Dell EMC Unity XT: Introduction to the Platform

Abstract

This white paper introduces the Dell EMC Unity XT platform, including Dell EMC Unity 380/F, 480/F, 680/F, and 880F models. It also provides an overview of purpose-built Dell EMC Unity XT systems and compares All-Flash and Hybrid variants.

January 2020
## Revisions

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<th>Date</th>
<th>Description</th>
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<tr>
<td>June 2019</td>
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Executive summary

This white paper provides an overview of the Dell EMC Unity™ XT platform hardware and includes information about virtual deployments of Dell EMC Unity storage. Models covered include Dell EMC Unity 380/F, 480/F, 680/F, and 880F systems. This document also describes purpose-built Dell EMC Unity XT systems and compares the similarities and differences between All-Flash and Hybrid variants.

For hardware details on the X00/F and X50F Dell EMC Unity models, refer to the Dell EMC Unity: Introduction to the Platform white paper.

For a software overview on all Dell EMC Unity family systems, refer to the Dell EMC Unity: Operating Environment (OE) Overview white paper. Step-by-step instructions for using software features within Dell EMC Unity storage can be found in Dell EMC™ Unisphere™ Online Help.

Audience

This white paper is intended for IT administrators, storage architects, partners, Dell EMC employees, and any other individuals involved in the evaluation, acquisition, management, operation, or design of a Dell EMC networked storage environment using the Dell EMC Unity XT family of storage systems.

Terminology

- **Dynamic Host Configuration Protocol (DHCP):** A protocol used to handle the allocation and administration of IP address space from a centralized server to devices on a network.
- **Fibre Channel protocol:** A protocol used to perform Internet Protocol (IP) and Small Computer Systems Interface (SCSI) commands over a Fibre Channel network.
- **File system:** A storage resource that can be accessed through file-sharing protocols such as SMB or NFS.
- **Fully Automated Storage Tiering for Virtual Pools (FAST™ VP):** A feature that relocates data to the most appropriate disk type depending on activity level to improve performance while reducing cost.
- **FAST Cache:** A feature that allows Flash drives to be configured as a large capacity secondary cache for the pools on the system.
- **Internet Small Computer System Interface (iSCSI):** Provides a mechanism for accessing block-level data storage over network connections.
- **Logical unit number (LUN):** A block-level storage device that can be shared out using a protocol such as iSCSI.
- **Network attached storage (NAS) server:** A file-level storage server used to host file systems. A NAS server is required in order to create file systems that use SMB or NFS shares, as well as VMware NFS datastores and VMware® vSphere® Virtual Volumes™ (File).
- **Network File System (NFS):** An access protocol that allows data access from Linux® or UNIX hosts located on a network.
- **Pool:** A repository of drives from which storage resources such as LUNs and file systems can be created.
- **REpresentational State Transfer (REST) API:** A lightweight communications architecture style that enables the execution of discrete actions against web services.
- **Server Message Block (SMB)**: A network file sharing protocol, sometimes referred to as CIFS, used by Microsoft® Windows® environments. SMB is used to provide access to files and folders from Windows hosts located on a network.

- **Snapshot**: A point-in-time view of data stored on a storage resource. A user can recover files from a snapshot, restore a storage resource from a snapshot, or provide access to a host.

- **Software-defined storage**: A storage architecture where the software storage stack is decoupled from the physical storage hardware.

- **Storage Policy Based Management (SPBM)**: Using storage policies to dictate where a VM will be stored, as opposed to choosing a datastore manually.

- **Storage processor (SP)**: A storage node that provides the processing resources for performing storage operations as well as servicing I/O between storage and hosts.

- **Unisphere**: An HTML5 graphical user interface used to manage Dell EMC Unity XT systems.

- **Unisphere Command Line Interface (UEMCLI)**: An interface that allows a user to perform tasks on the storage system by typing commands instead of using the graphical user interface.

- **Virtual Storage Appliance (VSA)**: A storage node that runs as a virtual machine instead of on purpose-built hardware.

- **vSphere API for Array Integration (VAAI)**: A VMware API that allows storage-related tasks to be offloaded to the storage system.

- **vSphere API for Storage Awareness (VASA)**: A VMware API that provides additional insight about the storage capabilities in vSphere.

- **Virtual Volumes (vVols)**: A VMware® storage framework which allows VM data to be stored on individual VMware vSphere® Virtual Volumes™ (vVols). This allows for data services to be applied at a VM-granularity level while utilizing Storage Policy Based Management (SPBM).
Introduction

In this constantly changing world of increasing complexity and scale, the need for an easy-to-use intelligent storage system has only grown greater. Customers using new applications and solutions require dependable storage and are often tasked with the challenge of doing more with less. The Dell EMC Unity XT family addresses this challenge by packaging a powerful storage system into a cost and space-efficient profile. Some of Dell EMC Unity XT highlight features include the following:

- **Dual-active architecture**: Dell EMC Unity XT storage uses both storage processors (SPs) to serve host I/O and run data operations in an active/active manner, thereby efficiently making use of all available hardware resources and optimizing performance, cost, and density in customer data centers.

