

## The importance of networked storage

*An SMB's data store is crucial for its operations. If things are not okay here, business losses will result. This is where networked storage options such as NAS, FC SAN and IP SAN can help*

Enterprise storage has moved away from DAS (Direct Attached Storage) to the network. This is due to the performance, efficiency, and cost benefits that centralised, networked storage offers vis-à-vis distributed DAS. The issue is especially relevant for Indian SMBs which have much to gain from having a proper network storage infrastructure.

The options available in terms of networked storage are NAS (Network Attached Storage) and SAN (Storage Area Network). While both can be used by enterprises of any size, the small business (SB) has traditionally favoured NAS whereas the medium business (MB) has gone in for NAS and entry-level SAN (FC- and IP-based). However, newer options are promising to buck these trends.

### On your LAN

As storage requirements of enterprises spiral up, DAS was not able to meet them. This is when NAS made its appearance on the LAN with the advantages of easy deployment, management and usability.

More importantly, NAS also brought about centralised storage for SMBs, unlike DAS' distributed model. Earlier, this benefit was available only to large enterprises which used expensive SANs. This made NAS the most popular option for SMBs even though it uses slower file-based data access as opposed to the faster block-level access used in SANs.

A NAS is nothing but an array of off-the-shelf hard disks controlled by an operating system. These disks can also be connected in RAID configuration for better redundancy and availability. Newer serial ATA drives have ensured that NAS technology is getting cheaper with better performance.

The most popular NAS operating systems are NetApp's Data Ontap, Microsoft's Windows Storage Server 2003, and Adaptec's GuardianOS. The Indian NAS market is dominated by Ontap (on devices from NetApp, IBM and HDS) and Storage Server 2003-based NAS devices from EMC, Dell and HP.



The operating system usually has built-in or additional tools for features such as backup and restore, mirroring, snapshot capability, etc. It is important to evaluate the functionality of these tools when choosing a NAS.

NAS gateways are a new option for organisations already having investments in FC (Fibre Channel) SAN. These devices come with FC, iSCSI, and Ethernet interfaces to connect to SANs and other environments. One of the main application areas for NAS gateways has been as nearline storage between SANs and tape-based backup.

### **Choosing a NAS solution**

The primary lookout when shopping for NAS is the operating system and data tools. The operating system must be able to support Windows, Unix and Linux servers. Always opt for the NAS that offers the best toolset for your requirements, along with providing high availability features like mirroring and failover.

Next come NAS management and environment support. The NAS chosen should have a single point of management. It should also have support for common protocols like NFS, CIFS, NDMP and SNMP.

It is a good idea to go in for NAS devices that use SATA drives as these offer higher performance with lower costs.

### **At the high end**

When it comes to top-level networked storage, SAN occupies prime position. These storage boxes use block-level data access for high-volume data access requirements.

Most vendors have entry-level FC SANs targeted at SMBs. These provide good value for enterprises looking for a high-performance, low-cost entry into the SAN arena

SANs create a parallel network for data traffic between hard disk storage arrays (usually SCSI drives connected as RAID). This helps achieve higher data throughputs such as those required in banking and telecom. The options available in SANs are FC- and IP-based SANs.

### **Fibre to the SAN**

FC SANs occupy the higher end of the SAN spectrum. In this type of SAN, the disk arrays are connected using fibre channel connections. FC is available at speeds of 1, 2, 4 and 10 Gbps.

An FC switch acts as the central point for control of data flowing through the SAN. The term 'Director' is used to represent SAN switches with over 64 FC ports. The disk arrays or JBOD (Just a Bunch of Ordinary Disks) are high-performance hard disk arrays connected in RAID configuration. Many commonly available disk arrays also have 'intelligent' features because of built-in software features.

SAN routers also deserve a mention here. These are devices that will be required if you plan to connect FC SANs to IP SANs and other environments.

Today, most vendors have entry-level FC SANs targeted at the SMB. These provide good value for enterprises looking at high-performance, low-cost entry into the SAN arena.

