

IBM Scale Out Network Attached Storage

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At a glance



The IBM® Scale Out Network Attached Storage (SONAS) is a highly scalable system designed to provide a clustered NAS system with a single name space for CIFS, NFS, and FTP services. The system consists of two to thirty Interface nodes (2851-SI1), one to thirty storage pods consisting of the Storage node (2851-SS1), Storage controller (2851-DR1) and attached disks, and one to two Management nodes (2851-SM1). The maximum configuration provides up to 14.4 PB of storage capacity in a single clustered, highly-redundant system.

The storage used in the SONAS system can be high performance 15K RPM SAS hard disk drives or high capacity 7.2K RPM SATA hard disk drives, allowing users to tune the configuration to suit their needs.

There are three rack configurations (2851-RXA, -RXB, and -RXC) that can be populated with the systems and switches needed to configure according to the needs of the user environment.

For ordering, contact your IBM representative, an IBM Business Partner, or IBM Americas Call Centers at 800-IBM-CALL (Reference: SE001).

Overview

IBM Scale Out Network Attached Storage (SONAS) is a Scale Out NAS offering designed to manage vast repositories of information in enterprise environments requiring very large capacities, high levels of performance, and high availability. The system supports multiple petabytes of storage and up to a billion files in a single file system and supports up to 256 file systems per system. Data access to the system from client computers is provided using industry standard network file protocols NFS v2/v3, CIFS, and FTP (including z/OS® NFS client support). In addition, the system supports traditional NAS features and functions, including:

- Snapshots
- Quotas (user, group, and fileset level)
- Integration with user directory servers such as Microsoft® Active Directory (AD) and Lightweight Directory Access Protocol (LDAP)
- Command line interface (CLI) and browser-based graphical user interface (GUI)
- Call home and remote support capabilities

In addition to these traditional features, the system supports advanced features, including integrated Tivoli® Storage Manager (TSM) backup client.

The system consists of:

- Management node
- Interface nodes
- Storage nodes
- Storage controllers
- Disk storage expansion units
- Ethernet and InfiniBand switches and racks

The Management node provides a central point for the system administrator to configure, monitor, and manage the system. The management node supports both a browser-based graphical user interface (GUI) and a command line interface (CLI). It also provides a System Health Center for monitoring the overall health of the system.

The Interface node provides the network port connection and the file services for the IBM SONAS system. These nodes can operate at up to 10 Gb speeds with optional adapters to providing extremely fast access to data. They are connected to the rest of the SONAS system via a redundant high speed InfiniBand data network.

The system has the concept of a storage pod. Each storage pod consists of a pair of storage nodes and one or two storage controllers. Each storage controller contains 60 disks, and can have one storage expansion attached for 60 additional disks per controller. Each storage pod supports a maximum of 240 hard disk drives. A maximum of 30 storage pods are supported for a maximum of 7200 hard disk drives in a single system.

These systems are configured within three pre-defined, customizable rack configurations. The Base Rack (2851-RXA) contains the management node, the InfiniBand switches, and from two to six interface nodes with up to one storage pod. Each Storage Expansion Rack (2851-RXB) contains up to two storage pods, for a

maximum of 480 disks. The Interface Expansion Rack (2851-RXC) contains up to twenty additional interface nodes.

Key prerequisites

Orders for the IBM Scale Out Network Attached Storage (SONAS) models must be configured using the eConfigurator (ECMSSD) to support accurate and complete order entry.

Planned availability date

- March 12, 2010: IBM Scale Out Network Attached Storage (SONAS) new order shipment begins
- April 23, 2010:
 - 2 TB drives for IBM Scale Out Network Attached Storage (Feature #1301) for SONAS nodes (2851-DR1, 2851-DE1)
 - Acoustic doors (Feature #6249) for SONAS racks (2851-RXA, 2851-RXB and 2851-RXC)
- June 12, 2010: Rear door heat exchanger (Feature #6858) for SONAS racks (2851-RXA, 2851-RXB, 2851-RXC)

Description

The main components of the IBM Scale Out Network Attached Storage (SONAS) system are the Interface node (2851-SI1), Management node (2851-SM1), Storage node (2851-SS1), Storage controller (2851-DR1), and Disk Storage expansion Unit (2851-DE1). These components are assembled into one of three rack configurations with Ethernet and InfiniBand switches.

The minimum SONAS system configuration consists of:

- Two Interface nodes
- Two 36-port 4X DDR InfiniBand switches
- One Management node
- Two Storage nodes with one Storage controller

The maximum size of a SONAS system, in terms of Interface nodes and Storage pods, depends on whether the 36-port or 96-port InfiniBand switch is selected. Each of the following major components requires one IB port on each IB switch:

- Management node
- Interface node
- Storage node

Three InfiniBand ports of each IB switch are reserved for the following components:

- Two reserved for future use
- One for the required Management node

The remaining IB ports are available for Interface nodes and Storage nodes.

The Interface node (2851-SI1) is a 2U server containing the following:

- Two Intel® Xeon® E5530 (Nehalem EP) quad-core processors
- 32 GB of DDR3 memory standard, with feature to add an additional 32 GB of memory
- Four onboard 10/100/1000 Ethernet ports (two available for customer use)

- Two 300 GB 2.5-inch SFF 10K RPM SAS Slim-HS hard disk drives with mirroring between the two HDDs
- Four PCIe Gen 2.0 x8 adapter slots (two available for customer use)
- Integrated Baseboard Management controller (IBMC)
- Two redundant hot-swappable power supplies
- Six redundant hot-swappable cooling fans

The Interface node provides the connections to the customer's IP network for attaching to the SONAS system for network file serving capabilities (CIFS, NFS, FTP). A SONAS system contains a minimum of two Interface nodes and a maximum of 30.

The Interface node contains two redundant hot-swappable 300 GB 2.5-inch 10K RPM SAS HDDs with mirroring between them for high-availability. The HDDs contain the SONAS System Software product which hosts the operating system and all other software needed for an operational SONAS system.

Two of the PCIe adapter slots are already populated with two single-port 4X Double Data Rate (DDR) InfiniBand Host Channel Adapters (HCA). The two HCAs attach to two independent InfiniBand switches in the SONAS system and interconnect the Interface nodes to the Management node(s) and the Storage nodes.

Two of the PCIe adapter slots are available for customer use to add more adapters for host IP interface connectivity.

Each Interface node comes standard with two 10/100/1000 Ethernet ports available to connect to the customer's IP network. Additional Ethernet connectivity may be achieved by adding one of the following features:

- 1100 (Quad-port 1GbE NIC)
- 1101 (Dual-port 10 Gb Converged Network Adapter).

Each Interface node is connected to the two InfiniBand switches by one InfiniBand cable to each switch, a total of two cables. The InfiniBand Host Channel Adapters (HCA) in the Interface nodes have an X4 port. The 36-port InfiniBand switches have QSFP connectors and the 96-port IB switches have X4 connects.

For an Interface node (2851-SI1) in the base rack (2851-RXA) no InfiniBand cables need to be ordered. Copper InfiniBand cables are automatically provided for all Interface nodes in the base rack. The length of the copper InfiniBand cables provided is based on the position of the Interface node in the rack.

The Management node (2851-SM1) is a 2U server containing the following:

- Two Intel Xeon E5530 (Nehalem EP) quad-core processors
- 32 GB of DDR3 memory
- Four onboard 10/100/1000 Ethernet ports (two for connecting to customer network for management access)
- Two 300 GB 2.5-inch SFF 10K RPM SAS Slim-HS hard disk drives with mirroring between the two HDDs
- One non-mirrored 300 GB 2.5-inch SFF 10K RPM SAS Slim-HS hard disk drive for centralized log/trace file collection
- Four PCIe Gen 2.0 x8 adapter slots
- Integrated Baseboard Management Controller (IBMC)
- Two redundant hot-swappable power supplies
- Six redundant hot-swappable cooling fans

The Management node provides the user interface for configuring, administering, and monitoring the SONAS system. A single Management node is required. The Management node contains two redundant hot-swappable 300 GB 2.5-inch 10K RPM SAS HDDs with mirroring between them for high-availability. The hard disk drives

contain the SONAS System Software product which hosts the operating system and all other software needed for an operational SONAS system.

Two of the PCIe x8 adapter slots are already populated with two single-port 4X Double Data Rate (DDR) InfiniBand Host Channel Adapters (HCA). The two HCAs attach to two independent InfiniBand switches in the SONAS system and interconnect the Management node to the other components of the SONAS system.

The Management node comes with two InfiniBand copper cables to connect it to the two InfiniBand switches in the base rack. The primary Management node is assumed to be in the SONAS base rack with the two InfiniBand switches.