- **Truly unified offering**: Dell EMC Unity XT storage delivers a full block and file unified environment in a single 2U enclosure. You can use the same pool to provision and host LUNs, consistency groups, NAS servers, file systems, and vVols alike. The Unisphere management interface offers a consistent look and feel whether managing block resources, file resources, or both.

- **A modern, simple interface**: Unisphere, the Dell EMC Unity XT management interface, is built with the today’s data-center administrator in mind. Using browser-native HTML5, Unisphere can be used across a variety of operating systems and web browsers without the need of additional plug-ins. The interface has been designed to mimic the practical flow of an administrator’s daily life, organizing provisioning and management functions into easy-to-find categories and sections.

- **Flexible deployment options**: With Dell EMC Unity XT storage, a deployment offering exists for a range of different use cases and budgets, from the virtual offering of Dell EMC UnityVSA™ to the purpose-built Dell EMC Unity XT platform. The purpose-built Dell EMC Unity XT system can be configured as an all-flash system with only solid-state drives, or as a hybrid system with a mix of solid-state and spinning media to deliver the best on both performance and economics.

- **Inline data reduction**: Data reduction technologies play a critical role in environments in which storage administrators are attempting to do more with less. Dell EMC Unity XT data reduction aids in this effort by attempting to reduce the amount of physical storage needed to save a dataset, which helps reduce the total cost of ownership (TCO) of a Dell EMC Unity XT storage system. Dell EMC Unity XT data reduction provides space savings through the use of data deduplication and compression. Data reduction is easy to manage, and once enabled, is intelligently controlled by the storage system.

- **Optional I/O modules**: A diverse variety of connectivity is supported on the purpose-built Dell EMC Unity XT platform. Also, I/O modules that support iSCSI and NAS may be used for both connections simultaneously.

- **Expanded file system**: At its heart, the Dell EMC Unity XT file system is a 64-bit-based file system architecture that provides increased maximums to keep pace with the modern data center. Provision file systems and VMware NFS datastores in sizes as large as 256 TB and enjoy creating multiple millions of files per directory and subdirectories per directory.

- **Native data protection**: Security and availability of data are critical concerns for many customers, and Dell EMC Unity XT storage offers multiple solutions to address this need. Unified snapshots provide point-in-time copies of block and file data that can be used for backup and restoration purposes. Asynchronous replication offers an IP-based replication strategy within a system or between two systems. Synchronous block replication benefits FC environments that are close together and require a zero-data loss schema. Data at Rest Encryption (D@RE) ensures user data on the system is protected from physical theft and can stand in the place of drive disposal processes, such as shredding.
**VMware integration**: Discovery of a VMware environment has never been easier, thanks to Dell EMC Unity XT VMware Aware Integration (VAI). You can use VAI to retrieve the ESXi™ host and vCenter® environment details into Unisphere for efficient management of your virtualization environment. Support for VMware vStorage APIs for Storage Awareness (VASA) and later enables the provisioning and use of vVols, a virtualization storage technology delivered by VMware ESXi. Dell EMC Unity XT supports vVols for both block and file configurations.

**Multiple management paths**: Configure and manage your Dell EMC Unity XT system in the way you are most comfortable. The Unisphere GUI is browser-based and provides a graphical view of the system and its resources. Use Unisphere CLI (UEMCLI) over SSH or a Windows host to run CLI commands against the system. Dell EMC Unity XT storage also has a full REST API library available. Any function possible in Unisphere is also possible using Dell EMC Unity XT REST API. Developing scripts or integrating management of the Dell EMC Unity XT system into existing frameworks has never been easier.
2 Hardware overview

The purpose-built Dell EMC Unity system is offered in multiple physical hardware models in both Hybrid configurations and All Flash configurations. For Hybrid systems, the platform starts with the Dell EMC Unity 300, and scales up to the Dell EMC Unity XT 880. For All Flash systems, the platform starts with the Dell EMC Unity 300F and scales up to the Dell EMC Unity XT 880F. The models share similarities in form factor and connectivity, but scale differently in processing and memory capabilities. See Table 1, Table 2, and Table 3 for model comparisons.

For software-defined offerings, the Dell EMC Unity family offers a virtual deployment called Dell EMC UnityVSA which can be installed on applicable VMware ESXi hosts. There is also the option of a dual-SP deployment of Dell EMC UnityVSA called Dell EMC UnityVSA HA which provides greater resiliency against disaster. Lastly, there is a cloud-specific deployment called Dell EMC Unity Cloud Edition that customers can leverage for file synchronization and disaster recovery operations in the cloud. More information about these available virtual deployments are in section 3 and section 5.

Additionally, the system limits change depending on the Dell EMC Unity model. Find more information on system limits in the Dell EMC Unity Simple Support Matrix.

**Note:** This document focuses specifically on the Dell EMC Unity XT systems which include the Dell EMC Unity 380/F, 480/F, 680/F, and 880/F models. For more information on other Dell EMC Unity models, see the Dell EMC Unity: Introduction to the Platform white paper.