## Tailored for the SMB

FC SANs still pose a high-cost entry barrier to SMBs, so their adoption level is currently low. In addition, most FC SANs still use highly proprietary technology leading to inter-operability and manageability issues. IP SANs are an attempt by various vendors to overcome these issues and tap into the SMB space.

An IP SAN uses the iSCSI protocol and Gigabit Ethernet over Cat 6 cabling to network disk arrays using a TCP/IP network. These SANs provide native-level block access and data transfer, and are similar in this respect to traditional FC SANs.

IP SANs are available in two physical configurations:

- Physically separate controller, switch and disk array units
- Single integrated controller, switch and disk array unit.

IP SANs have fewer inter-operability and management issues, being based on existing TCP/IP technology. This also makes it easier to train administrators on IP SANs than on FC SANs.

Although IP SANs offer lower performance, they are ideal for SMBs that do not require the higher data throughputs of FC SANs. With the availability of 10 Gigabit Ethernet (GbE) technology, IP SANs have the potential for higher speeds. However, IP SANs based on 10 GbE are yet to reach the market.

## SAN selection

When choosing a SAN (FC or IP), some features to look out for are the number of servers that can connect to an array, RAID levels supported, and minimum/maximum capacities.

Some of the array features to look out for in FC SANs are logical unit numbers, and connection types supported (FC, FICON, ESCON, SCSI, etc). Host connectivity options also have to be checked.

Features to look out for in FC and IP SANs include the number of controllers, automatic I/O path failover, and redundancy in components. The switch should also have management software with availability and SAN security features. VSAN (Virtual SAN) capability is yet another useful feature to have which will help virtually separate distinct SAN within a SAN.

It is important to check the compatibility of management software with infrastructure/storage management tools and operating systems used by the enterprise. Inter-operability with products from other vendors is also desirable.

Product support offered by the SAN vendor comes next. All the details such as onsite support, warranty, extension of warranty, time to resolution, parts and labour costs have to be verified before selecting the solution. In addition, it is a good idea to find out ongoing costs associated with the SAN at the time of selection itself. If possible, try out a pilot project to check the vendor's claims.



NAS									
Vendor	Product	Processor	Capacity	Interface	Operating System	Support Protocol	Raid Capability	Management Features	Contact
EMC	Netwin110	I Intel Processor at 2.4 GHz,512 KB level	-	-	Microsoft Windows Storage Server	-	-	-	EMC Tel: 022-55066700 Fax: 022-55022711 www.emc.com
EMC	Netwin 200	2 Intel Xeon at 3.06 Ghz,512KB level	-	10/100/1000 Ethernet	Microsoft Windows Storage Server	NFS, CIFS,Netware. Appletalk, FTP, NTFs, DFS	RAID 5		
HDS	Lightning9970V NAS Blade		18 TB	4 Full-duplex Gigabit Ethernet Ports per NAS Blade (2 per NAS Server)	Hitachi Lightning NAS Blade Manager v2 Software	NFS v2/v3 (UDP or TCP, Microsoft CIFS, HTTPS, FTP, SSH	-	-	HDS Tel: 022-26526100 www.hds.com
HP	ProLiant DL100	2.8 GHz Intel Celeron (320 GB Model) 2.8 GHz Intel Pentium 4 (640 GB Model) 3.2 GHz Intel Pentium 4 (1 TB Model)	512 MB of memory standard, expandable to 4 GB (320 GB Model) 1 GB of memory standard, expandable to 4 GB (640 GB and 1 TB models	Two Auto Sensing Gigabit NICs (embedded) 10/100/1000	Microsoft Windows Storage Server 2003	CIFS, NFS, NCP, Appletalk, HTTP and FTP	Hardware-based RAID for optimal performance.	Supports remote management via web GUI or command console.	HP India Tel: 022-56771700 Fax: 022-26184858 www.hp.com
HP	ProLiant ML110 Storage Server	2.8 GHz Intel Celeron, 533 MHz FSB (320 GB Model) 2.8 GHz Intel Pentium 4, 800 MHz FSB (640 GB Model) 3.2 GHz Intel Pentium 4, 800 MHz FSB (1 TB Model)	Four (4) 1" 7200 RPM SATA Hard Drives Standard (non hot-plug) 4 x 80 GB (320 GB Model) 4 x 160 GB (640 GB Model) 4 x 250 GB (1 TB Model)	Broadcom 5705 PCI Gigabit NIC (embedded) 10/100/1000 WOL (Wake on LAN)	Microsoft Windows Storage Server 2003	SMB/CIFS, NFS, NCP, Appletalk, HTTP and FTP.	1 non-redundant system fan	Supports remote management via web GUI or command console.	

