



New EMC VNX Unified Storage Family Offers the Best of CLARiiON and Celerra for the Midrange

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Management Summary

One of the major announcements at EMC's recent product launch event was the new VNX family of unified storage. In fact, you could say this new storage platform has been years, even decades, in the making because it represents an integration and convergence of EMC's successful CLARiiON and Celerra platforms. Within the VNX family, there are two series, the VNXe series¹, at the entry level, and the larger VNX series spanning the midrange (VNX5100/5300/5500/5700/7500).

The midrange VNX series are remarkable for their combination of unified SAN and NAS, scalability, performance, data protection, and resource efficiency. They support a menu of block and file protocols and expand to a maximum capacity of up to 1,000 drives (or 1,974 TB), arguably reaching into the high end. Performance is three times faster than the previous generation EMC midrange systems. They support unified management with *Unisphere*, local point-in-time copies, CDP (continuous data protection), and remote replication for disaster recovery. And a slew of efficiency features help squeeze more utility from system resources, which include thin provisioning, file level deduplication, compression, and FAST VP (Fully Automated Storage Tiering for Virtual Pools) and FAST Cache.

Add it up and the new VNX unified storage platform is one to be noticed. Read on for details.

EMC VNX Unified Storage Family

The new EMC VNX family of unified storage is an integration of the EMC CLARiiON and EMC Celerra platforms – two established and mature SAN and NAS product lines, respectively. (See *Evolution of EMC VNX* in the box on Page 2.) VNX brings together the software intelligence of CLARiiON and Celerra and delivers SAN and NAS (block and file) – and the ability to start with block or file only and upgrade to unified – all in a single platform.

The midrange VNX models range from the FC-only VNX5100 (all other VNX series models support block and file protocols) with up to 8 host ports and up to 75 drives (or 150 TB) to the sizable VNX7500 that supports FC, iSCSI, FCoE, NFS, CIFS, pNFS, and MPFS with up to 160 host ports and up to 1,000 drives (or 1,974 TB). Numerous software features are bundled into suites and packs for simpler procurement and lower per-unit pricing.

The Meaning of Unified

Unified storage is consolidated storage because enterprises use both block and file storage infrastructure. For enterprise applications and databases, block storage is generally preferred and the best performing. File storage lets users organize and share files over a network. It is simpler and more efficient to have both in one platform, though traditionally they have been separate elements in the infrastructure.

¹ For more details, see **The Clipper Group Navigator** dated January 31, 2011, entitled *EMC VNXe Unified Storage — Minutes to Provision, Enterprise-Class Features, and Starting Under \$10K* and available at <http://www.clipper.com/research/TCG2011004.pdf>.

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Architecture

VNX systems have a modular architecture with discrete enclosures in 1U, 2U, or 3U form factors.

- **Storage Processor Enclosure (SPE)** is 2U and provides block storage access via Fibre Channel, iSCSI, and FCoE protocols.
- **Disk Processor Enclosure (DPE)** is 3U and contains storage processors plus 25 small form-factor (2.5") SAS drives or 15 large form-factor (3.5") SAS drives. The VNX5700 and 7500 support the SPE, which includes storage processors but no drive trays. The VNX5100/5300/5500 support the DPE, which includes both.
- **X-Blade (a.k.a. Data Mover)** is 2U and provides file storage access with NFS, CIFS, pNFS, and MPFS protocols. Two X-Blades can be installed in a 2U Data Mover Enclosure (DME).
- **Disk Array Enclosures (DAE)** is either 2U and contains twenty-five 2.5" SAS drives or is 3U and contains fifteen 3.5" SAS drives flash, SAS, or NL-SAS (near-line SAS) drives.
- **Control Station (1U) and Secondary Power Supply (SPS) are 1U.** Control stations manage X-Blade failover.

Note that a unified or a file-only configuration contains all of the components above, and a block-only configuration includes a DPE or SPE, DAE, and SPS. Storage processors and X-blades add performance and front-end connectivity, and DAEs increase capacity. Exhibit 1 on the next page, *VNX Series Midrange Models and Specifications*, shows maximum configurations, but customers have significant flexibility in how they mix and configure storage processors, X-Blades, and DAEs for block and file performance and capacity.

Supported front-end host connectivity includes 8Gbit/s FC, GbE, 10GbE, and FCoE. The *UltraFlex* I/O ports allow users to mix and match connectivity options. FC modules auto-negotiate to 2, 4, or 8 Gbit/s. iSCSI modules support GbE and 10GbE and include TCP offload engines² that accelerate throughput. FCoE runs over 10GbE. VNX supports open systems host operating systems (e.g., *Windows*, *Linux*, *UNIX*, and *NetWare*) and *VMware* and *Hyper-V* virtual environments.

² TCP offload engine (TOE) provides hardware-accelerated I/O throughput.

Evolution of the EMC VNX

The EMC VNX unified storage family represents an integration of the very successful EMC *CLARiiON* and *Celerra* networked storage platforms. *CLARiiON* is the mid-range SAN platform that EMC acquired from Data General in 1999 and continued to develop and promote. *CLARiiON* runs the *FLARE (Fibre Logic Array Runtime Environment)* operating environment. *Celerra* is the NAS platform that EMC enhanced in recent years with SAN storage access to create a unified storage platform. *Celerra* runs the *DART (Data Access in Real Time)* operating environment.

EMC watchers have noted the increasing overlap between the *CLARiiON* and *Celerra* platforms. *Celerra* NAS added iSCSI and then Fibre Channel SAN connectivity. *CLARiiON* added iSCSI to its traditional high-performance Fibre Channel SAN. At this point, a convergence of the two platforms into the one VNX unified storage family appears to be a natural evolution and culmination. By integrating *FLARE* and *DART*, the VNX series inherits two solid and proven operating environments to deliver a best-of-both-worlds solution.