<table>
<thead>
<tr>
<th>Model</th>
<th>Dell EMC Unity 300/300F</th>
<th>Dell EMC Unity 400/400F</th>
<th>Dell EMC Unity 500/500F</th>
<th>Dell EMC Unity 600/600F</th>
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<tr>
<td>Processor (per SP)</td>
<td>Intel® E5-2603 v3 6c/1.6 GHz</td>
<td>Intel E5-2630 v3 8c/2.4 GHz</td>
<td>Intel E5-2660 v3 10c/2.6 GHz</td>
<td>Intel E5-2680 v3 12c/2.5 GHz</td>
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<td>64 GB/SP</td>
<td>128 GB/SP</td>
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<tr>
<td>Max. drives</td>
<td>150</td>
<td>250</td>
<td>500</td>
<td>1,000</td>
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**Table 2** Dell EMC Unity X50F model comparison

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<th>Model</th>
<th>Dell EMC Unity 350F</th>
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<th>Dell EMC Unity 550F</th>
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<tr>
<td>Processor (per SP)</td>
<td>Intel E5-2630 v4 6c/1.7 GHz</td>
<td>Intel E5-2630 v4 10c/2.2 GHz</td>
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<td>Memory</td>
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Table 3  Dell EMC Unity XT X80/F model comparison

<table>
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<tr>
<th>Model</th>
<th>Dell EMC Unity XT 380/380F</th>
<th>Dell EMC Unity XT 480/480F</th>
<th>Dell EMC Unity XT 680/680F</th>
<th>Dell EMC Unity XT 880/880F</th>
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<tbody>
<tr>
<td>Processor (per SP)</td>
<td>Intel E5-2603 V4 6c/1.7 GHz</td>
<td>2 x Intel Xeon® Silver 4108 8c/1.8 GHz</td>
<td>2 x Intel Xeon Silver 4116 12 c/2.1 GHz</td>
<td>2 x Intel Xeon Gold 6130 16c/2.1 GHz</td>
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<td>Memory</td>
<td>64 GB/SP</td>
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<td>192 GB/SP</td>
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<td>4.0 PB</td>
<td>8.0 PB</td>
<td>16.0 PB</td>
</tr>
</tbody>
</table>

2.1.1 Drive model comparison

Multiple drive types are supported on the Dell EMC Unity XT system. All Flash models support flash drives, while Hybrid Dell EMC Unity models support flash, SAS, and NL-SAS drives. All drives operate at 12 Gb/s speeds. SAS and NL-SAS drives utilize a 4 KB drive formatting size, while flash drives utilize a 520 byte block size. A list of all supported drives can be found on Dell EMC Support.

2.1.2 Data-in-place conversions

Data-in-place (DIP) conversions are not supported on Dell EMC Unity XT systems. Replication can be used to replicate data onto Dell EMC Unity XT models from other Dell EMC Unity systems, and then a planned failover can be performed to start production on the destination system.

DIP conversions remain supported on X00 and X50F models. For more information on DIP conversions, see the Dell EMC Unity Data-in-Place Conversion Guide.

2.2 Disk processor enclosure (380/F)

The Dell EMC Unity disk processor enclosure (DPE) for Dell EMC Unity XT models utilize a 25-drive 2U DPE using 2.5-inch drives. The Dell EMC Unity XT 380/F model uses a different physical chassis than the 480/F, 680/F, and 880/F models. The following figures and related information are specific to the 380/F model. For information about the DPE for the 480/F, 680/F, and 880/F models, see section 2.3.

Figure 1  25-drive 2U DPE (380/F)

For 380/F systems, the front of the DPEs (see Figure 2) have LEDs for both the enclosure and drives to indicate status and faults. The first four drives of the DPE are known as system drives, and contain copies of data used by the operating environment. While they can be used in pools to hold user data, the entire formatted capacity of the system drives is not available since some space is reserved for the system. These drives should not be moved within the DPE or relocated to another enclosure and should be replaced immediately in the event of a fault. A system drive cannot be used as a hot spare for a non-system drive. For
this reason, the minimum number of drives in a system is 5, with system drives configured in a RAID 1/0 (1+1 or 2+2) configuration including a non-system-drive hot spare.

The back of the DPE reveals the SPs and their on-board connectivity. Each SP has 2x 12 Gb SAS ports used for connecting additional storage and each SAS port has a 4-lane configuration. For front-end connectivity, the SPs have 2 x 10 GbE BaseT ports which can auto-negotiate between 10 Gb/1 Gb/100 Mb, as well as 2 x converged network adapter (CNA) ports. These CNA ports can be configured to serve 16 Gb/8 Gb/4 Gb Fibre Channel using either multi-mode or single-mode FC SFPs, 10 GbE Optical using SFP+ connectors or TwinAx cables in active or passive mode, or 1 GbE BaseT using RJ45 SFPs. For optical connections, the CNAs feature full iSCSI offload which relieves the SP from handling TCP/IP network stack operations. For management and servicing, each SP has a dedicated 1 GbE BaseT management port and a dedicated 1 GbE BaseT service port; both ports operate at 1 Gb/100 Mb/10 Mb speeds.