<b>HP</b>	ProLiant ML110 G2	Intel Celeron 2.8 GHz, 533 MHz FSB (320 GB Model) Intel Pentium 4 3.2 GHz, 800 MHz FSB (640 GB Model) Intel Pentium 4 3.2 GHz, 800 MHz FSB (1 TB Model)	Four (4) 1" 7200 RPM SATA Hard Drives Standard (non hot-plug on 320GB model, hot-plug on 640GB and 1TB models) 2 x 160 GB (320 GB Model, not upgradeable to 4 drives) 4 x 160 GB (640 GB Model) 4 x 250 GB (1 TB Model)	Intel 82541PI PCI Gigabit NIC (embedded) 10/100/1000 WOL (Wake on LAN)	Windows Storage Server 2003 OS	SMB/CIFS, NFS, NCP, AppleTalk, HTTP and FTP.	Software or hardware-based RAID	Supports remote management via web GUI or command console.	Fax: 022-26184858
<b>HP</b>	ProLiant ML350 G4	Intel Xeon Processor 3.0 GHz/800 - 1 MB L2 (Base model) Intel Xeon Processor 3.2 GHz/800 - 1 MB L2 (Int SCSI Storage Model)	Up to 1.80 TB utilizing 6 X 300 GB with the optional 2-bay hot plug SCSI drive cage. Note that 2 drive slots are utilized for the mirrored OS image	Embedded NC7751 PCI Gigabit NIC	Windows Storage Server 2003	SMB/CIFS, NFS, NCP, AppleTalk, HTTP and FTP	1 fan standard (Base Model) , 2 fans standard (Int SCSI Storage model); Additional fans for Base Model can be ordered as option	HP provides value add manageability features such as Services for Unix (SFU), Storage Manager Directory quota management and Array Configuration Utility (ACU) which can be administered through the web UI.	www.hp.com

<b>HP</b>	ProLiant ML370 G4	Intel Xeon Processor 3.4 GHz/800MHz - 1 MB L2 (Base model has 1 processor while the High Performance model ships with 2 processors).	Up to 1.8 TB utilizing 6 X 300 GB with the optional 2-bay Hot Plug SCSI drive cage. Note that 2 drive slots are utilised for the OS image. High Performance model includes 2-bay Hot Plug SCSI drive cage.	Integrated NC7781 PCI-X Gigabit NIC (single port)	Windows Storage Server 2003	SMB/CIFS, NFS, NCP, AppleTalk, HTTP and FTP	1 fan standard (Base Model) , 2 fans standard (High Performance model); Additional fans for Base Model can be ordered as option	HP provides value add manageability features such as Services for Unix (SFU), Storage Manager Directory quota management and Array Configuration Utility (ACU) which can be administered through the web UI.	
<b>Iomega</b>	NAS 100d series – 160GB	Intel Xscale IXP 420 Network Processor, 266MHz	160 GB	Single Auto sensing Fast Ethernet Port (10/100), RJ-45 connector	Linux	-	-	-	
<b>Iomega</b>	NAS 100d series – 250GB	Intel Xscale IXP 420 Network Processor, 266MHz	250 GB	Single Auto sensing Fast Ethernet Port (10/100), RJ-45 connector	Linux	-	-	-	
<b>Iomega</b>	NAS 200d series 320GB	Intel Celeron 2.0 GHz	320 GB	Single 10/100/1000 Ethernet Connectivity	Windows Storage Server 2003	-	Raid 0, 1	-	
<b>Iomega</b>	NAS 200d series 320GB with REV	Intel Celeron 2.0 GHz	320 GB	Single 10/100/1000 Ethernet Connectivity	Windows Storage Server 2003	-	Raid 0, 1	-	
<b>Iomega</b>	NAS 200d series 320GB with Print	Intel Celeron 2.0 GHz	320 GB	Single 10/100/1000 Ethernet Connectivity	Windows Storage Server 2003	-	Raid 0, 1	-	
<b>Iomega</b>	NAS 200d series 480GB	Intel Celeron 2.0 GHz	480 GB	Dual 10/100/1000 Ethernet Connectivity	Windows Storage Server 2003	-	Raid 0, 1, 5	-	
<b>Iomega</b>	NAS 200d series 480GB with Print	Intel Celeron 2.0 GHz	480 GB	Dual 10/100/1000 Ethernet Connectivity	Windows Storage Server 2003	-	Raid 0, 1, 5	-	
<b>Iomega</b>	NAS 200d series 750GB with Print	Intel Celeron 2.0 GHz	750 GB	Dual 10/100/1000 Ethernet Connectivity	Windows Storage Server 2003	-	Raid 0, 1, 5	-	