The Storage node (2851-SS1) is a 2U server containing the following:

- Two Intel Xeon E5530 (Nehalem EP) quad-core processors
- 8 GB of DDR3 memory
- Four onboard 10/100/1000 Ethernet ports
- Two 300 GB 2.5-inch SFF 10K RPM SAS Slim-HS hard disk drives with mirroring between the two HDDs
- Four PCIe Gen 2.0 x8 adapter slots
- Integrated Baseboard Management Controller (iBMC)
- Two redundant hot-swappable power supplies
- Six redundant hot-swappable cooling fans

The Storage node provides the InfiniBand connection to the InfiniBand cluster interconnect and direct fibre-channel attachment to the SONAS Storage controller. Storage nodes must be configured in high-availability (HA) pairs. The two Storage nodes in the HA pair are connected to one or two SONAS Storage controllers.

Two of the onboard Ethernet ports connect the storage node to the internal private management network, and two for a NULL Ethernet connection to the DASD Disk Storage controller.

The Storage node contains two redundant hot-swappable 300 GB 2.5-inch 10K RPM SAS HDDs with mirroring between them for high-availability. The hard disk drives contain the SONAS System Software product which hosts the operating system and all other software needed for an operational SONAS system.

All of the PCIe x8 adapter slots in the storage node are already populated with adapters. Two of the PCIe adapter slots are populated with two single-port 4X DDR InfiniBand HCAs for attaching to the two InfiniBand switches in the SONAS system. The other two PCIe x8 adapter slots are populated with two dual-port 8 Gbps Fibre Channel Host Bus Adapters (HBAs) for attaching to the SONAS Storage controller.

The SONAS Storage controller (2851-DR1) is a high-performance 4U Storage controller containing:

- Dual redundant hot-swappable RAID controllers
- Dual redundant hot-swappable power supply and cooling modules
- Support for 60 3.5-inch SAS/SATA HDDs

Each RAID controller contains:

- 4 GB of cache
- Two 8 Gbps FC host ports
- One drive-side SAS expansion port

The Storage controller supports RAID 1, 5 and 6. One high-density disk Storage expansion unit may be attached to the Storage controller. The Storage controller comes with four FC optical cables for attaching the Storage controller to the two Storage nodes.

All sixty hard disk drives in the Storage controller must be the same, therefore a quantity of six of feature #1300, #1301, or #1310 must be ordered.

The following table shows the total raw storage capacity of the Storage controller when populated with the different hard disk drive features:

Quantity	Feature	Description	Total raw storage capacity
6	1300	10-pack of 7.2K RPM 1 TB SATA	60 TB
6	1301	10-pack of 7.2K RPM 2 TB SATA	120 TB
6	1310	10-pack of 15K RPM 450 GB SAS	27 TB

Features #9011, #9012, #9013, and #9014 are plant-only feature and are used to indicate into which Storage controller location (1-4) this particular Storage controller is to be placed during manufacturing. The rack must be populated from the bottom of the rack (EIA position 1) to the top of the rack (EIA position 42) for stability reasons. Therefore, the following rules apply to the placement of Storage controllers within the rack:

- You may not have a Storage controller in location #4 (EIA positions 29-32) unless you have a Storage controller in location #3 (EIA positions 21-24).
- You may not have a Storage controller in location #3 (EIA positions 21-24) unless you have a Storage controller in location #2 (EIA positions 9-12).
- You may not have a Storage controller in location #2 (EIA positions 9-12) unless you have a Storage controller in location #1 (EIA positions 1-4).

Additionally, features #9013 and #9014 are not valid when plant-merging the storage controller into the Base Rack (2851-RXA), since the Base Rack only holds two Storage controllers.

The SONAS disk Storage expansion unit (2851-DE1) is a 4U high-density disk enclosure supporting 60 3.5 inch SATA or SAS hard disk drives One disk Storage expansion unit may be attached to a single SONAS Storage controller. Each disk Storage expansion unit contains the following:

- Two SAS switch modules which provide SAS connections to the storage controller
- Two redundant hot-swappable power supply and cooling units
- Support for 60 3.5-inch SAS or SATA HDDs

The Disk Storage expansion unit must be physically located in the same rack and in adjacent EIA positions as the SONAS Storage controller to which it is attaching.

All sixty hard disk drives in the disk Storage expansion unit must be the same, therefore a quantity of six of feature #1300, #1301, or #1310 must be ordered.

The following table shows the total raw storage capacity of the disk Storage expansion unit when populated with the different types of hard disk drive features:

Quantity	Feature	Description	Total raw storage capacity
6	1300	10-pack of 7.2K RPM 1 TB SATA	60 TB
6	1301	10-pack of 7.2K RPM 2 TB SATA	120 TB
6	1310	10-pack of 15K RPM 450 GB SAS	27 TB

Features #9021, #9022, #9023, and #9024 are plant-only features and are used to indicate into which disk Storage expansion unit location (1-4) this particular disk Storage expansion unit is to be placed during manufacturing. A disk Storage expansion unit must be attached to a Storage controller. The Storage controller attached to a disk Storage expansion unit should be in the EIA position immediately adjacent and below the disk Storage expansion unit. Therefore, the following rules apply to the placement of Storage controllers within the rack:

- You may not have a disk Storage expansion unit in disk Storage expansion unit location #1 (EIA positions 5-8) unless you have a Storage controller in Storage controller location #1 (EIA positions 1-4).
- You may not have a disk Storage expansion unit in disk Storage expansion unit location #2 (EIA positions 13-16) unless you have a Storage controller in Storage controller location #2 (EIA positions 9-12)
- You may not have a disk Storage expansion unit in disk Storage expansion unit location #3 (EIA positions 25-28) unless you have a Storage controller in storage controller location #3 (EIA positions 21-24)
- You may not have a disk Storage expansion unit in disk Storage expansion unit location #4 (EIA positions 33-36) unless you have a Storage controller in Storage controller location #4 (EIA positions 29-32)

Additionally, features #9023 and #9024 are not valid when plant-merging the Storage controller into the Base Rack (2851-RXA), since the Base Rack only holds two disk Storage expansion units.

Infiniband switches

The major components of a SONAS system (Interface node, Storage node, and Management node) are interconnected by a high-performance low-latency InfiniBand 4X Double Data Rate (DDR) fabric. Two redundant InfiniBand switches are incorporated inside each SONAS system.

For small and medium configuration, a 1U 36-port 4X DDR InfiniBand switch is available. For larger configurations a 7U 96-port 4X DDR InfiniBand switch is available. Two identical IB switches must be ordered for a SONAS system, either two 36-port IB switches or two 96-port IB switches. These IB switches are described in the following sections.

36-port IB switch

The SONAS 36-port IB switch (2851-I36) is a 4X DDR InfiniBand switch providing 36 QSFP ports, with each port operating at 20 Gbps. This IB switch provides a maximum backplane bandwidth of 1.44 Tbps and contains an embedded IB fabric manager. The switch provides two redundant hot-swap power supplies.

96-port IB switch

The 96-port IB switch (2851-I96) provides a 96-port 4X DDR InfiniBand switch providing up to 96 4X DDR X4 switch ports. The 96-port IB switch is intended for large SONAS system configurations. The IB switch provides a maximum backplane bandwidth of 3.84 Tbps. The 96-port IB switch comes standard with the following:

- Two 96-port InfiniBand Switch Fabric boards
- One 24-port 4X DDR Line Board
- One Hi-Memory Management board containing an embedded IB fabric manager
- Two Power Supply Units (PSU)
- All fan assemblies

The 96-port switch comes standard with one 24-port 4X DDR line board providing 24 4X DDR (20 Gbps) IB ports. Up to three additional SLB-2024 24-port 4X DDR line boards may be added for a total of 96 ports.

The 96-port IB switch comes standard with two SLB-2004 Switch Fabric boards. Up to two additional SLB-2004 Switch Fabric boards may be added to provide additional backplane bandwidth.

The 96-port IB switch comes standard with two power supplies. Up to two additional PSUs may be added for redundancy. The two standard power supplies are capable of powering a fully configured 96-port IB switch with:

- Four SFV-2004 Switch Fabric boards
- Four SLB-2024 24-port 4X DDR line boards

- Two SMB-HM Hi-Memory Management boards

The following options may be added to the 96-port InfiniBand switch:

- FC 1500 96-port InfiniBand Switch Fabric board
- FC 1501 24-port 4X DDR InfiniBand Line Board
- FC 1502 Hi-Memory Management Board
- FC 1503 Power Supply

Accessibility by people with disabilities

A U.S. Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at

http://www.ibm.com/able/product_accessibility/index.html

Reference information

Refer to IBM Scale Out Network Attached Storage Software Announcement [210-035](#), dated February 09, 2010.