The DPE on 380/F systems is internally connected to Bus 0 which is the same bus that the first SAS expansion port is connected to. Therefore, the DPE is recognized by the system as Bus 0 Enclosure 0 while the first DAE connected to the first SAS expansion port would be Bus 0 Enclosure 1. Furthermore, this means that the twenty-five drives in front of the DPE are internally recognized as Bus 0 Enclosure 0 Drive 0 – Bus 0 Enclosure 0 Drive 24.

For a detailed description of the hardware on Dell EMC Unity 380/F systems, see the Dell EMC Unity Hardware Information Guide.

Figure 2   Back view of DPE (380/F)

2.2.1 Storage processor (380/F)
The Dell EMC Unity XT 380/F system is powered by an Intel® Xeon® processor utilizing the Intel Broadwell architecture, with 6 cores per SP. Each purpose-built system contains two SPs, which are used for high availability and load-balancing purposes.
2.2.2 M.2 SSD (380/F)
An M.2 SSD device is located inside each SP and serves as a backup device in the event of an SP failure (Figure 3). In the event of an SP failure, the memory contents of the SP cache are written to the M.2 SSD device so it can be recovered once the SP is restored. If the M.2 SSD device itself encounters a failure, cache data can be recovered from the peer SP. The M.2 SSD device also holds the boot image that is used to run the operating environment.

![M.2 SSD device (380/F)](image)

Figure 3 M.2 SSD device (380/F)

2.2.3 Cooling modules (380/F)
Cooling modules or fan packs (Figure 4) are used to provide cool airflow to the SP interior. There are five counter-rotating cooling modules in an SP for 380/F systems. An SP can tolerate a single cooling module fault; in which case the surviving fans increase their speed to compensate for the faulted module. If a second cooling module faults, the SP gracefully saves cache content and shuts down to prevent overheating.

![Cooling module (380/F)](image)

Figure 4 Cooling module (380/F)
2.2.4 Battery backup unit (380/F)
The battery backup unit (BBU) provides power to the SP in the event that cabinet power is lost. The BBU (Figure 5) is designed to power the SP long enough for the system to store SP write cache content to the M.2 SSD device before powering down. The BBU includes sensors which communicate its charge and health status to the SP. In the event the BBU is discharged, the SP disables the write cache until the BBU has recharged. In the event the BBU has faulted or cannot sustain enough charge, an alert is generated.

![Figure 5 Battery backup unit (380/F)](image)

2.2.5 Baffle (380/F)
The baffle (Figure 6) directs airflow within the SP. Cool air drawn in from the cooling modules is directed to the processor and DIMMs for effective thermal management.

![Figure 6 Baffle (380/F)](image)
2.2.6 DIMMs (380/F)
There are four DIMM slots on an SP for a 380/F system. These are filled with up to four 16 GB DIMMs. An example DIMM is represented in Figure 7. DIMMs utilize error-correcting code (ECC) to protect against data corruption. If a DIMM is faulted, the system boots into Service Mode so the faulted DIMM can be replaced.

Figure 7  DIMM (380/F)

2.2.7 Power supply (380/F)
There are two power supply modules in a DPE, one per SP. A single power supply is capable of powering the entire DPE. Power supplies can be replaced without having to remove the SP or shut down the system. Power supplies are offered for AC power only. DC power options are not available for Dell EMC Unity XT systems.

Figure 8  Power supply (380/F)

2.3 Disk processor enclosure (480/F, 680/F, 880/F)
The disk processor enclosures (DPEs) for Dell EMC Unity XT models utilize a 25-drive 2U DPE using 2.5-inch drives. The Dell EMC Unity 380/F system uses a different physical chassis than the 480/F, 680/F, and 880/F models. The following figures and related information are specific to 480/F, 680/F, and 880/F models. For information about the DPE for the 380/F model, see section 2.2.

Figure 9  25-drive 2U DPE (480/F, 680/F, 880/F)
Hardware overview

For 480/F, 680/F, and 880/F systems, the front of the DPEs (Figure 9) have LEDs for both the enclosure and drives to indicate status and faults. The first four drives of the DPE are known as system drives, and contain data used by the operating environment. While they can be used in pools to hold user data, the entire formatted capacity of the system drives will not be available as some space is reserved for the system. These drives should not be moved within the DPE or relocated to another enclosure and should be replaced immediately in the event of a fault. A system drive cannot be used as a hot spare for a non-system drive. For this reason, the minimum number of drives in a system is 5 with system drives configured in a RAID 1/0 (1+1 or 2+2) configuration including a non-system-drive hot spare.

The back of the DPE reveals the SPs and their connectivity options (Figure 10). Each SP has 1 x 1 GbE management port, 1 x 1 GbE service port, 1 x 4-port mezzanine card (optional), 2 x I/O module slots (optional), and 2 x 12 Gb SAS ports, used for connecting additional storage. Each SAS port has a 4-lane configuration. For management and service, each SP has a dedicated 1 GbE BaseT management port and a dedicated 1 GbE BaseT service port; both ports can operate at 1 Gb/100 Mb/10 Mb speeds. For front-end connectivity, the SPs have the option of a 4-port mezzanine card which has the option of being a 4-port 25 GbE Optical, 4-port 10GbE BaseT, or blank filler based on how the system is ordered. For the 4-port 25 GbE Optical option, the port speed is based on the SFP installed in each of the ports. There can be a mix of SFP types on the same card as needed. For the 4-port 10 GbE option, the ports can auto-negotiate between 10 Gb/1 Gb/100 Mb speeds as needed. The 4-port card slots can be populated at a later point in time if the system is ordered with blank fillers for those slots.