<b>Iomega</b>	NAS 400r Series - 640GB	Intel Celeron processor, 2.8 GHz	640 GB	Dual Auto sensing Gigabit Ethernet Ports (10/100/1000), RJ-45 connector, with teaming and load balancing	Microsoft Windows Storage Server 2003	-	Raid 0, 1, 5 and JBOD	-	
<b>Iomega</b>	NAS 400r Series - 1TB	Intel Pentium 4 processor, 3.0 GHz	1 TB	Dual Auto sensing Gigabit Ethernet Ports (10/100/1000), RJ-45 connector, with teaming and load balancing	Microsoft Windows Storage Server 2003	-	Raid 0, 1, 5 and JBOD	-	
<b>Iomega</b>	NAS 400r Series	Intel Pentium 4 processor, 3.0 GHz	1.6 TB	Dual Auto sensing Gigabit Ethernet Ports (10/100/1000), RJ-45 connector, with teaming and load balancing	Microsoft Windows Storage Server 2003, Microsoft Exchange Database Support	-	Raid 0, 1, 5 and JBOD	-	
<b>NetApp</b>	FAS270	N.A.	8 TB	2 Ethernet 10/100/1000 Copper	Network Appliance Data ONTAP 7G software	NFS V2/V3/V4 over UDP or TCP, PCNFSD V1/V2 for (PC) NFS client authentication, Microsoft CIFS, VLD, HTTP 1.0, HTTP 1.1 Virtual Hosts	RAID 4, RAID DP	-	NetApp India 15/6, 2nd Floor Primerose Road Bangalore-560025 India Tel: +91.80.2532.7470 Fax: +91.80.2509.2331
<b>NetApp</b>	FAS270c	N.A.	8 TB	4 Ethernet 10/100/1000 Copper	Network Appliance Data ONTAP 7G software	NFS V2/V3/V4 over UDP or TCP, PCNFSD V1/V2 for (PC) NFS client authentication, Microsoft CIFS, VLD, HTTP 1.0, HTTP 1.1 Virtual Hosts	RAID 4,RAID DP -	-	
<b>NetApp</b>	FAS250	N.A.	2 TB	2 10/100/1000 Copper	Network Appliance Data ONTAP 7G software	NFS V2/V3/V4 over UDP or TCP, PCNFSD V1/V2 for (PC) NFS client authentication, Microsoft CIFS, VLD, HTTP 1.0, HTTP 1.1 Virtual Hosts	RAID 4,RAID DP -	-	
<b>Sun</b>	StorEdge 5210 NAS	Processor: One 3.06 GHz Intel Xeon processor	4 GB	Two 10/100/1000BaseT Ethernet ports	Storage-optimised operating system	CIFS/SMB, NetBIOS, NFS v2 and v3, FTP (including FXP)	Equipped with two power supplies. Second is for redundancy	-	
<b>Sun</b>	StorEdge 5310 NAS	-	-	Two 10/100/1000BaseT Ethernet ports	Storage-optimised operating system	CIFS/SMB, NetBIOS, NFS v2 and v3, FTP	-	-	India: 1 600 338 072