Product number

Description	Machine type	Model number	Feature number
IBM System Storage™ SONAS Interface Node	2851	SI1	
Additional 32GB Memory			1000
Quad port 1GbE NIC			1100
Dual port 10Gb CNA			1101
10m InfiniBand X4 to QSFP optical cable			1220
20m InfiniBand X4 to QSFP optical cable			1221
30m InfiniBand X4 to QSFP optical cable			1222
50m InfiniBand X4 to QSFP optical cable			1223
10m InfiniBand X4 to X4 optical cable			1230
20m InfiniBand X4 to X4 optical cable			1231
30m InfiniBand X4 to X4 optical cable			1232
50m InfiniBand X4 to X4 optical cable			1233
Plant merge into 2851 rack			9000
Field merge into 2851 rack			9001
Bulk order feature			9555
IGF transaction indicator			9556
Description	Machine type	Model number	Feature number
IBM System Storage SONAS Management Node	2851	SM1	
Plant merge into 2851 rack			9000
Field merge into 2851 rack			9001
IGF transaction indicator			9556
Description	Machine type	Model number	Feature number
IBM System Storage SONAS	2851	SS1	

Storage Node	
10m InfiniBand X4 to QSFP optical cable	1220
20m InfiniBand X4 to QSFP optical cable	1221
30m InfiniBand X4 to QSFP optical cable	1222
50m InfiniBand X4 to QSFP optical cable	1223
10m InfiniBand X4 to X4 optical cable	1230
20m InfiniBand X4 to X4 optical cable	1231
30m InfiniBand X4 to X4 optical cable	1232
50m InfiniBand X4 to X4 optical cable	1233
Plant merge into 2851 rack	9000
Field merge into 2851 rack	9001
Bulk order feature	9555
IGF transaction indicator	9556

Description	Machine type	Model number	Feature number
IBM System Storage SONAS Storage Controller	2851	DR1	
10-pack of 7.2K RPM 1TB SATA HDDs			1300
10-pack of 7.2K RPM 2TB SATA HDDs			1301
10-pack of 15K RPM 450GB SAS HDDs			1310
Plant merge into 2851 rack			9000
Field merge into 2851 rack			9001
Plant install 1st storage controller (EIA positions 1-4)			9011
Plant install 2nd storage controller (EIA positions 9-12)			9012
Plant install 3rd storage controller (EIA positions 21-24)			9013
Plant install 4th storage controller (EIA positions 29-32)			9014
Bulk order feature			9555
IGF transaction indicator			9556
Install in Base Rack			9800
Install in Storage Expansion Rack #1			9801
Install in Storage Expansion Rack #2			9802
Install in Storage Expansion Rack #3			9803
Install in Storage Expansion Rack #4			9804
Install in Storage Expansion Rack #5			9805
Install in Storage Expansion Rack #6			9806
Install in Storage Expansion Rack #7			9807
Install in Storage Expansion Rack #8			9808
Install in Storage Expansion Rack #9			9809
Install in Storage Expansion Rack #10			9810
Install in Storage Expansion Rack #11			9811
Install in Storage Expansion Rack #12			9812
Install in Storage Expansion Rack #13			9813
Install in Storage Expansion Rack #14			9814
Install in Storage Expansion Rack #15			9815

Description	Machine type	Model number	Feature number
IBM System Storage SONAS Disk Storage Expansion unit (DSE)	2851	DE1	
10-pack of 7.2K RPM 1TB SATA HDDs			1300
10-pack of 7.2K RPM 2TB SATA HDDs			1301
10-pack of 15K RPM 450GB SAS HDDs			1310
Plant merge into 2851 rack			9000

Field merge into 2851 rack	9001
Plant install 1st DES unit (EIA positions 5-8)	9021
Plant install 2nd DES unit (EIA positions 13-16)	9022
Plant install 3rd DES unit (EIA positions 25-28)	9023
Plant install 4th DES unit (EIA positions 33-36)	9024
Bulk order feature	9555
IGF transaction indicator	9556
Install in Base Rack	9800
Install in Storage Expansion Rack #1	9801
Install in Storage Expansion Rack #2	9802
Install in Storage Expansion Rack #3	9803
Install in Storage Expansion Rack #4	9804
Install in Storage Expansion Rack #5	9805
Install in Storage Expansion Rack #6	9806
Install in Storage Expansion Rack #7	9807
Install in Storage Expansion Rack #8	9808
Install in Storage Expansion Rack #9	9809
Install in Storage Expansion Rack #10	9810
Install in Storage Expansion Rack #11	9811
Install in Storage Expansion Rack #12	9812
Install in Storage Expansion Rack #13	9813
Install in Storage Expansion Rack #14	9814
Install in Storage Expansion Rack #15	9815

Description	Machine type	Model number	Feature number
IBM System Storage SONAS 36-port InfiniBand Switch	2851	I36	
Plant merge into 2851 rack			9000
Field merge into 2851 rack			9001
IGF transaction indicator			9556

Description	Machine type	Model number	Feature number
IBM System Storage SONAS 96-port InfiniBand Switch	2851	I96	
96-port InfiniBand Switch Fabric boards			1500
24-port 4X DDR InfiniBand Line Board			1501
Hi-memory Management board			1502
Power supply			1503
Plant merge into 2851 rack			9000
Field merge into 2851 rack			9001
IGF transaction indicator			9556

Description	Machine type	Model number	Feature number
IBM System Storage SONAS Base Rack	2851	RXA	
Two 50-port 10/100/1000 Level 2 Ethernet switches			0100
Service Ladder			0101
Plant install interface node			5000
Field install interface node (MES)			5001
Plant install management node			5002
Plant install storage node			5004
Field install storage node (MES)			5005
Plant install storage controller			5006
Field install storage controller			5007

(MES)	
Plant install disk storage expansion unit	5008
Field install disk storage expansion unit (MES)	5009
Plant install 36-port IB switch	5010
Plant install 96-port IB switch	5011
Standard front and rear doors	6070
Suite Attach Kit 2m rack	6086
Side Panel	6098
Acoustic front and rear doors	6249
Rear Door Heat Exchanger	6858
Side mount 1-phase PDUs	7188
Intelligent PDUs	7192
Config #1, 36-port IB switches, interface nodes only	9003
Config #2, 96-port IB switches, interface nodes only	9004
Config #3, 36-port IB switches, interface nodes and storage pod	9005
Power cord 1-ph, NEMA L6-30	9854
Power cord 1-ph IEC309, P+N+G 32A	9856
Power cord 1-ph Aust./New Zealand	9857
Power cord 1-ph, 250Vac Korea	9858

Description	Machine type	Model number	Feature number
IBM System Storage SONAS Storage expansion rack	2851	RXB	
Two 50-port 10/100/1000 Level 2 Ethernet switches			0100
Plant install storage node			5004
Field install storage node (MES)			5005
Plant install storage controller			5006
Field install storage controller (MES)			5007
Plant install disk storage expansion unit			5008
Field install disk storage expansion unit (MES)			5009
Standard front and rear doors			6070
Suite Attach Kit 2m rack			6086
Side Panel			6098
Acoustic front and rear doors			6249
Rear Door Heat Exchanger			6858
Side mount 1-phase PDUs			7188
Intelligent PDUs			7192
Storage expansion rack #1			9701
Storage expansion rack #2			9702
Storage expansion rack #3			9703
Storage expansion rack #4			9704
Storage expansion rack #5			9705
Storage expansion rack #6			9706
Storage expansion rack #7			9707
Storage expansion rack #8			9708
Storage expansion rack #9			9709
Storage expansion rack #10			9710
Storage expansion rack #11			9711
Storage expansion rack #12			9712
Storage expansion rack #13			9713
Storage expansion rack #14			9714
Storage expansion rack #15			9715
Power cord 1-ph, NEMA L6-30			9854
Power cord 1-ph IEC309, P+N+G 32A			9856
Power cord 1-ph Aust./New Zealand			9857
Power cord 1-ph, 250Vac Korea			9858

Description	Machine type	Model number	Feature number
IBM System Storage SONAS	2851	RXC	

Interface expansion rack	
Two 50-port 10/100/1000 Level 2 Ethernet switches	0100
Plant install interface node	5000
Field install interface node (MES)	5001
Standard front and rear doors	6070
Suite Attach Kit 2m rack	6086
Side Panel	6098
Acoustic front and rear doors	6249
Rear Door Heat Exchanger	6858
Side mount 1-phase PDUs	7188
Intelligent PDUs	7192
Power cord 1-ph, NEMA L6-30	9854
Power cord 1-ph IEC309, P+N+G 32A	9856
Power cord 1-ph Aust./New Zealand	9857
Power cord 1-ph, 250Vac Korea	9858

Model conversions

Not applicable

Feature conversions

Not applicable

Education support

Call IBM IT Education Services at 800-IBM-TEACH (426-8322) for catalogs, schedules, and enrollments.

Publications

Information about IBM Scale Out Network Attached Storage (SONAS) is provided on the Internet in the SONAS Information Center. The SONAS Information Center is also accessible through the product interface for easy access to task-specific topics. Adobe® Acrobat PDF versions of the content for browsing or printing are also in the SONAS Information Center and available as no-charge downloads from the IBM Publications Web site. In addition, a CD-ROM containing the SONAS product documentation is shipped with each order. To access the latest SONAS product information, see the IBM Scale Out Network Attached Storage Information Center at

<http://publib.boulder.ibm.com/infocenter/sonasic/sonas1ic/index.jsp>

The following publications are shipped with the product.

