



Technical Report

NetApp E-Series and Commvault Data Platform V11

Reference Architecture and Storage Best Practices

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In partnership with



Implementation Overview and Usage Considerations

This document outlines the reference architecture and best practices when using NetApp® E-Series storage in a Commvault® Data Platform® V11 environment.

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1 Executive Summary

Streamlined backup and recovery solutions are not on customers' wish lists these days, they are a business imperative. Meeting shrinking backup windows while protecting data is a challenge that all customers struggle with as their need to store, manage, and manipulate that data grows exponentially, whether for competitive gain or for compliance and regulatory mandates. Fast and consistent recovery is paramount.

This document outlines a reference architecture for enabling a collaborative backup and recovery solution on NetApp® E-Series with Commvault® Data Platform® V11 data protection software.

1.1 Introduction

Commvault and NetApp have jointly developed this reference architecture to provide guidance for Commvault Data Platform V11 deployments with NetApp E-Series storage that will accelerate time to application for this solution.

E-Series and Data Platform V11 offer a best-in-class backup and recovery solution through a tightly coupled and thoroughly tested reference architecture from industry leaders NetApp and Commvault. This solution is optimized for disk-to-disk backup and recovery relying on the policy-based management and deduplication features of Data Platform V11 while providing high-capacity storage performance on flexible NetApp E-Series storage arrays. This solution gives customers superior performance and functionality at a competitive price.

Features:

- Eliminate tape completely with a second copy off site
- Scalability
 - Front-end scalability with additional Commvault media servers (deduplication)
 - Back-end scalability with online capacity expansion of E-Series arrays (raw capacity)
- E-Series and Commvault data management platform reduce complexity through off-site replication
- Archiving and stubbing minimize future storage capacity needs
- Joint presales and world-class support from NetApp and Commvault
- Efficiency
 - Direct-to-disk backups are “DASH copied” or replicated in deduplicated fashion to a remote site to provide disaster recovery capabilities for all backed-up data
 - Targeted at opportunities that scale from several terabytes to multiple petabytes of primary data under management

1.2 About NetApp

NetApp is the data authority for hybrid cloud. We provide a full range of hybrid cloud data services that simplify management of applications and data across cloud and on-premises environments to accelerate digital transformation. Together with our partners, we empower global organizations to unleash the full potential of their data to expand customer touchpoints, foster greater innovation, and optimize their operations. For more information, visit www.netapp.com/. #DataDriven

1.3 About Commvault

A singular vision—a belief in a better way to address current and future data and information management needs—guides Commvault in the development of Singular Information Management® solutions for high-performance data protection, universal availability, and simplified management of data on complex storage networks. Commvault exclusive single-platform architecture gives companies unprecedented control over data growth, costs, and risk. Commvault software modules are designed to

work together seamlessly from the ground up, sharing a single code and common function set, to deliver superlative Backup & Recovery, Archive, Replication, Search, and Resource Management capabilities. More companies every day join those who have discovered the unparalleled efficiency, performance, reliability, and control only Commvault can offer. Information about Commvault is available at www.commvault.com. Commvault's corporate headquarters is located in Tinton Falls, New Jersey.

2 Reference Architecture Overview

This section describes reference architectures ranging from small environments that protect a few terabytes of data to enterprise-scale environments with petabytes of data under management.

2.1 Solution Configuration Options

Express (S) Small Configuration: Single Node

- Targeted for small businesses.
- Remote office or branch office with local backups.
- Initial configuration sufficient for typical 30- to 90-day retention.
- Expansion option: For long-term retention, add more expansion shelves and drives.
- Back-end size (BET) limited to 30TB usable capacity for this configuration. Back-end size is the actual capacity used after deduplication and compression. Front-end (FET) capacity is the size of application data that needs to be protected. For more information, refer to the Commvault documentation at <http://documentation.commvault.com>.

Figure 1) Small configuration: Single node.