SAN									
FC SAN Switches/Directors									
Vendor	Product	Switching	High availability features	Management software	Other features	Contact			
Brocade	Silkworm 12000	2 Gbps 64/128 Port director	Redundant and hot pluggable components, dual out of band management connections	Brocade Fabric OS	Security and access control service performance monitoring service , extended fabrics service, zoning service ,inter switch link trunking service	Brocade Communications Systems Private Limited (India) Level 2, Raheja Centre Point 294 CST Road, Near Mumbai University Off Bandra Kurla Complex, Santacruz (East) Mumbai - 400098 Tel: +91-22-5507 8605 / +91-22-5507 8606 Fax: +91-22-5507 8711 E-mail: apac-info@brocade.com			
Brocade	Silkworm 3200	2 Gbps 8 Port	Redundant and hot pluggable components, dual out of band management connections	Brocade Web Tools	Options for full fabric or entry fabric operation				
Brocade	Silkworm 3800	2 bps 16 Port	Redundant hot pluggable components ,automatic path rerouting	Brocade Fabric OS	Wire speed frame filtering				
Brocade	Silkworm 3900	2 Gbps 32 port,1 Gbps and 2 Gbps auto sensing enterprise fabric switch	Redundant hot pluggable components ,automatic path rerouting	Brocade Fabric OS	ISL trunking				
Cisco	MDS 9000 series	Support for up to 256 1/2 Gbps auto sensing FC ports; of internal bandwidth	Full redundancy of all major components and stateful process restart/failover	VSAN, ACL, FCC built in storage management	Support for FC, iSCSI , FCIP	Birla House (East Tower) 7th, 8th and 9th floor 25, Barakhamba Road New Delhi 110001 India Phone: +91 11 55611000 Fax: +91 11 23766126 Contact Person: Debjani De			Cisco Tel: 011-55611000 www.cisco.com

<b>HP</b>	StorageWorks SAN switch 2/8V and 2/8V power pack	Eight auto-sensing 1 and 2 Gb universal, self-configuring ports (F, FL, E). Can be programmed to fixed 1 Gb or 2 Gb speed. Full 16 Gb switching capacity for un-congested fully sustained, 2 Gb full duplex throughput	Hot Code Load Activation	WebTools OpenView API IP SNMP	Frame, filtering, advanced zoning, trunking (optional), performance monitoring (optional))	www.welcome.hp.com			
<b>HP</b>	Cisco 9120 and 9140	20-port and 40-port configurations Fibre Channel ports (auto-sensing 2/1 Gb) in a 1U switch	Full redundancy of all major components and stateful process restart/failover	VSAN, ACL, FCC built in storage management	Support for FC, iSCSI , FCIP				
<b>IBM</b>	IBM TotalStorage SAN b-type family switch H08, H16.F32,F16 and F08	2 Gbps switching with 4-8,8-16,16-32 ports	Redundant hot swappable fans, power supplies ,optics and concurrent firmware load	Webtools and Fabric Manager V#, v\$ management software	Switched fabric and FC-AL support ,end to end performance monitoring Secure Fabric OS				
<b>IBM</b>	MDS 9000 family	Support for up to 256 1/2 Gbps auto sensing FC ports; of internal bandwidth	Full redundancy of all major components and stateful process restart/failover	VSAN, ACL, FCC built in storage management	Support for FC, iSCSI , FCIP				
<b>McData</b>	Sphereon 4500 Fabric Switch	2 Gbps switching with 8,16,24 ports	Redundant hot swappable fans, power supplies ,optics and concurrent firmware activation	ENTERPRISE Fabric Connectivity Manager and SANpilot management software	Open Trunking and SANtegrity Binding	Mediate ASEAN and India Mediate Technology Systems Pte, Ltd 7 Raffles Avenue, #01-01 Singapore 039799 Country Manager: Gilbert Low Tel: +65-6398-8661 Fax: +65-6398-8715 Email: Info ASEAN			