Title	Order number	Part number
Environmental Notices and User Guide	Z125-5823-02	29R2153
IBM Translated Safety Notices	G229-9054-02	45D6431
IBM Statement of Limited Warranty	GA32-0722-00	46X2375
IBM License Agreement for Machine Code	Z125-5468-04	49Y017

The following publications will be available at product availability. To order, contact your IBM representative.

Title	Order number	Part number
SONAS Software Administration Guide	GA32-0713-00	N/A
IBM Scale Out Network Attached Storage Software Configuration Guide	GA32-0718-00	N/A
SONAS User's Guide	GA32-0714-00	N/A
SONAS Installation Guide	GA32-0715-00	N/A
SONAS Introduction & Planning Guide	GA32-0716-00	N/A
Problem Determination and Troubleshooting Guide	GA32-0717-00	N/A

IBM Publications Center Portal

<http://www.ibm.com/shop/publications/order>

The Publications Center is a worldwide central repository for IBM product publications and marketing material with a catalog of 70,000 items. Extensive search facilities are provided, as well as payment options via credit card. A large number of publications are available online in various file formats, which can currently be downloaded free of charge.

Additional copies are available. To order, contact your IBM representative. These publications are also available at the following Web site

<http://www.ibm.com/storage>

The IBM Publications Center Portal

An online IBM information center will be available on the general availability date at the following Web site

<http://publib.boulder.ibm.com/infocenter/sonasic/sonas1ic/index.jsp>

Services

Global Technology Services

Support for installation and general technical support can be provided by local Field Technical Support Specialists (FTSS). You can also purchase complete planning, installation, implementation and configuration service from IBM Global Services. The list of selected services available in your region, either as standard or customized offerings, for the efficient installation, implementation, or integration of this product can be obtained from your respective IBM GTS regional offering executive. Implementation services for the SONAS appliance will be available at the time of SONAS product general availability or ship date:

Offering ID	Description
6948-K11	Implementation Services for Network Attached Storage systems - IBM Scale Out Network Attached Storage (SONAS)

IBM services include business consulting, outsourcing, hosting services, applications, and other technology management.

These services help you learn about, plan, install, manage, or optimize your IT infrastructure to be an On Demand Business. They can help you integrate your high-speed networks, storage systems, application servers, wireless protocols, and an array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs.

For details on available services, contact your IBM representative or visit

<http://www.ibm.com/services/>

For details on available IBM Business Continuity and Recovery Services, contact your IBM representative or visit

<http://www.ibm.com/services/continuity>

For details on education offerings related to specific products, visit

<http://www.ibm.com/services/learning/index.html>

Select your country, and then select the product as the category.

Technical information

Specified operating environment

Physical specifications

Width: 644 mm (25.4 in.)
Depth: 1608 mm (63.3 in.)
Height: 2015 mm (79.3 in.)

Model		Fully populated weight	
2851-RXA	FC 9003	794 Kg	(1750 lbs)
2851-RXA	FC 9004	749 Kg	(1650 lbs)
2851-RXA	FC 9005	1044 Kg	(2300 lbs)
2851-RXB		1343 Kg	(2960 lbs)
2851-RXC		817 Kg	(1800 lbs)

Operating environment

- Operating temperature maximum range
 - 10 C to 35° C (50 F to 95° F) at 900 m or less
- Recommended operating temperature range
 - 20 C to 25° C (68 F to 77° F)
- Operating relative humidity range
 - 40% to 55% non-condensing
- Non-operating temperature range
 - 5 C to 45° C (41 F to 113° F)
- Non-operating relative humidity range
 - 8% to 80% non-condensing
- Shipping temperature range
 - -40 C to 60° C (-40 F to 140° F)
- Shipping relative humidity range
 - 5% to 100% non-condensing

Recommended Power ratings for 2851 (per line cord)

Inrush Product	Voltag	Frequency (Hz)	Current (Amps)	current (A)	Power (Watts)	KVA	kbtu/hr
2851-RXA	200-240	50-60	24	300	4800	4.8	16.4
2851-RXB	200-240	50-60	24	300	4800	4.8	16.4
2851-RXC	200-240	50-60	24	300	4800	4.8	16.4
2851-I36	100-240	50-60	5	N/A	500	0.5	1.7
2851-I96	100-240	50-60	15	N/A	1500	1.5	5.2
2851-DE1	200-240	50-60	10	N/A	2000	2.0	6.9
2851-DR1	200-240	50-60	10	N/A	2000	2.0	6.9

2851-SI1	100-127	50-60	7.8	N/A	780	0.78	2.7
SS1, SM1	/200-240		/3.8				

Software requirements

The SONAS SW PID (5639-SN1) is a corequisite of the management, interface, and storage hardware nodes (2851-SI1, -SM1, -SS1), and must be ordered concurrently with the proper chargeable feature.

Planning information

Customer responsibilities

The IBM Scale Out Network Attached Storage machine type (2851) is designated as Customer Engineer (CE) installable. CE setup, operation, and service publications are available.

You are responsible for downloading or obtaining from IBM, and installing designated Machine Code (microcode, basic input/output system code (called "BIOS"), utility programs, device drivers, and diagnostics delivered with an IBM machine) and other software updates in a timely manner from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides. You may request IBM to install Machine Code changes; however, you may be charged for that service.

Cable orders

It is the customer's responsibility to provide the appropriate type for connecting the host or network and the 2851.

The cables to connect the various components of the 2851 must be ordered on the initial order and replacements can be obtained by ordering via MES.

Security, auditability, and control

This product uses the security and auditability features of the host hardware, host software, and/or application software to which it is attached.

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communications facilities.

IBM Electronic Services

IBM has transformed its delivery of hardware and software support services to help you achieve higher system availability. Electronic Services is a Web-enabled solution that offers an exclusive, no-additional-charge enhancement to the service and support available for IBM servers. These services are designed to provide the opportunity for greater system availability with faster problem resolution and preemptive monitoring. Electronic Services comprises two separate, but complementary, elements: Electronic Services news page and Electronic Services Agent.

The Electronic Services news page is a single Internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. The news page enables you to gain easier access to IBM resources for assistance in resolving technical problems.

The Electronic Service Agent™ is no-additional-charge software that resides on your server. It monitors events and transmits system inventory information to IBM on a periodic, client-defined timetable. The Electronic Service Agent automatically reports hardware problems to IBM. Early knowledge about potential problems enables IBM to deliver proactive service that may result in higher system availability and performance. In addition, information collected through the Service Agent is

made available to IBM service support representatives when they help answer your questions or diagnose problems. Installation and use of IBM Electronic Service Agent for problem reporting enables IBM to provide better support and service for your IBM server.

To learn how Electronic Services can work for you, visit

<http://www.ibm.com/support/electronic>

Terms and conditions

IBM Global Financing

Yes

Warranty period

One year

Warranty service

If required, IBM provides repair or exchange service depending on the types of warranty service specified for the machine. IBM will attempt to resolve your problem over the telephone, or electronically via an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. If applicable to your product, parts considered Customer Replaceable Units (CRUs) will be provided as part of the machine's standard warranty service.

Service levels are response-time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information.

CRU Service

IBM provides replacement CRUs to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM upon your request. CRUs are designated as being either a Tier 1 or a Tier 2 CRU.

Tier 1 CRU

Installation of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.

Tier 2 CRU

You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge.

Based upon availability, CRUs will be shipped for next business day (NBD) delivery. IBM specifies, in the materials shipped with a replacement CRU, whether a defective CRU must be returned to IBM. When return is required, return instructions and a container are shipped with the replacement CRU, you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

The following parts have been designated as Tier 1 CRUs:

- Hard disk drive
- Optical drive
- Fan
- I/O adapters
- Operator panel

- PCI adapters
- Power cord
- Power supply
- Processor power regulator
- Service processor

On-site Service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

The service level is:

- 9 hours per day, Monday through Friday, excluding holidays, next business day response. Calls must be received by 5 p.m. local time in order to qualify for next business day response.
- 9 hours per day, Monday through Friday, excluding holidays, 4 hour average, same business day response. Same business day service level includes the installation of Tier 1 CRUs at no additional charge.
- 24 hours per day, 7 days a week, 4 hour average, same day response. Same day service level includes the installation of Tier 1 CRUs at no additional charge.

Warranty service upgrades

During the warranty period, warranty service upgrades provide an enhanced level of On-site Service for an additional charge. Service levels are response-time objectives and are not guaranteed. See the Warranty services section for additional details.

IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability.

Maintenance service options

On-site Service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose. The following on-site response-time objectives are available as warranty service upgrades for your machine. Available offerings are:

- 9 hours per day, Monday through Friday, excluding holidays, 4 hour average, same business day response
- 24 hours per day, 7 days a week, 4 hour average response
- 24 hours per day, 7 days a week, 2 hour average response

Customer Replaceable Units (CRUs) may be provided as part of the machine's standard warranty CRU Service except that you may install a CRU yourself or request IBM installation, at no additional charge, under one of the On-site Service levels specified above. For additional information on the CRU Service, see the warranty information.