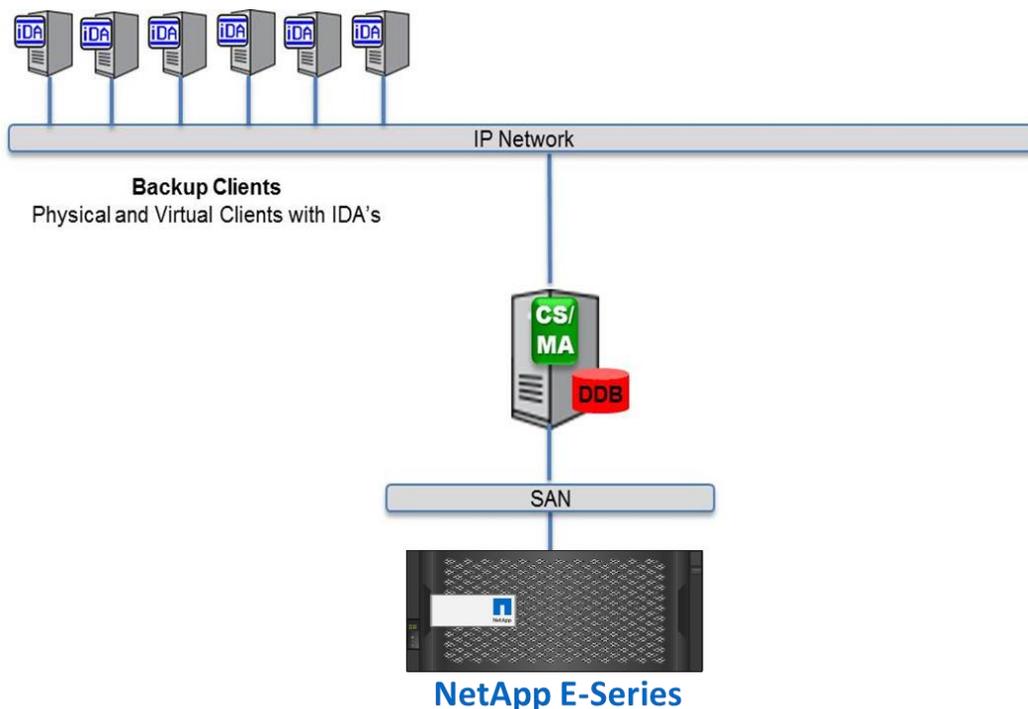


Table 1) Small configuration: Single node.

Option	Description
Scope	Around 20TB (FET) of production data based on data type, up to 30TB of back-end size
Software	OS: 64-bit Windows for CommServe®/MediaAgent (CS/MA) combo OR 64-bit Windows/Linux for MediaAgent only
Commvault	V11 CommServe and MediaAgent OR MediaAgent only
Server Configuration (1 Server Required)	
CPU/RAM	8 Cores 32GB RAM 2 x 650W power supply
Internal storage	<ul style="list-style-type: none"> • 2 x 300GB 15K RPM drives in RAID 1 for OS and Commvault installation. • 2 X 300GB 15K RPM drives in RAID 1 for index cache. For IOPS requirements, refer to the Commvault documentation at http://documentation.commvault.com. • 2 X 400GB value SSDs in RAID 1 for deduplication database. For IOPS requirements, refer to the Commvault documentation at http://documentation.commvault.com.
NIC	Dual port, 10 GigE card for data ingest and egress Quad, 1 GigE ports for management interface
Host bus adapter cards	Dual port SAS adapter Dual port HBA for tape out (optional)
Back-End Storage Configuration	
Storage	NetApp E2800, E5700,EF570, E600,EF560. For information about these systems and drive shelves, see section 3, NetApp E-Series Hardware and Software Specifications.

Work Group (M) Medium Configuration: Single Node

- Targeted for medium businesses and smaller data centers.
- Initial configuration sufficient for typical 30- to 90-day retention.
- Expansion options:
 - For long-term retention, add more expansion shelves and drives.
 - For additional capacity, buy new nodes in the same cell.
- Back-end size (BET) limited to 60TB usable capacity for this configuration. Front-end (FET) capacity can vary from 40 to 50TB, based on data type.

Figure 2) Medium configuration: Single node.