The DPE on 480/F, 680/F, and 880/F systems is internally connected to Bus 99 which is a separate bus than the first SAS expansion port that is connected to Bus 0. Therefore, the DPE is recognized by the system as Bus 99 Enclosure 0 while the first DAE connected to the first SAS expansion port would be Bus 0 Enclosure 0. This is different than X00/F, X50F, and 380/F systems. Furthermore, this means that the twenty-five drives in front of the DPE for 480/F, 680/F, and 880/F systems are internally recognized as Bus 99 Enclosure 0 Drive 0 – Bus 99 Enclosure 0 Drive 24. In Unisphere, the drives are seen DPE Drive 0 – DPE Drive 24.

For a detailed description of hardware for 480/F, 680/F, and 880/F systems, see the Dell EMC Unity 480/F, Unity 680/F, Unity 880/F Hardware Information Guide.

2.3.1 Storage processor (480/F, 680/F, 880/F)

The purpose-built Dell EMC Unity platform for 480/F, 680/F, and 880/F systems is powered by an Intel® Xeon® processor utilizing the Intel Skylake architecture. The CPU model depends on the system model, and the core count varies between 8 to 18 cores per CPU with two CPUs per SP. Each purpose-built system contains two SPs, which are used for high availability and load-balancing purposes.
2.3.2 M.2 SSD (480/F, 680/F, 880/F)

There are two M.2 SSD devices, one connected with the SATA protocol and one connected with the NVMe protocol, located inside each SP for 480/F, 680/F, and 880/F systems. The devices serve two separate purposes: one as a backup device in the event of an SP failure (Figure 11) and one as a boot device for the system operating environment (Figure 12). In the event of an SP failure, the memory contents of the SP cache are written to the M.2 NVMe SSD device so the data can be recovered once the SP is restored. If the M.2 NVMe SSD device itself encounters a failure, cache data can be recovered from the peer SP. The M.2 SATA SSD device holds the boot image that is used to boot the operating environment.

![Figure 11 M.2 NVMe SSD device (480/F, 680/F, 880/F)](image1)

![Figure 12 M.2 SATA SSD device (480/F, 680/F, 880/F)](image2)

2.3.3 Cooling modules (480/F, 680/F, 880/F)

Cooling modules or fan packs are used to provide cool airflow to the SP interior. There are six counter-rotating cooling modules in an SP for 480/F, 680/F, and 880/F systems. An SP can tolerate a single cooling module fault; the surviving fans increase their speed to compensate for the faulted module. If a second cooling module faults, the SP gracefully saves the write cache content and shuts down.

![Figure 13 Cooling module (480/F, 680/F, 880/F)](image3)
2.3.4 **Battery backup unit (480/F, 680/F, 880/F)**

The battery backup unit (BBU) provides power to the SP in the event that cabinet power is lost. The BBU is designed to power the SP long enough for the system to store SP cache content to the M.2 SSD devices before powering down. The BBU includes sensors which communicate its charge and health status to the SP. In the event the BBU is discharged, the SP disables cache until the BBU has recharged. In the event the BBU has faulted or cannot sustain enough charge, an alert is generated.

![Battery backup unit (480/F, 680/F, 880/F)](image)

Figure 14  Battery backup unit (480/F, 680/F, 880/F)

2.3.5 **Baffle (480/F, 680/F, 880/F)**

The baffle directs airflow within the SP. Cool air drawn in from the cooling modules is directed to the processor and DIMMs for effective thermal management.

![Baffle (480/F, 680/F, 880/F)](image)

Figure 15  Baffle (480/F, 680/F, 880/F)
2.3.6 **DIMMs (480/F, 680/F, 880/F)**

There are twenty-four DIMM slots on an SP. These are filled with up to twelve DIMMs, depending on the model. An example DIMM is represented in Figure 16. DIMMs are between 16 GB and 32 GB in size and use error-correcting code (ECC) to protect against data corruption. If a DIMM is faulted, the system boots into service mode so the faulted DIMM can be replaced.

![DIMM (480/F, 680/F, 880/F)](image)

Figure 16  DIMM (480/F, 680/F, 880/F)

2.3.7 **Power supply (480/F, 680/F, 880/F)**

There are two power supply modules in a DPE. A single power supply is capable of powering the entire DPE. Power supplies can be replaced without having to remove the SP. Power supplies are offered for AC power only. DC power options are not available for Dell EMC Unity XT systems.

![Power supply (480/F, 680/F, 880/F)](image)

Figure 17  Power supply (480/F, 680/F, 880/F)

2.4 **I/O module options (380/F, 480/F, 680/F, 880/F)**

Each SP on Dell EMC Unity XT systems can support up to two I/O modules. I/O modules provide additional connectivity. For the two SPs in a DPE, the I/O modules configured must match between SPs. Fibre Channel over Ethernet (FCoE) and Fibre Channel over IP (FCIP) are not supported on the Dell EMC Unity platform.