Maintenance services

If required, IBM provides repair or exchange service depending on the types of maintenance service specified for the machine. IBM will attempt to resolve your problem over the telephone or electronically, via an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response-time objectives and are not guaranteed. The specified

level of maintenance service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information. The following service selections are available as maintenance options for your machine type.

On-site Service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

Service levels are:

- 9 hours per day, Monday through Friday, excluding holidays, next business day response
- 9 hours per day, Monday through Friday, excluding holidays, 4 hour average response
- 24 hours per day, 7 days a week, 4 hour average response
- 24 hours per day, 7 days a week, 2 hour average response

Customer Replaceable Unit (CRU) Service

If your problem can be resolved with a CRU (for example, keyboard, mouse, speaker, memory, or hard disk drive), and depending upon the maintenance service offerings in your geography, IBM will ship the CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM upon your request.

Based upon availability, CRUs will be shipped for next business day delivery. IBM specifies, in the materials shipped with a replacement CRU, whether a defective CRU must be returned to IBM. When return is required, return instructions and a container are shipped with the replacement CRU and you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

CRUs may be provided as part of the machine's standard maintenance service except that you may install a CRU yourself or request IBM installation, at no additional charge, under any of the On-site Service levels specified above.

Usage plan machine

No

IBM hourly service rate classification

Three.

When a type of service involves the exchange of a machine part, the replacement may not be new, but will be in good working order.

Field-installable features

Yes

Model conversions

No

Machine installation

Installation is performed by IBM. IBM will install the machine in accordance with the IBM installation procedures for the machine. In the United States, contact IBM at 1-800-IBM-SERV (426-7378). In other countries, contact the local IBM office. A Systems Assurance Review is mandatory for this product. The SAR will qualify the

site environment and capture customer requirements for a custom manufacturing build prior to the IBM installation.

Graduated program license charges apply

No

Licensed machine code

IBM Machine Code is licensed for use by a customer on the IBM machine for which it was provided by IBM under the terms and conditions of the IBM License Agreement for Machine Code, to enable the machine to function in accordance with its specifications, and only for the capacity authorized by IBM and acquired by the customer. You can obtain the agreement at

http://www.ibm.com/servers/eserver/support/machine_warranties/machine_code.html

IBM may release changes to the Machine Code. IBM plans to make the Machine Code changes available for download from the IBM System Storage technical support Web site:

<http://www.ibm.com/systems/support/storage/nas/sonas>

You may also obtain updated code by contacting your IBM representative.

If the machine does not function as warranted and your problem can be resolved through your application of downloadable Machine Code, you are responsible for downloading and installing these designated Machine Code changes as IBM specifies. If you would prefer, you may request IBM to install downloadable Machine Code changes; however, you may be charged for that service.

Educational allowance

A reduced charge is available to qualified education customers. The educational allowance may not be added to any other discount or allowance.

The educational allowance is 15% for the products in this announcement.

Prices

Product charges

Description	Machine type	Model number	Feature number
IBM System Storage SONAS Interface Node	2851	SI1	
Additional 32GB Memory			1000
Quad port 1GbE NIC			1100
Dual port 10Gb CNA			1101
10m InfiniBand X4 to QSFP optical cable			1220
20m InfiniBand X4 to QSFP optical cable			1221
30m InfiniBand X4 to QSFP optical cable			1222
50m InfiniBand X4 to QSFP optical cable			1223
10m InfiniBand X4 to X4 optical cable			1230
20m InfiniBand X4 to X4 optical cable			1231
30m InfiniBand X4 to X4 optical cable			1232
50m InfiniBand X4 to X4 optical cable			1233

Plant merge into 2851 rack			9000
Field merge into 2851 rack			9001
Bulk order feature			9555
IGF transaction indicator			9556
IBM System Storage SONAS Management Node	2851	SM1	
Plant merge into 2851 rack			9000
Field merge into 2851 rack			9001
IGF transaction indicator			9556
IBM System Storage SONAS Storage Node	2851	SS1	
10m InfiniBand X4 to QSFP optical cable			1220
20m InfiniBand X4 to QSFP optical cable			1221
30m InfiniBand X4 to QSFP optical cable			1222
50m InfiniBand X4 to QSFP optical cable			1223
10m InfiniBand X4 to X4 optical cable			1230
20m InfiniBand X4 to X4 optical cable			1231
30m InfiniBand X4 to X4 optical cable			1232
50m InfiniBand X4 to X4 optical cable			1233
Plant merge into 2851 rack			9000
Field merge into 2851 rack			9001
Bulk order feature			9555
IGF transaction indicator			9556
IBM System Storage SONAS Storage Controller	2851	DR1	
10-pack of 7.2K RPM 1TB SATA HDDs			1300
10-pack of 7.2K RPM 2TB SATA HDDs			1301
10-pack of 15K RPM 450GB SAS HDDs			1310
Plant merge into 2851 rack			9000
Field merge into 2851 rack			9001
Plant install 1st storage controller (EIA positions 1-4)			9011
Plant install 2nd storage controller (EIA positions 9-12)			9012
Plant install 3rd storage controller (EIA positions 21-24)			9013
Plant install 4th storage controller (EIA positions 29-32)			9014
Bulk order feature			9555
IGF transaction indicator			9556
Install in Base Rack			9800
Install in Storage Expansion Rack #1			9801
Install in Storage Expansion Rack #2			9802
Install in Storage Expansion Rack #3			9803
Install in Storage Expansion Rack #4			9804
Install in Storage Expansion Rack #5			9805
Install in Storage Expansion Rack #6			9806
Install in Storage Expansion Rack #7			9807
Install in Storage Expansion Rack #8			9808
Install in Storage Expansion Rack #9			9809
Install in Storage Expansion Rack #10			9810
Install in Storage Expansion Rack #11			9811
Install in Storage Expansion Rack #12			9812
Install in Storage Expansion Rack #13			9813
Install in Storage Expansion Rack #14			9814
Install in Storage Expansion Rack #15			9815

IBM System Storage SONAS	2851	DE1	
Disk Storage Expansion unit (DSE)			
10-pack of 7.2K RPM 1TB SATA HDDs			1300
10-pack of 7.2K RPM 2TB SATA HDDs			1301
10-pack of 15K RPM 450GB SAS HDDs			1310
Plant merge into 2851 rack			9000
Field merge into 2851 rack			9001
Plant install 1st DES unit (EIA positions 5-8)			9021
Plant install 2nd DES unit (EIA positions 13-16)			9022
Plant install 3rd DES unit (EIA positions 25-28)			9023
Plant install 4th DES unit (EIA positions 33-36)			9024
Bulk order feature			9555
IGF transaction indicator			9556
Install in Base Rack			9800
Install in Storage Expansion Rack #1			9801
Install in Storage Expansion Rack #2			9802
Install in Storage Expansion Rack #3			9803
Install in Storage Expansion Rack #4			9804
Install in Storage Expansion Rack #5			9805
Install in Storage Expansion Rack #6			9806
Install in Storage Expansion Rack #7			9807
Install in Storage Expansion Rack #8			9808
Install in Storage Expansion Rack #9			9809
Install in Storage Expansion Rack #10			9810
Install in Storage Expansion Rack #11			9811
Install in Storage Expansion Rack #12			9812
Install in Storage Expansion Rack #13			9813
Install in Storage Expansion Rack #14			9814
Install in Storage Expansion Rack #15			9815
IBM System Storage SONAS	2851	I36	
36-port InfiniBand Switch			
Plant merge into 2851 rack			9000
Field merge into 2851 rack			9001
IGF transaction indicator			9556
IBM System Storage SONAS	2851	I96	
96-port InfiniBand Switch			
96-port InfiniBand Switch Fabric boards			1500
24-port 4X DDR InfiniBand Line Board			1501
Hi-memory Management board			1502
Power supply			1503
Plant merge into 2851 rack			9000
Field merge into 2851 rack			9001
IGF transaction indicator			9556
IBM System Storage SONAS	2851	RXA	
Base Rack			
Two 50-port 10/100/1000 Level 2 Ethernet switches			0100
Service Ladder			0101
Plant install interface node			5000
Field install interface node (MES)			5001
Plant install management node			5002
Plant install storage node			5004
Field install storage node (MES)			5005
Plant install storage controller			5006
Field install storage controller (MES)			5007
Plant install disk storage expansion unit			5008

