EMC VNX5500-F UNIFIED STORAGE FLASH ARRAY

EMC® VNX5500-F™ unified storage all-flash array delivers uncompromising performance, availability, and flexibility for environments requiring the highest levels of transactional throughput. The EMC VNX5500-F is designed for five-9's availability, a requirement for mission critical databases. Testing has shown the VNX5500-F delivers 10x the performance at 1/8th the transaction cost for both Oracle and Microsoft SQL OLTP workloads.

Specifications

ARCHITECTURE

Based on the powerful new family of Intel Xeon-5600 processors, the EMC VNX5500-F implements a modular architecture that integrates hardware components for block, file, and object with concurrent support for native NAS, iSCSI, Fibre Channel, and FCoE protocols. The VNX5500-F delivers file (NAS) functionality via one-to-three X-blade data movers and block (iSCSI, FCoE, and FC) storage via dual storage processors leveraging full 6 Gb SAS connectivity to Flash drives.

The unified configuration includes the following rack-mounted enclosures:

- Disk processor enclosure (holds disk drives) plus standby power system to deliver block protocols
- One or more data mover enclosures to deliver file protocols (optional)
- Control station (optional)

PHYSICAL SPECIFICATIONS

BLOCK COMPONENTS	
Min/Max Drives	25/250
Array Enclosure Options (DPE)	3U Disk Processor Enclosure* with 21 x 2.5" 100 GB Flash drives or 21 x 2.5" 200 GB Flash drives
Drive Enclosure Options (DAE)	25 x 2.5" Flash/SAS drives–2 U 15 x 3.5" Flash/SAS drives–3 U
Standby Power System	1U 1.2KW
Raid Options	0/1/10/3/5/6
CPU/Memory per Array	Intel Xeon 5600/24 GB
Max Block UltraFlex IO Modules per Array	4
Embedded IO Ports per Array	8 FC ports and 4 SAS ports (2 BE SAS buses)**
Max Total Ports per Array	24
2/4/8 Gb/s FC Max Ports per Array	16
1 GBaseT iSCSI Max Total Ports per Array	16
10 GbE iSCSI Min/Max Total Ports per Array	8
Max FCoE Total Ports per Array	8
6 Gb/s SAS Buses (4 Lanes per Bus) for DAE Connections	2

FILE COMPONENTS***	
# File X-Blades	1-3
# Control Stations	1-2 x 1U Server
X-Blade: CPU/Memory	Intel Xeon 5600/12 GB
Max File UltraFlex IO Modules per X-Blade	4
Min/Max 2/4/8 Gb/s FC Ports per X-Blade	4
Max IP Ports per X-Blade	12
Max 1 GBaseT Ports per X-Blade	12
Max 10 GbE Ports per X-Blade	6

OTHER	
Management	LAN 2 x 10/100/1000 Copper GbE

FUNCTIONAL LIMITS	
Max Raw Capacity	679 TB
Max SAN Hosts	4,096
Max Number of Pools	40
Max Number of LUNs	4,096
Max LUN Size	14 TB (Virtual Pool LUN)
Max File System Size	16 TB
Maximum Usable File Capacity per X-Blade	256 TB
OS Support	Block OS's Plus File OS's see E-Lab Navigator and NAS Support Matrix on Powerlink

* The disk processor enclosure also includes four SAS vault drives (300 GB 10K RPM)
**4 embedded FC ports per array are reserved for file connectivity
*** The File components are not required when ordering a block-only system

VNX5500-F CONNECTIVITY

The VNX5500-F provides flexible connectivity options via UltraFlex IO modules for both the file X-blades for NAS connectivity and the block storage processors for FC and iSCSI host connectivity (see above table for number of modules supported per blade or SP).

BLOCK-TO-HOST CPU (SP -BASED) ULTRAFLEX™ IO MODULE OPTIONS

IO Module	Description
Four-Port Fibre Channel Module	FC module with four ports auto-negotiating to 2/4/8 Gbps; uses optical SFP and OM2/OM3 cabling to connect directly to host HBA or FC switch
Four-Port 1 Gb/s iSCSI Module with TOE	iSCSI module with four 1 GBaseT RJ-45 copper connections to Cat 6 cabling to Ethernet switch; includes TCP offload engine
Two-Port 10 Gb/s iSCSI Module with TOE	iSCSI module with two 10 Gb/s Ethernet ports and choice of SFP+ optical connection or active twinax copper connection to Ethernet switch; includes TCP offload engine
Two-Port 10 GbE FCoE Module	FCoE module with two 10 Gb/s Ethernet ports and choice of SFP+ optical connection or active twinax copper connection to converged enhanced Ethernet switch