The Dell EMC Unity XT systems support the following I/O modules:

- 12 Gb SAS (480/F, 680/F, 880/F only)
- 25 GbE optical (4-port)
- 16 Gb Fibre Channel (4-port)
- 10 GbE BaseT (4-port)
The 12 Gb SAS (4-port) I/O module is used to provide additional back-end connectivity to DAEs. Each SAS port supports up to 10 DAEs and up to a maximum of 250 drives. This module is required when using high-bandwidth x8 SAS lane connections for the 80-drive DAE.

Figure 18  12 Gb SAS I/O module

The 16 Gb Fibre Channel (4-port) I/O module offers front-end connectivity at 16 Gb/s speeds and can auto-negotiate to 8 Gb/s and 4 Gb/s speeds depending on the SFPs installed. There are ordering options for single-mode SFPs and multi-mode SFPs configurations depending on the use case in a data-center environment. Single-mode SFPs only operate at 16 Gb speeds and are not compatible with multi-mode connections. Single-mode connections are usually used for long-distance synchronous replication use cases to remote sites while multi-mode is typically used for transmitting data over shorter distances in local-area SAN networks and connections within buildings.

Figure 19  16Gb Fibre Channel I/O module
The 10 GbE BaseT (4-port) I/O module operates at up to 10 Gb/s speeds, is used for front-end host access, and supports both iSCSI and NAS protocols. The I/O module can also auto-negotiate to 1 Gb/s and 100 Mb/s speeds as needed. The ports on an individual Ethernet I/O module, as well as the on-board Ethernet ports or mezzanine card Ethernet ports, support link aggregation, fail safe networking (FSN), and VLAN tagging. Link aggregation can be configured across all available Ethernet ports as needed.

![Figure 20 10 GbE BaseT I/O module](image)

The 25 GbE optical I/O module runs at a fixed speed of 25 Gb/s given it is using 25 Gb SFPs. The I/O module also supports 10 Gb SFPs to run at 10 Gb/s speeds. The optical I/O module ports support SFP+ and TwinAx (active or passive mode) connections. Different SFPs or TwinAx cables can be mixed on the same I/O module and are hot swappable.

![Figure 21 25 GbE optical I/O module](image)

### 2.5 Disk array enclosure options (380/F, 480/F, 680/F, 880/F)

The purpose-built Dell EMC Unity XT Series systems have three different DAE configuration options:

- 25-drive 2U DAE using 2.5-inch drives
- 15-drive 3U DAE using 3.5-inch drives
- 80-drive 3U DAE using 2.5-inch drives
2.5.1 25-drive 2.5-inch 2U DAE
The 25-drive, 2.5-inch 2U DAE holds up to twenty-five 2.5-inch drives (Figure 22). The back of the DAE includes LEDs to indicate power and fault status. There are also LEDs to indicate bus and enclosure IDs.

![25-drive 2.5-inch 2U DAE (Front)](image)

Figure 22 25-drive 2.5-inch 2U DAE (Front)

The 25-drive 2.5-inch 2U DAE can be powered with AC power and is attached to the DPE with mini-SAS HD connectors (Figure 23).

![25-drive 2.5-inch 2U DAE (back)](image)

Figure 23 25-drive 2.5-inch 2U DAE (back)

2.5.2 15-drive 3.5-inch 3U DAE
The 15-drive 3.5-inch 3U DAE is available for Dell EMC Unity XT Hybrid systems, can be powered with AC power, and is attached to the DPE with mini-SAS HD connectors (Figure 24).

![15-drive 3.5" 3U DAE (front)](image)

Figure 24 15-drive 3.5" 3U DAE (front)
The back of the DAE includes LEDs to indicate power and fault status (Figure 25). There are also LEDs to indicate bus and enclosure IDs.

Figure 25  15-drive 3.5-inch 3U DAE (back)

2.5.3  80-drive 2.5-inch 3U DAE
The 80-drive 2.5-inch 3U DAE is available for Dell EMC Unity XT Hybrid and All Flash systems. It can be powered with AC power and is attached to the DPE with mini-SAS HD connectors (Figure 26). A high-bandwidth x8-lane SAS connectivity option to the DPE is also available for models that support the 4-port 12 Gb SAS I/O module, which include the Dell EMC Unity 480/F, 680/F, and 880/F models. For supported drive types and sizes on the 80-drive DAE, see the Dell EMC Unity Drive Support Matrix.

In terms of operating power, the 80-drive DAE operates from 200 V to 240 V AC at 47 Hz to 63 Hz with a maximum power consumption of 1,611 VA (1,564 W). For a full listing of power requirements and related hardware information, see the Dell EMC Unity Hardware Information Guide on Dell EMC Support.

Figure 26  80-drive 2.5-inch 3U DAE
Dell EMC UnityVSA

3 Dell EMC UnityVSA

Dell EMC Unity™ storage is offered in a virtual storage appliance version known as Dell EMC UnityVSA™. Dell EMC UnityVSA is a software-defined storage (SDS) solution that runs atop the VMware ESXi server platform. Dell EMC UnityVSA provides a flexible storage option for environments that do not require purpose-built storage hardware such as test/development or remote office/branch office (ROBO) environments. Users can quickly provision a Dell EMC UnityVSA system on general-purpose server hardware, which can result in reduced infrastructure costs and a quicker rate of deployment.