Field install disk storage expansion unit (MES)			5009
Plant install 36-port IB switch			5010
Plant install 96-port IB switch			5011
Standard front and rear doors			6070
Suite Attach Kit 2m rack			6086
Side Panel			6098
Acoustic front and rear doors			6249
Rear Door Heat Exchanger			6858
Side mount 1-phase PDUs			7188
Intelligent PDUs			7192
Config #1, 36-port IB switches, interface nodes only			9003
Config #2, 96-port IB switches, interface nodes only			9004
Config #,3, 36-port IB switches, interface nodes and storage pod			9005
Power cord 1-ph, NEMA L6-30			9854
Power cord 1-ph IEC309, P+N+G 32A			9856
Power cord 1-ph Aust./New Zealand			9857
Power cord 1-ph, 250Vac Korea			9858
IBM System Storage SONAS Storage expansion rack	2851	RXB	
Two 50-port 10/100/1000 Level 2 Ethernet switches			0100
Plant install storage node			5004
Field install storage node (MES)			5005
Plant install storage controller			5006
Field install storage controller (MES)			5007
Plant install disk storage expansion unit			5008
Field install disk storage expansion unit (MES)			5009
Standard front and rear doors			6070
Suite Attach Kit 2m rack			6086
Side Panel			6098
Acoustic front and rear doors			6249
Rear Door Heat Exchanger			6858
Side mount 1-phase PDUs			7188
Intelligent PDUs			7192
Storage expansion rack #1			9701
Storage expansion rack #2			9702
Storage expansion rack #3			9703
Storage expansion rack #4			9704
Storage expansion rack #5			9705
Storage expansion rack #6			9706
Storage expansion rack #7			9707
Storage expansion rack #8			9708
Storage expansion rack #9			9709
Storage expansion rack #10			9710
Storage expansion rack #11			9711
Storage expansion rack #12			9712
Storage expansion rack #13			9713
Storage expansion rack #14			9714
Storage expansion rack #15			9715
Power cord 1-ph, NEMA L6-30			9854
Power cord 1-ph IEC309, P+N+G 32A			9856
Power cord 1-ph Aust./New Zealand			9857
Power cord 1-ph, 250Vac Korea			9858
IBM System Storage SONAS Interface expansion rack	2851	RXC	
Two 50-port 10/100/1000 Level 2 Ethernet switches			0100
Plant install interface node			5000
Field install interface node (MES)			5001
Standard front and rear doors			6070
Suite Attach Kit 2m rack			6086
Side Panel			6098
Acoustic front and rear doors			6249

Rear Door Heat Exchanger	6858
Side mount 1-phase PDUS	7188
Intelligent PDUS	7192
Power cord 1-ph, NEMA L6-30	9854
Power cord 1-ph IEC309, P+N+G 32A	9856
Power cord 1-ph Aust./New Zealand	9857
Power cord 1-ph, 250Vac Korea	9858

Machine

Model Feature Mach/Mod/Feat	Plant/Field install	MES removal	CSU
2851/SI1/1000	Both	No	No
2851/SI1/1100	Both	No	No
2851/SI1/1101	Both	No	No
2851/SI1/1220	Both	No	No
2851/SI1/1221	Both	No	No
2851/SI1/1222	Both	No	No
2851/SI1/1223	Both	No	No
2851/SI1/1230	Both	No	No
2851/SI1/1230	Both	No	No
2851/SI1/1231	Both	No	No
2851/SI1/1232	Both	No	No
2851/SI1/1233	Both	No	No
2851/SI1/9000	Plant	No	No
2851/SI1/9001	Plant	No	No
2851/SI1/9555	Field	No	No
2851/SI1/9556	Plant	No	No
2851/SML/9000	Plant	No	No
2851/SML/9001	Plant	No	No
2851/SML/9556	Plant	No	No
2851/SS1/1220	Both	No	No
2851/SS1/1221	Both	No	No
2851/SS1/1222	Both	No	No
2851/SS1/1223	Both	No	No
2851/SS1/1230	Both	No	No
2851/SS1/1231	Both	No	No
2851/SS1/1232	Both	No	No
2851/SS1/1233	Both	No	No
2851/SS1/9000	Plant	No	No
2851/SS1/9001	Plant	No	No
2851/SS1/9555	Field	No	No
2851/SS1/9556	Plant	No	No
2851/DR1/1300	Both	No	No
2851/DR1/1301	Both	No	No
2851/DR1/1310	Both	No	No
2851/DR1/9000	Plant	No	No
2851/DR1/9001	Plant	No	No
2851/DR1/9011	Plant	No	No
2851/DR1/9012	Plant	No	No
2851/DR1/9013	Plant	No	No
2851/DR1/9014	Plant	No	No
2851/DR1/9555	Field	No	No
2851/DR1/9556	Plant	No	No
2851/DR1/9800	Plant	No	No
2851/DR1/9801	Plant	No	No
2851/DR1/9802	Plant	No	No
2851/DR1/9803	Plant	No	No
2851/DR1/9804	Plant	No	No
2851/DR1/9805	Plant	No	No
2851/DR1/9806	Plant	No	No
2851/DR1/9807	Plant	No	No
2851/DR1/9808	Plant	No	No
2851/DR1/9809	Plant	No	No
2851/DR1/9810	Plant	No	No
2851/DR1/9811	Plant	No	No
2851/DR1/9812	Plant	No	No
2851/DR1/9813	Plant	No	No

2851/DR1/9814	Plant	NO	NO
2851/DR1/9815	Plant	NO	NO
2851/DE1/1300	Both	NO	NO
2851/DE1/1301	Both	NO	NO
2851/DE1/1310	Both	NO	NO
2851/DE1/9000	Plant	NO	NO
2851/DE1/9001	Plant	NO	NO
2851/DE1/9021	Plant	NO	NO
2851/DE1/9022	Plant	NO	NO
2851/DE1/9023	Plant	NO	NO
2851/DE1/9024	Plant	NO	NO
2851/DE1/9555	Field	NO	NO
2851/DE1/9556	Plant	NO	NO
2851/DE1/9800	Plant	NO	NO
2851/DE1/9801	Plant	NO	NO
2851/DE1/9802	Plant	NO	NO
2851/DE1/9803	Plant	NO	NO
2851/DE1/9804	Plant	NO	NO
2851/DE1/9805	Plant	NO	NO
2851/DE1/9806	Plant	NO	NO
2851/DE1/9807	Plant	NO	NO
2851/DE1/9808	Plant	NO	NO
2851/DE1/9809	Plant	NO	NO
2851/DE1/9810	Plant	NO	NO
2851/DE1/9811	Plant	NO	NO
2851/DE1/9812	Plant	NO	NO
2851/DE1/9813	Plant	NO	NO
2851/DE1/9814	Plant	NO	NO
2851/DE1/9815	Plant	NO	NO
2851/I36/9000	Plant	NO	NO
2851/I36/9001	Plant	NO	NO
2851/I36/9556	Plant	NO	NO
2851/I96/1500	Both	NO	NO
2851/I96/1501	Both	NO	NO
2851/I96/1502	Both	NO	NO
2851/I96/1503	Both	NO	NO
2851/I96/1500	Both	NO	NO
2851/I96/9000	Plant	NO	NO
2851/I96/9001	Plant	NO	NO
2851/I96/9556	Plant	NO	NO
2851/RXA/0100	Plant	NO	NO
2851/RXA/0101	Both	NO	NO
2851/RXA/5000	Plant	NO	NO
2851/RXA/5001	Field	NO	NO
2851/RXA/5002	Plant	NO	NO
2851/RXA/5004	Plant	NO	NO
2851/RXA/5005	Field	NO	NO
2851/RXA/5006	Plant	NO	NO
2851/RXA/5007	Field	NO	NO
2851/RXA/5008	Plant	NO	NO
2851/RXA/5009	Field	NO	NO
2851/RXA/5010	Plant	NO	NO
2851/RXA/5011	Plant	NO	NO
2851/RXA/6070	Both	NO	NO
2851/RXA/6086	Both	NO	NO
2851/RXA/6098	Both	NO	NO
2851/RXA/6249	Both	NO	NO
2851/RXA/6858	Both	NO	NO
2851/RXA/7188	Plant	NO	NO
2851/RXA/7192	Plant	NO	NO
2851/RXA/9003	Plant	NO	NO
2851/RXA/9004	Plant	NO	NO
2851/RXA/9005	Plant	NO	NO
2851/RXA/9854	Both	NO	NO
2851/RXA/9856	Both	NO	NO
2851/RXA/9857	Both	NO	NO
2851/RXA/9858	Both	NO	NO
2851/RXB/0100	Plant	NO	NO
2851/RXB/5004	Plant	NO	NO
2851/RXB/5005	Field	NO	NO
2851/RXB/5006	Plant	NO	NO
2851/RXB/5007	Field	NO	NO