FILE-TO-NFS/CIFS CLIENT (X-BLADE-BASED) ULTRAFLEX IO MODULE OPTIONS

IO Module	Description
Four-Port 1 GBase-T IP Module	10/100/1000 BaseT module with four ports supporting RJ-45 copper connections to Cat 6 cabling to Ethernet switch
Four-Port 1 GBaseT and 1 GbE Opt IP Module	IP module with two ports of 10/100/1000 Base-T and two ports 1 GbE optical
Two-Port 10 GbE Opt IP Module	IP module with two 10 Gb/s Ethernet ports and choice of SFP+ optical connection or active twinax copper connection to Ethernet switch
Four-Port 8 Gb/s Fibre Channel Module	FC module with four ports auto-negotiating to 2/4/8 Gbps; uses optical SFP and OM2/OM3 cabling to connect directly to captive array and to provide NDMP tape connection

MAXIMUM CABLE LENGTHS

Shortwave optical OM2: 50 meters (8 Gb), 100 meters (4 Gb), and 300 meters (2 Gb)

Shortwave optical OM3: 150 meters (8 Gb), 380 meters (4 Gb), and 500 meters (2 Gb)

BACK-END (DISK) CONNECTIVITY

Each storage processor connects to one side of each of two or six (four are optional) redundant pairs of four-lane x 6 Gb/s Serial Attached SCSI (SAS) buses, providing continuous drive access to hosts in the event of a storage processor or bus fault.

EXPANDABILITY

VNX5500-F supports a maximum of 250 drives in up to a 15 disk expansion chassis and can be expanded into a tiered storage system by adding disk array enclosures with any combination of Flash, SAS, and Near-line SAS drives.

DISK ARRAY ENCLOSURES

	25 x 2.5” Drive DAE	15 x 3.5” Drive DAE
Drive Types Supported	2.5” Flash 2.5” 10K Rotating	3.5” Flash 15K Rotating 2.5” 10K Rotating (in 3.5” carrier) 3.5” Near-line Rotating
Drive Mixing	No limitations	No limitations
Controller Interface	6 Gb SAS	6 Gb SAS

DISK DRIVES FOR 25 X 2.5” DRIVE DISK PROCESSOR ENCLOSURE/DISK ARRAY ENCLOSURE

Nominal Capacity	100 GB Solid State Drive *	200 GB Solid State Drive *	300 GB 10K Drive	600 GB 10K Drive
Formatted Capacity**	93.1 GB	186.31 GB	272.59 GB	545.19 GB
Form Factor	2.5”	2.5”	2.5”	2.5”
Height	1.0”	1.0”	1.0”	1.0”
Rotational Speed	Solid State	Solid State	10,000 rpm	10,000 rpm
Interface	6 Gb SAS	6 Gb SAS	6 Gb SAS	6 Gb SAS
Data Buffer	N/A SSD	N/A SSD	16 MB min	16 MB min

ACCESS TIME				
Average Read	N/A	N/A	3.6 msec	3.7 msec
Average Write	N/A	N/A	4.2 msec	4.2 msec
Rotation Latency	N/A	N/A	3.0 msec	3.0 msec

NOMINAL POWER CONSUMPTION (WATTS)				
Operating Mode	4.97	4.97	6.15	5.6
Idle Mode	1.36	1.36	3.5	3.1