In Dell EMC Unity OE version 4.5, Dell EMC UnityVSA HA is available. UnityVSA HA is an enhanced version of the single-SP UnityVSA solution. This is accomplished by adding high availability (HA) functionality whereby Dell EMC UnityVSA HA can recover from an SP or host failure which significantly increases the system’s applicable use case scenarios, as well as enables non-disruptive upgrades (NDU). Dell EMC UnityVSA HA is only available with Professional Edition (PE) licenses in capacity choices of 10 TB, 25 TB, or 50 TB options.

3.1 Overview

Dell EMC UnityVSA retains the ease-of-use and ease-of-management found in the purpose-built Dell EMC Unity product. Its feature set and data services are designed to be on par with the rest of the Dell EMC Unity family. There are some main differences in functionality support, which stem from the virtual nature of the Dell EMC UnityVSA deployment.

3.2 Hardware requirements

Dell EMC UnityVSA can run on any server that supports VMware ESXi and meets minimum hardware requirements. If local storage is used, a hardware RAID controller on the ESXi server is recommended to be used to configure redundant storage for Dell EMC UnityVSA. If storage is provided from a redundant storage system or server SAN, a RAID controller on the ESXi server is not required. A full description of the minimum server requirements for a single UnityVSA instance is detailed in Table 4.

Table 4 Dell EMC UnityVSA single-SP server and VM requirements

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware CPU</td>
<td>Intel® Xeon® E5 Series Dual-Core CPU 64-bit x86 Intel 2 GHz+ (SSE 4.2 or greater)</td>
</tr>
<tr>
<td>Hardware memory</td>
<td>18 GB (ESXi 6.0)</td>
</tr>
<tr>
<td></td>
<td>20 GB (ESXi 6.5/6.7)</td>
</tr>
<tr>
<td>Hardware network</td>
<td>4 x 1 GbE or higher for I/O and management</td>
</tr>
<tr>
<td>Disk space</td>
<td>Minimum 100 GB</td>
</tr>
<tr>
<td>Hardware RAID (server DAS)</td>
<td>RAID controller: 512 MB NV cache and battery backed (recommended)</td>
</tr>
<tr>
<td>VMware ESXi</td>
<td>ESXi 6.0–6.7</td>
</tr>
</tbody>
</table>
Dell EMC UnityVSA HA has similar physical requirements as Dell EMC UnityVSA single-SP on a per-SP basis. In terms of VMware requirements, a vCenter is mandatory in addition to the configuration of internal networks. To comply with best practices, Dell EMC UnityVSA HA requires a separate ESXi host for each SP that is deployed. The white paper *Dell EMC UnityVSA* provides further detail on the best practices and the exact VMware requirements. A full description of server requirements for a single SP of the Dell EMC UnityVSA HA are outlined in Table 5.

**Table 5  Dell EMC UnityVSA HA hardware requirements**

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware CPU (per SP)</td>
<td>Intel® Xeon® E5 Series Dual Core CPU 64-bit x86 Intel 2 GHz+ (SSE 4.2 or greater)</td>
</tr>
<tr>
<td>Hardware memory (per SP)</td>
<td>18 GB (ESXi 6.0) 20 GB (ESXi 6.5/6.7)</td>
</tr>
<tr>
<td>Hardware network (per SP)</td>
<td>4 x 1 GbE or higher for I/O and management; 2 x 10 GbE or higher unused VMNIC ports for inter-SP networking</td>
</tr>
<tr>
<td>Hardware RAID (per SP)</td>
<td>RAID controller: 512 MB NV cache and battery backed (recommended)</td>
</tr>
<tr>
<td>VMware ESXi</td>
<td>ESXi 6.0–6.7</td>
</tr>
<tr>
<td>Hardware switch</td>
<td>vLAN/VXLAN support is required (at least 3 VLANs must be available).</td>
</tr>
<tr>
<td>Disk space</td>
<td>One private or shared datastore for private system data per SP VM.¹</td>
</tr>
<tr>
<td></td>
<td>At least 4 separate shared datastores between the two ESXi hosts (One for shared system data², two for separate storage heartbeat disks³, and one for virtual disk capacity allocation.)</td>
</tr>
<tr>
<td>Storage processors (SPs)</td>
<td>2</td>
</tr>
</tbody>
</table>
## Dell EMC UnityVSA

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual CPUs (per SP)</td>
<td>2</td>
</tr>
<tr>
<td>Virtual memory (per SP)</td>
<td>12 GB</td>
</tr>
<tr>
<td>Virtual network (management)</td>
<td>1 x 1 GbE or higher</td>
</tr>
<tr>
<td>Virtual network (data)</td>
<td>4 x 1 GbE or higher</td>
</tr>
<tr>
<td>Virtual network (internal communication)</td>
<td>3 x 1 GbE or higher</td>
</tr>
</tbody>
</table>

1 Minimum 60 GB for private system data.
2 Minimum 30 GB shared system data.
3 Minimum 2 MB for each storage heartbeat disk.