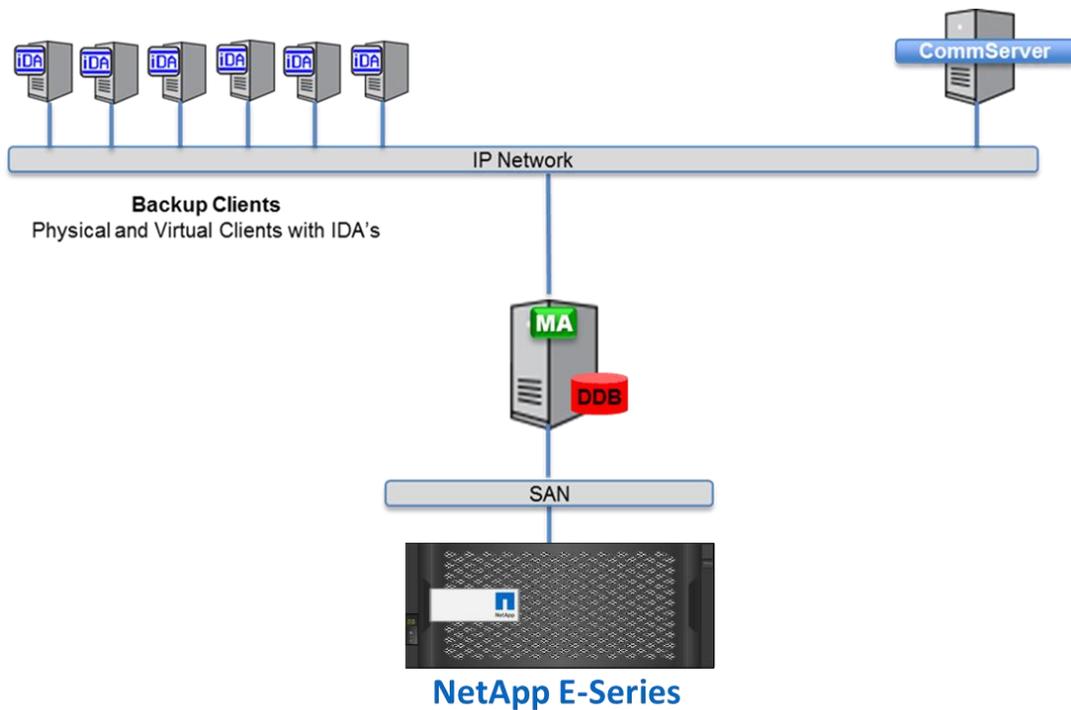


Table 2) Medium configuration: Single node.

Option	Description
Scope	40 to 50TB of production data based on data type, up to 60TB of back-end size
Software	OS: 64-bit Windows for CommServe/MediaAgent (CS/MA) combo OR 64-bit Windows/Linux for MediaAgent only
Commvault	V11 CommServe and MediaAgent OR MediaAgent only
Server Configuration (CS/MA Combo OR Dedicated MA)	
Software	OS: 64-bit Windows for CS/MA Combo OR 64-bit Windows/Linux for MediaAgent only
Form factor	2U rack mount with minimum 12 SFF (2.5") drive bays
CPU/RAM	12 Cores 64GB RAM 2 x 650W power supply

Option	Description
Internal storage	<ul style="list-style-type: none"> • 4 x 400GB+ value SSDs in RAID 5 for OS, Commvault installation, and index cache. For IOPS requirements, refer to the Commvault documentation at http://documentation.commvault.com. • 4 X 400GB+ value SSDs in RAID 5 + 1 hot spare for deduplication database. For IOPS requirements, refer to the Commvault documentation at http://documentation.commvault.com.
NIC	Dual port, 10 GigE card for data ingest and egress Quad 1 GigE ports for management interface
Host bus adapter cards	Dual port SAS adapter Dual port HBA for tape out (optional)
Server Configuration (Dedicated CS – Physical OR Virtual)	
Software	OS: 64-bit Windows
CPU/RAM	8 Cores 32GB RAM 2 x 650W power supply
Internal storage	2 x 400+ GB value SSDs in RAID 1 for OS and Commvault installation
Back-End Storage Configuration	
Storage	NetApp E2800, E5700,EF570, E600,EF560. For information about these systems and drive shelves, see section 3, NetApp E-Series Hardware and Software Specifications.

Data Center (L) Large Configuration: Single Node

- Targeted for enterprise data centers.
- Initial configuration sufficient for typical 30- to 90-day retention.
- Expansion options:
 - For long-term retention, add more expansion shelves and drives.
 - For additional capacity, buy new nodes in the same cell.
- Back-end size (BET) limited to 150TB usable capacity for this configuration. Front-end (FET) capacity can be up to 100TB, based on data type.

Figure 3) Large configuration: Single node.