* Drive Options for Disk Processor Enclosure

** 520 bytes/sector, 1 MB = 1,048,576 bytes

DISK DRIVES FOR 15 X 3.5" DRIVE DISK ARRAY ENCLOSURE

Nominal Capacity	100 GB Solid State Drive	200 GB Solid State Drive	300 GB 15K Drive	600 GB 15K Drive	300 GB 10K Drive	600 GB 10K Drive	2 TB 7.2K Drive	3 TB 7.2K Drive*
Formatted Capacity*	93.1 GB	186.31 GB	272.59 GB	545.19 GB	272.59 GB	545.19 GB	1,852.09 GB	2,778.13 GB
Drive Form Factor	3.5	3.5"	3.5"	3.5"	2.5"	2.5"	3.5"	3.5"
Height	1.0"	1.0"	1.0"	1.0"	1.0"	1.0"	1.0"	1.0"
Rotational Speed	Solid State	Solid State	15,000 rpm	15,000 rpm	10,000 rpm	10,000 rpm	7,200 rpm	7,200 rpm
Interface	6 Gb SAS	6 Gb SAS	6 Gb SAS	6 Gb SAS	6 Gb SAS	6 Gb SAS	6 Gb SAS	6 Gb SAS
Data Buffer	N/A SSD	N/A SSD	16 MB min	16 MB min	16 MB min	16 MB min	16 MB min	16 MB min
ACCESS TIME								
Average Read	N/A	N/A	3.4 msec	3.4 msec	3.6 msec	3.7 msec	8.5 msec	8.5 msec
Average Write	N/A	N/A	3.9 msec	3.9 msec	4.2 msec	4.2 msec	9.5 msec	9.5 msec
Rotation Latency	N/A	N/A	2.0 msec	2.0 msec	3.0 msec	3.0 msec	4.16 msec	4.16 msec
NOMINAL POWER CONSUMPTION (WATTS)								
Operating Mode	4.97	4.97	12.92	16.35	6.15	5.6	12.2	12.2
Idle Mode	1.36	1.36	8.74	11.68	3.5	3.1	8.0	8.0

VNX5500-F OE PROTOCOLS AND SOFTWARE FACILITIES

The VNX5500-F offers support for a wide variety of protocol and advanced features available via various software suites and packs.

PROTOCOLS AND FACILITIES SUPPORTED

- Access-based Enumeration (ABE) for Microsoft Windows®Server 2003
- Address Resolution Protocol (ARP)
- Automated Volume Management (AVM): File system provisioning
- Block Protocols: iSCSI, Fibre Channel (FCP SCSI-3), and FCoE
- Common Criteria Certification: EAL 3+ Assurance Level
- DFS Distributed File System (Microsoft) as Leaf node or Root Server
- Ethernet Trunking
- File Protocols: NFSv2, v3, and v4; CIFS (SMB 1 and SMB 2); FTP (including SFTP and FTPs)
- FileMover API: Open API for automated, transparent data movement between tiers of storage
- Network Lock Manager (NLM) v1, v3, and v4
- Failsafe Networking
- Internet Control Message Protocol (ICMP)
- Kerberos Authentication
- Lightweight Directory Access Protocol (LDAP)
- LDAP signing for Windows
- Link Aggregation (IEEE 802.3ad)
- UNIX archive utilities (tar/cpio)
- Network Data Management Protocol (NDMP) v1-v4
- Network Equipment-Building System (NEBS) Level 3 / ETSI Certified
- Network Information Service (NIS) Client
- Network Status Monitor (NSM) v1

- Object support via EMC Atmos™ Virtual Edition
- Portmapper v2
- Network Time Protocol (NTP) client
- NT LAN Manager (NTLM)
- Restriction of Hazardous Substances (RoHS) compliance
- Routing Information Protocol (RIP) v1-v2
- Simple Network Management Protocol V1-V3 (SNMP)
- Simple Network Time Protocol (SNTP)
- Virtual Data Movers for Microsoft Windows clients
- Virtual LAN (IEEE 802.1q)

VNX5500-F SOFTWARE

Management	Unisphere™ for Block, Unisphere for File, or Unisphere for Unified
Protocols	CIFS, NFS, pNFS, MPFS, FC, FCoE, and iSCSI included
Base Software (included with VNX OE)	File Single Instancing, Compression, and Virtual Provisioning

SOFTWARE SUITES	
FAST Suite: Automatically optimize for the highest system performance and the lowest storage cost simultaneously	Dynamically tier data across drives Extendable cache for performance boost Trend analysis and reporting Monitor and achieve performance objectives
Security and Compliance Suite: Keep data safe from changes, deletions, and malicious activity	Encrypt data where it is created Disk-based WORM functionality Anti-virus integration and alerting
Local Protection Suite: Practice Safe Data Protection and Repurposing	Block storage snaps and clones Continuous Data Protection for DVR-like recovery for block storage File system snaps
Remote Protection Suite: Protect data against localized failures, outages, and disasters	Unified storage replication with DVR-like recovery Integrated WAN deduplication and bandwidth reduction Granular file system level replication and recovery
Application Protection Suite: Automate application copies and prove compliance	Application copy management Prove protection compliance

SOFTWARE PACKS	
Protection Pack	Local Protection Suite + Remote Protection Suite + Application Protection Suite
Total Efficiency Pack	FAST Suite + Security & Compliance Suite + Local Protection Suite + Remote Protection Suite + Application Protection Suite

NOTE: For more detail on software licensing, please contact your sales representative.