2851/RXB/5008	Plant	No	No
2851/RXB/5009	Field	No	No
2851/RXB/6070	Both	No	No
2851/RXB/6086	Both	No	No
2851/RXB/6098	Both	No	No
2851/RXB/6249	Both	No	No
2851/RXB/6858	Both	No	No
2851/RXB/7188	Plant	No	No
2851/RXB/7192	Plant	No	No
2851/RXB/9701	Plant	No	No
2851/RXB/9702	Plant	No	No
2851/RXB/9703	Plant	No	No
2851/RXB/9704	Plant	No	No
2851/RXB/9705	Plant	No	No
2851/RXB/9706	Plant	No	No
2851/RXB/9707	Plant	No	No
2851/RXB/9708	Plant	No	No
2851/RXB/9709	Plant	No	No
2851/RXB/9710	Plant	No	No
2851/RXB/9711	Plant	No	No
2851/RXB/9712	Plant	No	No
2851/RXB/9713	Plant	No	No
2851/RXB/9714	Plant	No	No
2851/RXB/9715	Plant	No	No
2851/RXB/9854	Both	No	No
2851/RXB/9856	Both	No	No
2851/RXB/9857	Both	No	No
2851/RXB/9858	Both	No	No
2851/RXC/0100	Plant	No	No
2851/RXC/5000	Plant	No	No
2851/RXC/5001	Field	No	No
2851/RXC/6070	Both	No	No
2851/RXC/6086	Both	No	No
2851/RXC/6098	Both	No	No
2851/RXC/6249	Both	No	No
2851/RXC/6858	Both	No	No
2851/RXC/7188	Plant	No	No
2851/RXC/7192	Plant	No	No
2851/RXC/9854	Both	No	No
2851/RXC/9856	Both	No	No
2851/RXC/9857	Both	No	No
2851/RXC/9858	Both	No	No

Mach type	Model	Feat code	Description	IBM list price
2851	SI1		Interface Node	\$8,547
2851	SI1	1000	Additional 32GB Memory	\$1,410
2851	SI1	1100	Quad port 1GbE NIC	\$529
2851	SI1	1101	Dual port 10Gb CNA	\$2,999
2851	SI1	1220	10m InfiniBand X4 to QSFP optical cable	\$1,733
2851	SI1	1221	20m InfiniBand X4 to QSFP optical cable	\$1,870
2851	SI1	1222	30m InfiniBand X4 to QSFP optical cable	\$2,008
2851	SI1	1223	50m InfiniBand X4 to QSFP optical cable	\$2,283
2851	SI1	1230	10m InfiniBand X4 to X4 optical cable	\$1,733
2851	SI1	1231	20m InfiniBand X4 to X4 optical cable	\$1,870

2851	SI1	1232	30m InfiniBand X4 to X4 optical cable	\$2,008
2851	SI1	1233	50m InfiniBand X4 to X4 optical cable	\$2,283
2851	SI1	9000	Plant merge into 2851 rack	\$0
2851	SI1	9001	Field merge into 2851 rack	\$0
2851	SI1	9555	Bulk order feature	\$0
2851	SI1	9556	IGF transaction indicator	\$0
2851	SM1		Management Node	\$9,206
2851	SM1	9000	Plant merge into 2851 rack	\$0
2851	SM1	9001	Field merge into 2851 rack	\$0
2851	SM1	9556	IGF transaction indicator	\$0
2851	SS1		Storage Node	\$12,897
2851	SS1	1220	10m InfiniBand X4 to QSFP optical cable	\$1,733
2851	SS1	1221	20m InfiniBand X4 to QSFP optical cable	\$1,870
2851	SS1	1222	30m InfiniBand X4 to QSFP optical cable	\$2,008
2851	SS1	1223	50m InfiniBand X4 to QSFP optical cable	\$2,283
2851	SS1	1230	10m InfiniBand X4 to X4 optical cable	\$1,733
2851	SS1	1231	20m InfiniBand X4 to X4 optical cable	\$1,870
2851	SS1	1232	30m InfiniBand X4 to X4 optical cable	\$2,008
2851	SS1	1233	50m InfiniBand X4 to X4 optical cable	\$2,283
2851	SS1	9000	Plant merge into 2851 rack	\$0
2851	SS1	9001	Field merge into 2851 rack	\$0
2851	SS1	9555	Bulk order feature	\$0
2851	SS1	9556	IGF transaction indicator	\$0
2851	DR1		Storage Controller	\$117,767
2851	DR1	1300	10-pack of 7.2K RPM 1TB SATA HDDs	\$16,868
2851	DR1	1301	10-pack of 7.2K RPM 2TB SATA HDDs	\$40,362
2851	DR1	1310	10-pack of 15K RPM 450GB SAS HDDs	\$34,855

2851	DR1	9000	Plant merge into 2851 rack	\$0
2851	DR1	9001	Field merge into 2851 rack	\$0
2851	DR1	9011	Plant install 1st storage controller (EIA positions 1-4)	\$0
2851	DR1	9012	Plant install 2nd storage controller (EIA positions 9-12)	\$0
2851	DR1	9013	Plant install 3rd storage controller (EIA positions 21-24)	\$0
2851	DR1	9014	Plant install 4th storage controller (EIA positions 29-32)	\$0
2851	DR1	9555	Bulk order feature	\$0
2851	DR1	9556	IGF transaction indicator	\$0
2851	DR1	9800	Install in Base Rack	\$0
2851	DR1	9801	Install in Storage Expansion Rack #1	\$0
2851	DR1	9802	Install in Storage Expansion Rack #2	\$0
2851	DR1	9803	Install in Storage Expansion Rack #3	\$0
2851	DR1	9804	Install in Storage Expansion Rack #4	\$0
2851	DR1	9805	Install in Storage Expansion Rack #5	\$0
2851	DR1	9806	Install in Storage Expansion Rack #6	\$0
2851	DR1	9807	Install in Storage Expansion Rack #7	\$0
2851	DR1	9808	Install in Storage Expansion Rack #8	\$0
2851	DR1	9809	Install in Storage Expansion Rack #9	\$0
2851	DR1	9810	Install in Storage Expansion Rack #10	\$0

2851	DR1	9811	Install in Storage Expansion Rack #11	\$0
2851	DR1	9812	Install in Storage Expansion Rack #12	\$0
2851	DR1	9813	Install in Storage Expansion Rack #13	\$0
2851	DR1	9814	Install in Storage Expansion Rack #14	\$0
2851	DR1	9815	Install in Storage Expansion Rack #15	\$0
2851	DE1		Disk Storage Expansion unit (DSE)	\$47,107
2851	DE1	1300	10-pack of 7.2K RPM 1TB SATA HDDs	\$16,868
2851	DE1	1301	10-pack of 7.2K RPM 2TB SATA HDDs	\$40,362
2851	DE1	1310	10-pack of 15K RPM 450GB SAS HDDs	\$34,855
2851	DE1	9000	Plant merge into 2851 rack	\$0
2851	DE1	9001	Field merge into 2851 rack	\$0
2851	DE1	9021	Plant install 1st DES unit (EIA positions 5-8)	\$0
2851	DE1	9022	Plant install 2nd DES unit (EIA positions 13-16)	\$0
2851	DE1	9023	Plant install 3rd DES unit (EIA positions 25-28)	\$0
2851	DE1	9024	Plant install 4th DES unit (EIA positions 33-36)	\$0
2851	DE1	9555	Bulk order feature	\$0
2851	DE1	9556	IGF transaction indicator	\$0
2851	DE1	9800	Install in Base Rack	\$0
2851	DE1	9801	Install in Storage Expansion Rack #1	\$0
2851	DE1	9802	Install in Storage Expansion Rack #2	\$0
2851	DE1	9803	Install in Storage Expansion Rack #3	\$0

2851	DE1	9804	Install in Storage Expansion Rack #4	\$0
2851	DE1	9805	Install in Storage Expansion Rack #5	\$0
2851	DE1	9806	Install in Storage Expansion Rack #6	\$0
2851	DE1	9807	Install in Storage Expansion Rack #7	\$0
2851	DE1	9808	Install in Storage Expansion Rack #8	\$0
2851	DE1	9809	Install in Storage Expansion Rack #9	\$0
2851	DE1	9810	Install in Storage Expansion Rack #10	\$0
2851	DE1	9811	Install in Storage Expansion Rack #11	\$0
2851	DE1	9812	Install in Storage Expansion Rack #12	\$0
2851	DE1	9813	Install in Storage Expansion Rack #13	\$0
2851	DE1	9814	Install in Storage Expansion Rack #14	\$0
2851	DE1	9815	Install in Storage Expansion Rack #15	\$0
2851	I36		36-port InfiniBand Switch	\$34,917
2851	I36	9000	Plant merge into 2851 rack	\$0
2851	I36	9001	Field merge into 2851 rack	\$0
2851	I36	9556	IGF transaction indicator	\$0
2851	I96		96-port InfiniBand Switch	\$134,592
2851	I96	1500	Voltaire sFB-2004 Switch Fabric boards	\$20,406
2851	I96	1501	Voltaire sLB-2024 24-port 4X DDR InfiniBand Line Board	\$47,750