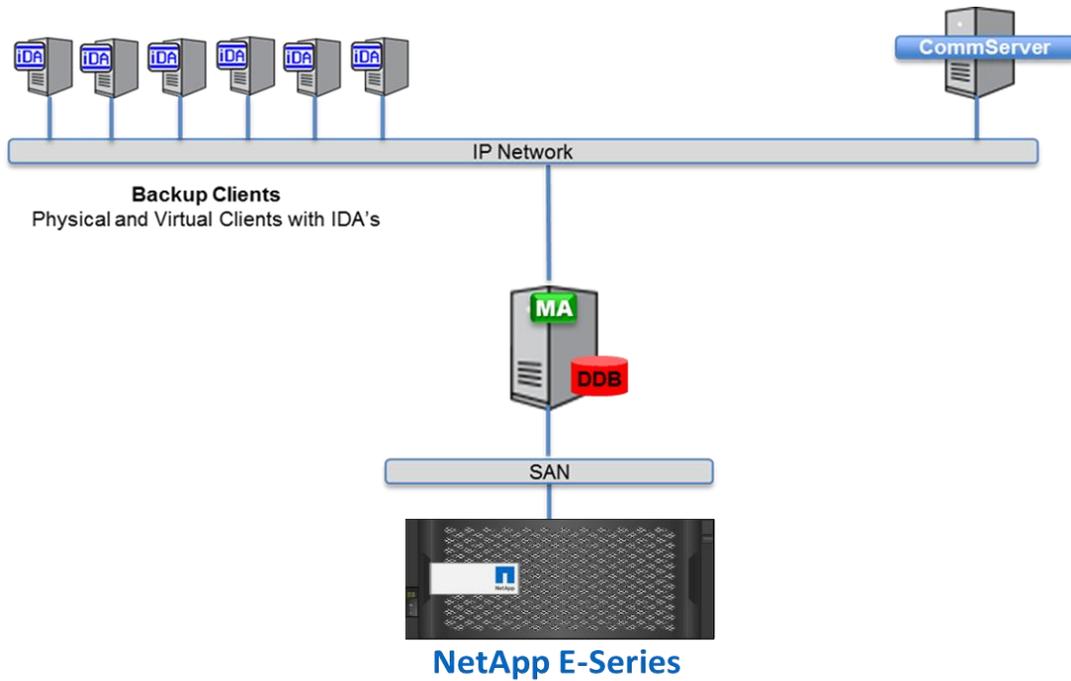


Table 3) Large configuration: Single node.

Option	Description
Scope	Around 100TB of production data, based on data type, up to 150TB of back-end size
Software	OS: 64-bit Windows for CommServe (CS) 64-bit Windows/Linux for MediaAgent only
Commvault	V11 CommServe and MediaAgent
Server Configuration (Dedicated MA)	
Software	OS: 64-bit Windows/Linux for MediaAgent
Form factor	2U rack mount with minimum 12 SFF (2.5") drive bays
CPU/RAM	12 Cores 64GB RAM 2 x 650W power supply

Internal storage	<ul style="list-style-type: none"> • 400GB usable disk, minimum 4 spindles 15K RPM or higher OR SSD class disk for OS and Commvault installation • 1.2TB usable capacity volume (RAID 1 or RAID 5) SSD class disk/PCIe I/O cards 2GB controller cache memory for index cache. For IOPS requirements, refer to the Commvault documentation at http://documentation.commvault.com. • 1.2TB usable capacity volume (RAID 1 or RAID 5) SSD class disk/PCIe I/O cards 2GB controller cache memory for deduplication database. For IOPS requirements, refer to the Commvault documentation at http://documentation.commvault.com.
NIC	Dual port, 10 GigE card for data ingest and egress Quad 1 GigE ports for management interface
Host bus adapter cards	Dual port SAS adapter Dual port HBA for tape out (optional)
Server Configuration (Dedicated CS – Physical)	
Software	OS: 64-bit Windows
Form factor	2U rack mount with minimum 12 SFF (2.5”) drive bays
CPU/RAM	8 Cores 32GB RAM 2 x 650W power supply
Internal storage	2 x 400+ GB value SSDs in RAID 1 for OS and Commvault installation
Back-End Storage Configuration	
Storage	NetApp E2800, E5700,EF570, E600,EF560. For information about these systems and drive shelves, see section 3, NetApp E-Series Hardware and Software Specifications.

Data Center (XL) Extra-Large Configuration: Single Node

- Targeted for enterprise data centers.
- Initial configuration sufficient for typical 30- to 90-day retention.
- Expansion options:
 - For long-term retention, add more expansion shelves and drives.
 - For additional capacity, buy new nodes in the same cell.
- Back-end size (BET) limited to 200TB usable capacity for this configuration. Front-end (FET) capacity can be up to 130TB, based on data type.