File connectivity is GbE and 10GbE. CIFS provides file access for *Windows* systems; NFS provides file access for *UNIX* and *Linux*; and *MPFS (Multi-Path File System)* is an EMC technology delivering high-speed file access that uses the LAN as the control path and the SAN as the data path.

The back-end drive connections are 6Gb/s SAS. Supported 3.5" drives are: 100 GB and 200 GB SSD for ultra-fast performance; 300 GB and 600 GB SAS at 15,000 RPM for fast performance; and 2 TB NL-SAS at 7,200 RPM for high capacity. Supported 2.5" drives are 300 GB and 600 GB SAS at 10,000 RPM for high-density midrange performance. Maximum capacity of the VN7500 is 1,000 drives and 1,974 TB. VNX can automatically move data between storage tiers to help gain the most performance from their drive mixture, especially flash drives. (See details on the FAST Suite at the end of the next page).

According to EMC, VNX performance at its high end is a formidable three times faster than EMC's previous generation of midrange storage systems. Powered by Intel 6-core *Xeon 5600*

Exhibit 1 — VNX Series Midrange Models and Specifications

Model	Max. SPE Ports (Block)	# X-Blades (File)	Max. X-Blade Ports	# Drives	Max. Capacity	Max. SAN Hosts
VNX5100	8 x 8Gbit/s FC	N/A	N/A	4 to 75	150 TB	512
VNX5300	8 x 8Gb/s FC plus: 8 FC or 8 GbE iSCSI or 4 x 10GbE iSCSI or 4 x 10GbE FCoE	1 to 2	8 x 8Gb/s FC plus 16 GbE or 8 x 10GbE	4 to 125	240 TB	2,048
VNX5500	8 x 8Gb/s FC plus: 16 FC or 16 GbE iSCSI or 8 x 10GbE iSCSI or 8 x 10GbE FCoE	1 to 3	12 x 8Gb/s FC plus 36 GbE or 18 x 10GbE	4 to 250	480 TB	4,096
VNX5700	24 x 8Gb/s FC or 24 GbE iSCSI or 12 x 10GbE iSCSI or 12 x 10GbE FCoE	2 to 4	16 x 8Gb/s FC plus 48 GbE or 24 x 10GbE	4 to 500	984 TB	4,096
VNX7500	32 x 8Gb/s FC or 32 GbE iSCSI or 16 x 10GbE iSCSI or 16 x 10GbE FCoE	2 to 8	32 x 8Gb/s FC plus 128 GbE or 64 x 10GbE	4 to 1,000	1,974 TB	8,192

Source: EMC

processors, EMC cites three times improvement in the number of IOPS and users for *SQL Server* and *Oracle* and three times faster for VMware boot and *View* refresh.

VNX has built-in redundancy for high availability. Features include dual active/active controllers, automatic failover and failback, mirrored write cache with de-stage to disk in the event of power failure, RAID 0, 1, 0/1, 3, 5, and 6. In addition, the system supports internal monitoring, call-home, remote diagnostics, and non-disruptive software upgrades and field hardware replacement.

Software

Included with the VNX Operating Environment and management software are:

- **Management with *Unisphere*** – Centrally manages all EMC VNX, VNXe, CLARiiON, Celerra, and *RecoverPoint* systems. It is integrated with VMware *vCenter* to give administrators insight into the virtual environment and enable two-click storage provisioning from *vCenter*.
- **File deduplication and compression³** – Reduces space by up to 50% by deduplicating and compressing inactive files.
- **Block compression⁴** – Reduces space needed for inactive LUNs.

- **Virtual Provisioning** – Enables thin provisioning for space efficiency and thick provisioning for best performance.
- **SAN Copy** – Non-disruptively migrates data to and from VNX, CLARiiON, Symmetrix, and third-party storage systems.
- **Protocols** – All block and file protocol licenses are included.

Optional software features in the VNX *Total Protection Pack* include:

- **Local protection** – Full clone and snapshot copies and CDP for recovery to any point in time.
- **Remote protection** – Remote data replication for disaster recovery and CDP, with WAN deduplication and bandwidth reduction.
- **Application protection** – Creates application-consistent, restartable snapshots and backups.

Optional software features in the VNX *Total Efficiency Pack* include:

- **Total Protection Pack Suite** plus
- **FAST Suite⁵** – *FAST VP* automates data placement among storage tiers in 1 GB increments based on read and write activity. It optimizes storage performance and cost by placing the hottest (i.e., the most active) data on flash drives,

³ Unavailable on VNX5100

⁴ Unavailable on VNX5100

⁵ Unavailable on VNX5100

moderately active data on SAS drives, and inactive data on nearline (slower) SAS drives. Administrators set policies for how and when to move data. Furthermore, a related feature – *FAST Cache* – extends available cache by up to 2 TB using flash drives to improve performance for OLTP workloads.

- **Security and Compliance Suite** – Host-based data encryption, anti-virus integration and alerting, and disk-based WORM⁶.

Software packs are priced less than buying suites or features individually.

Warranty

The VNX series includes a three-year enhanced warranty, with next-business day onsite support and 24x7 remote support.

Conclusion

The new VNX unified storage platform brings together the best features of EMC CLARiiON and Celerra and then takes a big step forward. If your enterprise has what are commonly known as midrange storage requirements, you should look closely at the new EMC VNX.



⁶ Write-Once, Read-Many (WORM) ensures data is immutable and non-erasable for a specified period of time.

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