<b>McData</b>	Sphereon 4300 Fabric Switch	2Gbps switching with up to 12 ports	Redundant hot swappable fans, power supplies ,optics and concurrent firmware activation	Enterprise Fabric Connectivity Manager and SANpilot management software	-				
<b>McData</b>	Sphereon 3232 Fabric Switch	Port Count: 32 Port Density: 32/1.5u Port Speed: 1.0625-2.125 GB/s, full duplex	Redundant hot swappable fans, power supplies ,optics and concurrent firmware activation	Enterprise Fabric Connectivity Manager and SANpilot management software	Open Trunking and SANtegrity Binding				

**SAN Routers**

<b>Vendor</b>	<b>Product</b>	<b>No of Ports</b>	<b>Interface</b>	<b>Protocol Support</b>					
<b>Brocade</b>	Silkworm Multiprotocol router	16 ports, Fibre Channel (E, F, EX) and Gigabit Ethernet Supported management Telnet; SNMP (FE MIB, FC Management MIB);	-		-				
<b>Cisco</b>	SN 5428	Two ports	-	-	-				
<b>HP</b>	StorageWorks IP Storage Router 2122-2	2 Ethernet port, 2 FC ports	-	iSCSI 1.0, FCIP	-				
<b>McData</b>	Eclipse 1620 SAN Router	-	Ethernet: Full duplex IEEE 802.3 Gigabit Ethernet (1,000 Mbps each direction) or Fast Ethernet (100 Mbps each direction) standard on each port; 802.3x symmetric flow control	Fibre Channel Protocols: FC-AL, FC-AL-2, FC-FLA, FC-GS-2, FC-GS-3, FC-FG, FC-PH, FC-PH-2, FC-PH-3, FC-PLDA, FC-SW, FC-SW-2, FCP and E_Port IP Storage: iSCSI, iFCP, iSNS	-				

<b>McData</b>	Eclipse 2640 SAN Router	-	Ethernet Full duplex IEEE 802.3 Gigabit Ethernet standard on each port (1,000 Mb/s each direction); 802.3x symmetric flow control; 802.1Q VLAN support; 802.3ad active failover within link aggregated trunks; Spanning Tree Protocol (STP)	TCP, UDP Fibre Channel: FC-AL, FC-AL-2, FC-FLA, FC-GS-2, FC-GS-3, FC-FG, FC-PH, FC-PH-3, FC-PLDA, FC-SW, FC-SW-2, FCP and E_Port IP Storage: iSCSI, iFCP, iSNS					
<b>McData</b>	Eclipse 3300 SAN Router	-	-	Fibre Channel Protocols: FC-AL, FC-AL-2, FC-FLA, FC-GS-2, FC-GS-3, FC-FG, FC-PH, FC-PH-2, FC-PH-3, FC-PLDA, FC-SW, FC-SW-2, FCP, and E_					
<b>Storagetek</b>	StorageNet 3300	-	Two-gigabit Fibre Channel port and maximum throughput of 160 megabytes per second	-					
<b>Storagetek</b>	StorageNet 3400	Up to 8 Fibre Channel ports or up to 12 SCSI buses (with 2 FC ports)	Fibre Channel port speed: 1 or 2 Gb per second Total aggregate throughput: Over 300 MB/sec maximum sustained	-					

**NAS Gateways**

Vendor	Product	Processor	Capacity	Interface		Support Protocol	Raid capability	Management features	Contact
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<b>IBM</b>	NAS Gateway 300	Two 2.4GHz Intel Xeon per engine with 400MHz frontside	11TB/22TB	Dual 10/100 Ethernet ports for clustering heartbeat or interconnection to the Service/Management LAN	-	CIFS, NFS (v2, v3) , HTTP, FTP	SAN disk dependent IBM	-	
<b>IBM</b>	NAS Gateway 500	1.45 GHz POWER4+ processor (Orderable as 1-way, 2-way or 4-way configuration) using the following: — One-way processor book with one 1.45GHz POWER4+ processor4 — Two-way processor book with two 1.45GHz POWER4+ processors4	16 GB for a 1-way configuration, 16 GB for a 2-way configuration with one two-way processor book, 32 GB for a 2-way configuration with two one-way processor books, and 32 GB for a 4-way configuration	Dual 10/100 Ethernet ports for clustering heartbeat or interconnection to the Service/Management LAN	-	NFS V2/V3 over UDP or TCP, PCNFSD V1/V2 for (PC) NFS client authentication, Microsoft® CIFS, VLD, HTTP 1.0, HTTP 1.1 virtual hosts	-	-	
<b>NetApp</b>	R200	-	8.1 TB Can scale up to 97 .4 TB	-	-	NFS V2/V3 over UDP or TCP, PCNFSD V1/V2 for (PC) NFS client authentication, Microsoft® CIFS, VLD, HTTP 1.0, HTTP 1.1 virtual hosts	RAID 4		