For more information about the Dell EMC UnityVSA and Dell EMC UnityVSA HA, refer to the white paper *Dell EMC UnityVSA* on Dell EMC Support.
4 Dell EMC Unity Cloud Edition

As customers select a cloud-operating model to support their applications, elasticity and scalability of public clouds and enterprise file capabilities such as tiering, quotas, and snapshots are top requirements. Customers are looking to leverage the cloud for file synchronization and disaster recovery operations.

Dell EMC Unity Cloud Edition addresses these requirements with support for VMware Cloud (VMC) on Amazon Web Services (AWS). Dell EMC Unity Cloud Edition can be easily deployed in a VMware Cloud Software-Defined Data Center (SDDC) to provide native file services such as NFS and SMB. Dell EMC Cloud Edition also enables disaster recovery between on-premise-deployed Dell EMC Unity systems and VMware Cloud-based appliances.

Dell EMC Unity Cloud Edition is a virtualized storage appliance that has a rich feature set, comparable to the rest of the Dell EMC Unity family. Because of its ease of use and quick deployment time, this makes Dell EMC Unity Cloud Edition the ideal candidate for test/development environments or production deployments into VMC on AWS.

For more information on Dell EMC Unity Cloud Edition and its benefits, see the paper Dell EMC Unity Cloud Edition with VMware Cloud on AWS.
5 Conclusion

The Dell EMC Unity XT product family sets a new standard for storage by delivering compelling simplicity, a modern design, and enterprise features at an affordable price and compact footprint. Dell EMC Unity XT storage meets the needs of resource-constrained IT professionals in both large and small companies. The purpose-built Dell EMC Unity XT system is offered in All Flash and Hybrid models, providing flexibility for differing use cases and budgets. The converged offering through the Converged Infrastructure Portfolio delivers industry-leading converged infrastructure powered by Dell EMC Unity XT storage. Dell EMC UnityVSA and Dell EMC Unity Cloud Edition offer dynamic deployment models that allow starting for free and growing as business needs evolve.

The Dell EMC Unity XT system was designed with ease-of-use at the forefront. The modern design of the management interfaces is built with best practices in mind, making it easy to provision storage intelligently without having to micromanage every detail. A software feature set built with the same mindset allows for automation and set-it-and-forget-it style upkeep. An IT generalist can set up, configure, and manage a Dell EMC Unity XT system without needing to become a storage expert. A strong support ecosystem offers a variety of media for learning and troubleshooting, backed by the quality support model of Dell EMC. Lastly, users looking to refresh their existing Dell EMC infrastructure can use the intuitive migration capabilities of the Dell EMC Unity XT platform.

With simplified ordering, all-inclusive software, new differentiated features, internet-enabled management, and a modern design, Dell EMC Unity XT storage is where powerful meets simplicity.
A Technical support and resources

Dell.com/support is focused on meeting customer needs with proven services and support.

Storage technical documents and videos provide expertise that helps to ensure customer success on Dell EMC storage platforms.

A.1 Related resources

The following documents can be found on Dell EMC Support:

- Dell EMC Unity: Best Practices Guide
- Dell EMC Unity: Cloud Tiering Appliance (CTA)
- Dell EMC Unity: Compression
- Dell EMC Unity: Compression for File
- Dell EMC Unity: Data at Rest Encryption
- Dell EMC Unity: Data Integrity
- Dell EMC Unity: Data Reduction
- Dell EMC Unity: DR Access and Testing
- Dell EMC Unity: Dynamic Pools
- Dell EMC Unity: FAST Technology Overview
- Dell EMC Unity: File-Level Retention (FLR)
- Dell EMC Unity: High Availability
- Dell EMC Unity: Introduction to the Platform
- Dell EMC Unity: NAS Capabilities
- Dell EMC Unity: MetroSync
- Dell EMC Unity: MetroSync and Home Directories
- Dell EMC Unity: MetroSync and VMware vSphere NFS Datastores
- Dell EMC Unity: Migration Technologies
- Dell EMC Unity: OpenStack Best Practices for Ocata Release
- Dell EMC Unity: Performance Metrics
- Dell EMC Unity: Replication Technologies
- Dell EMC Unity: Snapshots and Thin Clones
- Dell EMC Unity: Operating Environment (OE) Overview
- Dell EMC Unity: Unisphere Overview
- Dell EMC Unity: Virtualization Integration
- Dell EMC UnityVSA
- Dell EMC Unity Cloud Edition with VMware Cloud on AWS
- Dell EMC Unity Data Reduction Analysis
- Dell EMC Unity: Migrating to Dell EMC Unity with SAN Copy
- Dell EMC Unity Storage with Microsoft Hyper-V
- Dell EMC Unity Storage with Microsoft SQL Server
- Dell EMC Unity Storage with Microsoft Exchange Server
- Dell EMC Unity Storage with VMware vSphere
- Dell EMC Unity Storage with Oracle Databases
- Dell EMC Unity 350F Storage with VMware Horizon View VDI
- Dell EMC Unity: 3,000 VMware Horizon Linked Clone VDI Users
- Dell EMC Storage with VMware Cloud Foundation