in this table are based on typical workloads.

Upgrade calculation

Complete the following steps to determine the power-module capacity that is needed to maintain full redundancy in each power domain.

Attention: If you are replacing the existing power modules with 1800 W power modules, you must upgrade the management-module firmware. If two management modules are installed in the BladeCenter unit, both management modules must be upgraded to the same level of firmware. Go to the IBM Support Web site at <http://www.ibm.com/pc/support/> and obtain the latest firmware.

1. In the power worksheets on page 6, list the blade servers that are installed in the blade bays.
2. In Table 1, look up the number of IBM power units associated with each blade server and enter it in the applicable power worksheet (see “Example calculation” on page 7).
3. Add all of the IBM power unit values for each domain and enter the totals.

4. To maintain full power redundancy in power domain A, make sure that the power modules in bays 1 and 2 are connected to different 200-240 volt ac power sources and meet the following requirements:
 - If the sum of the IBM power unit values is less than 7.4, domain A has power modules that are 1200 W or greater.
 - If the sum is greater than or equal to 7.4 and less than 9.0, domain A has power modules that are 1400 W or greater.
 - If the sum is greater than or equal to 9.0, domain A has power modules that are 1800 W.

Note: If the label on the power module shows 7.5A, the power module is a 1200 W module; if the label on the power module shows 9A, the power module is a 1400 W module; if the label on the power module shows 12A, the power module is an 1800 W module.

Important: If the sum of the power unit values in power domain A is greater than the capacity of the installed power modules, power domain A has nonredundant power. Complete the following steps:

- a. Determine whether rearranging the blade servers between power domain A and power domain B in the BladeCenter unit will sufficiently reduce the power requirements for the power domain (use the power worksheets on page 6).
 - b. If rearranging the blade servers does not sufficiently reduce the power requirements, the power modules must be upgraded to maintain redundancy. Install the 1200W to 1400W Power Supply Upgrade Kit (part number 90P0197) on the power modules to attain 1400 W, or install the 1800W Power Supply Module option (part number 13N0570) to attain 1800 W. Go to <http://www.ibm.com/pc/compat/> for information about ordering these options.
5. To maintain full power redundancy in power domain B, make sure that the power modules in bays 3 and 4 are connected to different 200-240 volt ac power sources and meet the following requirements:
 - If the sum of the IBM power unit values is less than 9.9, domain B has power modules that are 1200 W or greater.
 - If the sum is greater than or equal to 9.9 and less than 11.5, domain B has power modules that are 1400 W or greater.
 - If the sum is greater than or equal to 11.5, domain B has power modules that are 1800 W.

Note: If the label on the power module shows 7.5A, the power module is a 1200 W module; if the label on the power module shows 9A, the power module is a 1400 W module; if the label on the power module shows 12A, the power module is a 1800 W module.

Important: If the sum of the power unit values in power domain B is greater than the capacity of the installed power modules, power domain B has nonredundant power. Complete the following steps:

- a. Determine whether rearranging the blade servers between power domain A and power domain B in the BladeCenter unit will sufficiently reduce the power requirements for the power domain (use the power worksheets on page 6).
- b. If rearranging the blade servers does not sufficiently reduce the power requirements, the power modules must be upgraded to maintain redundancy. Install the 1200W to 1400W Power Supply Upgrade Kit (part number 90P0197) on the power modules to attain 1400 W, or install the 1800W Power Supply Module option (part number 13N0570) to attain 1800 W. Go to <http://www.ibm.com/pc/compat/> for information about ordering these options.

Statement 13:



DANGER

Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device for electrical specifications.

Power distribution unit assessment

If your calculations indicate that you need to upgrade your power modules, you will also need to reassess your power distribution unit (PDU) configuration. Use the IBM *BladeCenter Planning and Installation Guide* to determine the number and types of PDUs that you need. Complete the following steps to obtain the *BladeCenter Planning and Installation Guide*:

1. Go to <http://www.ibm.com/pc/support/>.
2. Click the BladeCenter link under **Servers**, and then select the brand **Servers** and the family **BladeCenter**.
3. Click **Continue**.
4. From the **View by document type** menu, click **Online publications**.

Power worksheets

Power domain A worksheet (for power modules 1 and 2)

Blade bay	Blade server description	IBM power units
1		
2		
3		
4		
5		
6		
	Total	

Power domain B worksheet (for power modules 3 and 4)

Blade bay	Blade server description	IBM power units
7		
8		
9		
10		
11		
12		
13		
14		
	Total	

Example calculation

Power domain A worksheet (for power modules 1 and 2)

Blade bay	Blade server description	IBM power units
1	3.06 GHz/533 MHz blade server with 2 microprocessors	1.6
2	SCSI Storage Expansion Unit	0.4
3	3.06 GHz/533 MHz blade server with 2 microprocessors	1.6
4	SCSI Storage Expansion Unit	0.4
5	3.06 GHz/533 MHz blade server with 2 microprocessors	1.6
6	3.06 GHz/533 MHz blade server with 2 microprocessors	1.6
	Total	7.2

Result:

- 7.2 IBM power units < 7.4 IBM power units
- Two 1200 W power modules will provide full power redundancy for power domain A

Power domain B worksheet (for power modules 3 and 4)

Blade bay	Blade server description	IBM power units
7	3.2 GHz/533 MHz blade server with 2 microprocessors	1.65
8	3.2 GHz/533 MHz blade server with 2 microprocessors	1.65
9	3.2 GHz/533 MHz blade server with 2 microprocessors	1.65
10	3.2 GHz/533 MHz blade server with 2 microprocessors	1.65
11	3.2 GHz/533 MHz blade server with 2 microprocessors	1.65
12	3.2 GHz/533 MHz blade server with 2 microprocessors	1.65
13	3.2 GHz/533 MHz blade server with 2 microprocessors	1.65
14	Filler blade	0.0
	Total	11.55

Result:

- 11.55 IBM power units > 11.5 IBM power units
- Two 1800 W power modules will provide full power redundancy for power domain B

Attention: To maintain proper system cooling, each unoccupied blade bay must contain a filler blade. To maintain proper module cooling, each unoccupied IO or management module bay must contain a filler.

The copyright information on this page pertains only to Appendix H: BladeCenter Power Module Upgrade Guidelines.
This book contains more information following this page.

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