**Disk Arrays**

<b>Vendor</b>	Products	Capacity (max))	Connectivity	Availability features	RAID Support				
<b>EMC</b>	CX300		2 Gb Fibre Channel host interface	-	RAID 0, 1,1/0,5				
<b>HDS</b>	Thunder 9530V	Fibre Channel 4TB, Serial ATA N/A	Dual 2 Gbps fibre channel ports	N.A.	N.A.				
<b>HDS</b>	Thunder 9520V	Fibre Channel N/A, Serial ATA 19.7TB	Dual 2 Gbps fibre channel ports	N.A.	N.A.				

<b>HP</b>	MSA1500 cs	24 TB	2 Gb/1 Gb Fibre connections to host	Server Clustering Support	Hot plug expansion and replacement of hard drives, redundant controllers				
<b>HP</b>	MSA1000	6 TB	2 Gb/1 Gb Fibre connections to host	Server Clustering Support	Hot plug expansion and replacement of hard drives, redundant controllers				
<b>HP</b>	MSA500	2 TB	2 Gb/1 Gb Fibre connections to host	Server Clustering Support	Hot plug expansion and replacement of hard drives, redundant controllers				
<b>IBM</b>	DS4800								
<b>Storagetek</b>	FLA300	4 Number of drives(max). Drive capacity:36 GB (15, 000 rpm) 73 GB (10,000 rpm or 15,000 rpm) 146 GB (10, 000 rpm)	2 Gb/s and supports up to 14 Fibre Channel drives.	-	-				
<b>Storagetek</b>	FLA200	Maximum number of drives: 14 Drive capacity: 36 GB (15, 000 rpm) 73 GB (10,000 rpm or 15,000 rpm) 146 GB (10,000 rpm)	Dual, independent FC-AL interface ports each drive 200 MB/sec, 400 MB/sec total	-	-				
<b>Sun</b>	StorEdge 6120 Array	Up to 12.2 TB with expansion trays	2 Gb Fibre Channel host interface		Multiple RAID levels				

<b>Sun</b>	StorEdge 3120 SCSI Array	Over one terabyte of capacity	Number of ports: Up to two server nodes (user configurable) Interface type: Ultra 320 SCSI Low Voltage Differential (LVD)	-	Multiple RAID levels				
<b>Sun</b>	StorEdge 3310 SCSI Array	Up to 3.6 terabytes of capacity per tray	2U, 12 drive form factor	-	-				

**IPSAN**

<b>Vendor</b>	<b>Product</b>	<b>Capacity</b>	<b>Port type</b>	<b>Protocol</b>	<b>Operating system</b>	<b>RAID level</b>	<b>Contact</b>		
<b>EMC/Dell</b>	AX100i	160 GB SATA	2 Gbps optical	FCP SCSI 3	Windows, Linux, Sun Solaris	RAID 5, RAID1/0			
<b>EMC/Dell</b>	AX100SC	250 GB SATA	2 Gbps optical	FCP SCSI 3	Windows, Linux, Sun Solaris	RAID 5, RAID1/0	`C' Wing 4th Floor Fortune 2000, Bandra Kurla Complex Bandra (East) Mumbai 400 051 Phone: +91 22 55066700 Fax: +91 22 55022711 Website: <a href="http://india.emc.com">http://india.emc.com</a>		
<b>Intrinsa</b>	IP 3000	8 TB (250 GB disk) 12.8 TB (400 GB disk)	2 Gbps optical	iSCSI	Microsoft Windows 2000/XP/Server 2003, Solaris 8,9 and RedHat Linux	RAID 0,1,1/0			