2851	I96	1502	Voltaire sMB-HM Hi-memory Management board	\$35,719
2851	I96	1503	Voltaire sPU power supply	\$10,250
2851	I96	9000	Plant merge into 2851 rack	\$0
2851	I96	9001	Field merge into 2851 rack	\$0
2851	I96	9556	IGF transaction indicator	\$0
2851	RXA		Base Rack	\$28,736
2851	RXA	0100	Two 50-port 10/100/1000 Level 2 Ethernet switches	\$6,838
2851	RXA	0101	Service Ladder	\$0
2851	RXA	5000	Plant install interface node	\$0
2851	RXA	5001	Field install interface node (MES)	\$0
2851	RXA	5002	Plant install management node	\$0
2851	RXA	5003	Field install management node (MES)	\$0
2851	RXA	5004	Plant install storage node	\$0
2851	RXA	5005	Field install storage node (MES)	\$0
2851	RXA	5006	Plant install storage controller	\$0
2851	RXA	5007	Field install storage controller (MES)	\$0
2851	RXA	5008	Plant install disk storage expansion unit	\$0
2851	RXA	5009	Field install disk storage expansion unit MES	\$0
2851	RXA	5010	Plant install interface node	\$0
2851	RXA	5011	Plant install 96-port IB switch	\$0
2851	RXA	6070	Standard front and rear doors	\$2,109
2851	RXA	6086	Suite Attach Kit 2m rack	\$250
2851	RXA	6098	Side Panel	\$150
2851	RXA	6249	Acoustic front and rear doors	\$7,277
2851	RXA	6858	Rear Door Heat Exchanger	\$7,250
2851	RXA	7188	Side mount 1-phase PDUs	\$2,000
2851	RXA	7192	Intelligent PDUs	\$2,500
2851	RXA	9003	Config #1, 36-port IB	\$0

				switches, interface nodes only	
2851	RXA	9004		Config #2, 96-port IB switches,interface nodes only	\$0
2851	RXA	9005		Config #,3, 36-port IB switches interface nodes and storage pod	\$0
2851	RXA	9854		Power cord 1-ph, NEMA L6-30	\$0
2851	RXA	9856		Power cord 1- ph IEC309, P +N+G 32A	\$0
2851	RXA	9857		Power cord 1- ph Aust./New Zealand	\$0
2851	RXA	9858		Power cord 1- ph, 250Vac Korea	\$0
2851	RXB			Storage expansion rack	\$23,108
2851	RXB	0100		Two 50-port 10/100/1000 Level 2 Ethernet switches	\$6,838
2851	RXB	5004		Plant install storage node	\$0
2851	RXB	5005		Field install storage node (MES)	\$0
2851	RXB	5006		Plant install storage controller	\$0
2851	RXB	5007		Field install storage controller (MES)	\$0
2851	RXB	5008		Plant install disk storage expansion unit	\$0
2851	RXB	5009		Field install disk storage expansion unit (MES)	\$0
2851	RXB	6070		Standard front and rear doors	\$2,109
2851	RXB	6086		Suite Attach Kit 2m rack	\$250
2851	RXB	6098		Side Panel	\$150
2851	RXB	6249		Acoustic front and rear doors	\$7,277
2851	RXB	6858		Rear Door Heat Exchanger	\$7,250
2851	RXB	7188		Side mount 1- phase PDUs	\$2,000
2851	RXB	7192		Intelligent PDUs	\$2,500
2851	RXB	9701		Storage expansion rack #1	\$0

2851	RXB	9702	Storage expansion rack #2	\$0
2851	RXB	9703	Storage expansion rack #3	\$0
2851	RXB	9704	Storage expansion rack #4	\$0
2851	RXB	9705	Storage expansion rack #5	\$0
2851	RXB	9706	Storage expansion rack #6	\$0
2851	RXB	9707	Storage expansion rack #7	\$0
2851	RXB	9708	Storage expansion rack #8	\$0
2851	RXB	9709	Storage expansion rack #9	\$0
2851	RXB	9710	Storage expansion rack #10	\$0
2851	RXB	9711	Storage expansion rack #11	\$0
2851	RXB	9712	Storage expansion rack #12	\$0
2851	RXB	9713	Storage expansion rack #13	\$0
2851	RXB	9714	Storage expansion rack #14	\$0
2851	RXB	9715	Storage expansion rack #15	\$0
2851	RXB	9854	Power cord 1-ph, NEMA L6-30	\$0
2851	RXB	9856	Power cord 1-ph IEC309, P+N+G 32A	\$0
2851	RXB	9857	Power cord 1-ph Aust./New Zealand	\$0
2851	RXB	9858	Power cord 1-ph, 250Vac Korea	\$0
2851	RXC		Interface expansion rack	\$23,108
2851	RXC	0100	Two 50-port 10/100/1000 Level 2 Ethernet switches	\$6,838
2851	RXC	5000	Plant install interface node	\$0
2851	RXC	5001	Field install interface node (MES)	\$0
2851	RXC	6070	Standard front and rear doors	\$2,109

2851	RXC	6086	Suite Attach Kit 2m rack	\$250
2851	RXC	6098	Side Panel	\$150
2851	RXC	6249	Acoustic front and rear doors	\$7,277
2851	RXC	6858	Rear Door Heat Exchanger	\$7,250
2851	RXC	7188	Side mount 1- phase PDUs	\$7,781
2851	RXC	7192	Intelligent PDUs	\$2,500
2851	RXC	9854	Power cord 1-ph, NEMA L6-30	\$0
2851	RXC	9856	Power cord 1- ph IEC309, P +N+G 32A	\$0
2851	RXC	9857	Power cord 1- ph Aust./New Zealand	\$0
2851	RXC	9858	Power cord 1- ph, 250Vac Korea	\$0

Alternative service

Mach type	Feat Modelcode	IBM Description	price	ESA MA	ESA MA	ESA MA	ESA MA	ESA WSU	ESA WSU	ESA WSU	SLCC	LEG MA	ESA MA	LEG WSU	ESA STD
				24x7 (E2H)	24x7 (E24)	24x7 (E4H)	24x7 (E95)	1yr	1yr	1yr		24x7 (IOR)	24x7 (I08)	24x7 (I08)	24x7 (IOR)
2851	SI1	Interface Node	\$8,547 338	\$	\$	\$	\$	\$	\$	\$	1828	\$	\$	\$	24x7
2851	SM1	Management Node	\$9,261 338	\$	\$	\$	\$	\$	\$	\$	1828	\$	\$	\$	24x7
2851	SS1	Storage Node	\$12,897 413	\$	\$	\$	\$	\$1,000	\$	\$	1828	\$	\$	\$	24x7
2851	DR1	Storage Controller	\$17,567 750	\$	\$	\$	\$	\$1,680	\$	\$	1828	\$	\$	\$	24x7
2851	DR1	1300 10- pack of 7.2K RPM 1TB SATA HDDs	\$16,858 155	\$	\$	\$	\$	\$	\$	\$	1828	\$	\$	\$	24x7
2851	DR1	1301 10- pack of 7.2K RPM 2TB SATA HDDs	\$40,352 263	\$	\$	\$	\$	\$	\$	\$	1828	\$	\$	\$	24x7
2851	DR1	1310 10- pack of 15K RPM 450GB SAS HDDs	\$34,855 241	\$	\$	\$	\$	\$	\$	\$	1828	\$	\$	\$	24x7
2851	DE1	Disk Storage Expansion unit (DSE)	\$47,107 313	\$	\$	\$	\$	\$	\$	\$	1828	\$	\$	\$	24x7

2851 DE1	1300	10-	\$16,858	\$	\$	\$	\$	\$	\$	1828	\$	\$	\$	24x7
		pack	155	103	93	74	964	346	222		124	89	346	
		of												
		7.2K												
		RPM												
		1TB												
		SATA												
		HDDs												
2851 DE1	1301	10-	\$40,352	\$	\$	\$	\$	\$	\$	1828	\$	\$	\$	24x7
		pack	263	175	158	126	1,638	588	378		210	151	588	
		of												
		7.2K												
		RPM												
		2TB												
		SATA												
		HDDs												
2851 DE1	1310	10-	\$34,855	\$	\$	\$	\$	\$	\$	1828	\$	\$	\$	24x7
		pack	241	160	144	116	1,500	539	345		193	139	539	
		of												
		15K												
		RPM												
		450GB												
		SAS												
		HDDs												
2851 I36		36-	\$34,947	\$	\$	\$	\$	\$	\$	1828	\$	\$	\$	24x7
		port	313	208	188	150	1,950	700	450		250	180	700	
		InfiniBand												
		Switch												
2851 I96		96-	\$134,592	\$	\$	\$	\$	\$2,520	\$	1828	\$	\$	\$	24x7
		port	750	675	540	7,000	1,620	900	648	2,520				
		InfiniBand												
		Switch												
2851 RXA		Base	\$28,756	\$	\$	\$	\$	\$	\$	1828	\$	\$	\$	24x7
		Rack	250	167	150	120	1,560	560	360		200	144	560	
2851 RXB		Storage	\$23,158	\$	\$	\$	\$	\$	\$	1828	\$	\$	\$	24x7
		expansion	219	146	131	105	1,365	490	315		175	126	490	
		rack												
2851 RXC		Interf	\$23,158	\$	\$	\$	\$	\$	\$	1828	\$	\$	\$	24x7
		expansion	219	146	131	105	1,365	490	315		175	126	490	
		rack												

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Corrections

(Corrected on March 3, 2010)

The At a glance and Description sections have been updated