OPTIONAL VMWARE FACILITIES AND TITLES

- VNX Plug-in for VMware®: For provisioning, management, cloning, and deduplication
- Site Recovery Manager (SRM) Integration: Managing failover and failback making disaster recovery rapid and reliable
- Replication Manager: Host-based management of array-based copies of data

ADDITIONAL OPTIONAL EMC TITLES

- EMC Ionix™: VNX integration with EMC Storage management infrastructure
- EMC PowerPath®: Path management
- Cloud Tiering Appliance: Transparent file-based tiering within and across platforms

VNX5500-F ELECTRICAL SPECIFICATIONS

(For specific power specifications please refer to the EMC Power Calculator at power.emc.com with your Powerlink® account.)

DPE ENCLOSURE

POWER	
AC Line Voltage	100 to 240 Vac ± 10%, single-phase, 47 to 63 Hz
AC Line Current (operating maximum)	4.6 A max at 100 Vac, 2.3 A max at 200 Vac
Power Consumption (operating maximum)	460 VA (450 W) max
Power Factor	0.98 min at full load, low voltage
Heat Dissipation (operating maximum)	1.62 x 10^6 J/hr, (1,540 Btu/hr) max
In-rush Current	15 A max for ½ line cycle, per line cord at 240 Vac 8 A max for ½ line cycle, per line cord at 120 Vac
Startup Surge Current	29 A rms max for 50 ms, at any line voltage
AC Protection	12.5 A fuse on each power supply, both phases
AC Inlet Type	IEC320-C14 appliance coupler, per power zone
Ride-through Time	30 ms min
Current Sharing	± 15 percent of full load, between power supplies
Height (in/cm)	5.25 in/ 13.34 cm
Width (in/cm)	17.5 in/ 44.45 cm
Depth (in/cm)	24.25 in/ 61.6 cm
Weight (lb/kg) (with and without drives)	Full: 75.25/34.2 Empty: 59.0/26.8

NOTE: The DPE requires a Standby Power Supply (see the following information)

STANDBY POWER SUPPLY

POWER	1.2kW Standby Power Supply
AC Line Voltage	100 to 240 Vac ± 10%, single-phase, 47 to 63 Hz
AC Line Current, Internal, and Pass-through	0.10 A max at 100 Vac, internal power consumption (Up to 10 A max at 100 Vac, pass-through to AC outlets) 0.05 A max at 200 Vac, internal power consumption (Up to 6 A max at 200 Vac, pass-through to AC outlets)
Internal Power Consumption	70 VA (40 W) pk in hi-charge mode, 10 VA (6 W) in float charge mode
Power Factor	N/A for pass-through load, internal 10 VA load is 0.60 power factor
Heat Dissipation	21.6 x 10^3 J/hr, (20 Btu/hr) steady state
In-rush Current	9 A max for ½ line cycle, per power supply at 240 Vac
AC Protection	15 A fuse, both phases
AC Inlet Type	IEC320-C14 appliance coupler with switch
AC Outlet Type	IEC320-C13 appliance coupler, quantity two
Charge Times	190 minutes max
AC Failure Detect Time	10 ms max
Transfer Time	25 ms max
Dimensions (H/W/L)	1.6 in/17.5 in/23.75 in or 4.0 cm/44.45 cm/60.3 cm
Weight	47 lb/21.6 Kg

DATA MOVER ENCLOSURES, DISK ARRAY ENCLOSURES AND CONTROL STATION

	VNX5500-F DME with (2) Data Movers	15x3.5" Disk Array Enclosure	25x2.5" Disk Array Enclosure	Control Station
POWER				
AC Line Voltage	100 to 240 Vac ± 10%, single-phase, 47 to 63 Hz	100 to 240 Vac ± 10%, single-phase, 47 to 63 Hz	100 to 240 Vac ± 10%, single-phase, 47 to 63 Hz	100 to 240 Vac ± 10%, single-phase, 47 to 63 Hz
AC Line Current (operating maximum)	5.0 A max at 100 Vac, 2.5 A max at 200 Vac	2.8 A max at 100 Vac, 1.4 A max at 200 Vac	2.5 A max at 100 Vac, 1.3 A max at 200 Vac	1.0 A max at 100 Vac, 0.5 A max at 200 Vac
Power Consumption (operating maximum)	500 VA (470 W) max	280 VA (235 W) max	250 VA (230 W) max	132 VA (104 W) max
Power Factor	0.98 minimum at full load, low voltage	0.98 min at full load, low voltage	0.98 min at full load, low voltage	0.80 min at full load, low voltage
Heat Dissipation (operating maximum)	1.69 x 10^6 J/hr, (1,610 Btu/hr) max	8.46 x 10^5 J/hr, (800 Btu/hr) max	8.28 x 10^5 J/hr, (785 Btu/hr) max	3.60 x 10^5 J/hr, (300 Btu/hr) max
In-rush Current	15 A max for ½ line cycle, per line cord at 240 Vac 8 A max for ½ line cycle, per line cord at 120 Vac	50 A max for ½ line cycle, per line cord at 240 Vac 25 A max for ½ line cycle, per line cord at 120 Vac	50 A max for ½ line cycle, per line cord at 240 Vac 25A max for ½ line cycle, per line cord at 120 Vac	15 A max for ½ line cycle at 240 Vac 8 A max for ½ line cycle at 120 Vac
Startup Surge Current	27 A rms max for 50 ms, at any line voltage	10.6 A rms max for 100 ms, at any line voltage	10.6 A rms max for 100 ms, at any line voltage	NA
AC Protection	7.8 A fuse on each power supply, both phases	10 A fuse on each power supply, both phases	10 A fuse on each power supply, both phases	NA
AC Inlet Type	IEC320-C14 appliance coupler, per power zone	IEC320-C14 appliance coupler, per power zone	IEC320-C14 appliance coupler, per power zone	IEC320-C14 appliance coupler, per power zone
Ride-through Time	30 ms min	30 ms min	30 ms min	NA
Current Sharing	± 15 percent of full load, between power supplies	± 10 percent of full load, between power supplies	± 10 percent of full load, between power supplies	NA
DIMENSIONS				
Height (in/cm)	3.5 in/8.9 cm	5.25 in/13.34 cm	3.45 in/8.76 cm	1.75 in/4.45 cm
Width (in/cm)	17.5 in/44.45 cm	17.6 in/44.75 cm	17.62 in/44.75 cm	17.5 in/44.45 cm
Depth (in/cm)	500 VA (470 W) max	280 VA (235 W) max	250 VA (230 W) max	132 VA (104 W) max
Weight (lb/kg)	24.25 in/61.6 cm	14 in/35.56 cm	13 in/33.02 cm	20 in/50.8 cm
(with and without drives)	52.5 lb/23.81 kg	Full: 67/30.45 Empty: 32/14.5	Full: 38.35/17.4 Empty: 22.1/10.0	18 lb/8.16 kg

40U CABINET

AC Voltage: 200 to 240 Vac ± 10 percent, single-phase, 47 to 63 Hz

Power Configuration: Two power domains (base and extended), each redundant

Power Inlet Count: Either two (for redundant base configuration) or four (for redundant extended configuration)

Plug Types: NEMA L6-30P or IEC309-332 P6 or IP57 (Australia)

Input Power Capacity: 4,800 VA @ 200 VAC, 5,760 VA @ 240 VAC (base configuration)
9,600 VA @ 200 VAC, 11,520 VA @ 240 VAC (extended configuration)

AC Protection: 30 A site circuit breakers on each power branch

40U Cabinet Dimensions: Height - 75 in (190.8 cm); Width - 24.0 in (61.1 cm)
Depth - 39.0 in (99.2 cm); Weight Empty - 380 lb (173 kg)

OPERATING ENVIRONMENT

Temperature:	50–104 degrees F (10–40 degrees C)
Temperature Gradient:	18 degrees F/hr (10 degrees C/hr)
Relative Humidity:	20% to 80% (non-condensing)
Altitude:	7,500 ft. (2,286.4 m) @ 104 degrees F (40 degrees C) max. 10,000 ft (3,048 m) @ 98.6 degrees F (37 degrees C) max.

ELECTROMAGNETIC EMISSIONS AND IMMUNITY

FCC Class A EN55022 Class A

CE Mark VCCI Class A (for Japan)

ICES-003 Class A (for Canada) AS/NZS 3548 Class A (for Australia/New Zealand)

EN55024 Immunity, ITE BSMI Class A (for Taiwan)

QUALITY AND SAFETY STANDARDS

UL 60950; CSAC 22.2-60950, FN 60950

Manufactured under an ISO 9000-registered quality system

CONTACT US

To learn more about how EMC products, services, and solutions can help solve your business and IT challenges, contact your local representative or authorized reseller, or visit us at www.EMC.com.

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