Figure 4) Extra-large configuration: Single node

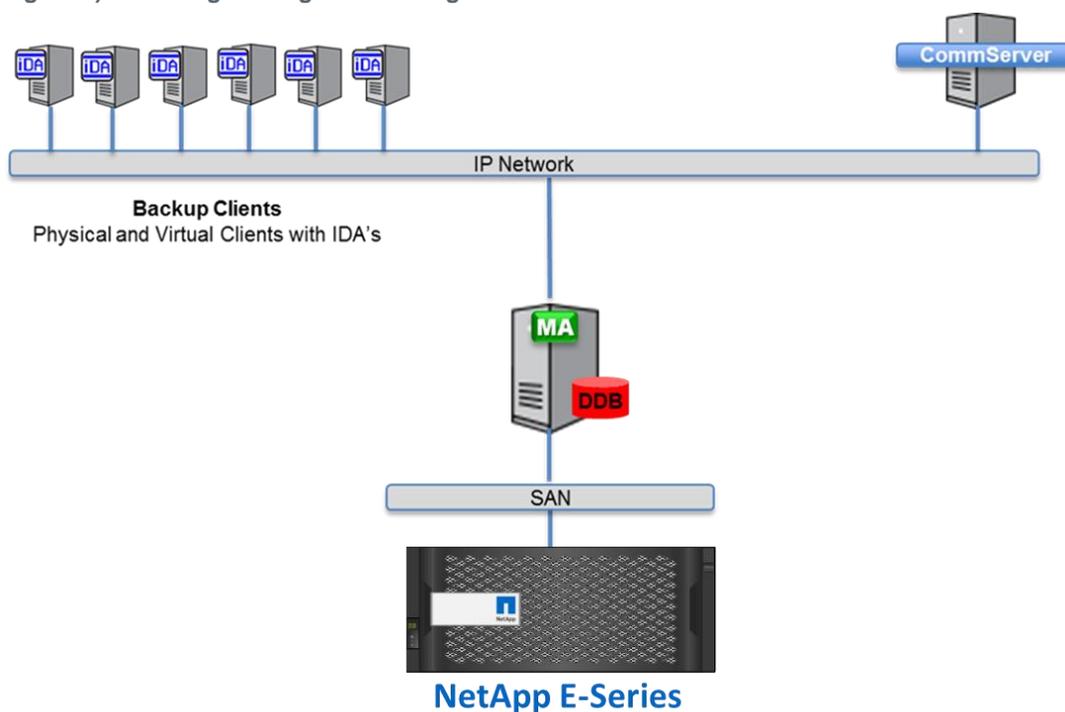


Table 4) Extra-large configuration: Single node.

Option	Description
Scope	Around 120 to 130TB of production data based on data type, up to 200TB of back-end size
Software	OS: 64-bit Windows for CommServe 64-bit Windows/Linux for MediaAgent only
Commvault	V11 CommServe and MediaAgent
Server Configuration (Dedicated MA)	
Software	OS: 64-bit Windows/Linux for MediaAgent
Form factor	2U rack mount with minimum 12 SFF (2.5") drive bays
CPU/RAM	16 Cores 128GB RAM 2 x 650W power supply

Internal storage	<ul style="list-style-type: none"> • 2 x 400GB SSD class disk for OS disk in RAID 1 • 2TB usable capacity volume (RAID 1 or RAID 5) with SSD class disks/PCIe I/O cards 2GB controller cache memory for index cache database. For IOPS requirements, refer to the Commvault documentation at http://documentation.commvault.com. • 2TB usable capacity volume (RAID 1 or RAID 5) with SSD class disks/PCIe I/O Cards 2GB controller cache memory for deduplication database. For IOPS requirements, refer to the Commvault documentation at http://documentation.commvault.com.
NIC	Dual port, 10 GigE card for data ingest and egress Quad 1 GigE ports for management interface
Host bus adapter cards	Dual port SAS adapter Dual port HBA for tape out (optional)
Server Configuration (Dedicated CS – Physical)	
Software	OS: 64-bit Windows
Form factor	2U rack mount with minimum 12 SFF (2.5") drive bays
CPU/RAM	8 Cores 32GB RAM 2 x 650W power supply
Internal storage	2 x 400+ GB value SSDs in RAID 1 for OS and Commvault installation
Back-End Storage Configuration	
Storage	NetApp E2800, E5700,EF570, E600,EF560. For information about these systems and drive shelves, see section 3, NetApp E-Series Hardware and Software Specifications.

Data Center Large or Extra-Large Configuration: Multinode – Global Deduplication Across Nodes

- Targeted for enterprise data centers:
 - Includes HA and resiliency at the node level.
 - Provides global deduplication across nodes in the cluster.
 - Combine up to four nodes for petabyte scale capacity.
- Initial configuration sufficient for typical 30- to 90-day retention.
- Expansion option:
 - For long-term retention, add more expansion shelves and drives.
 - For additional capacity, buy new nodes in the same cell.

The Commvault V11 data management platform supports clustering together four MediaAgent nodes, each hosting a single deduplication database partition, in a partitioned configuration for global deduplication.

Figure 5 shows a two-node configuration.

Figure 5) Extra-large configuration: Multinode.

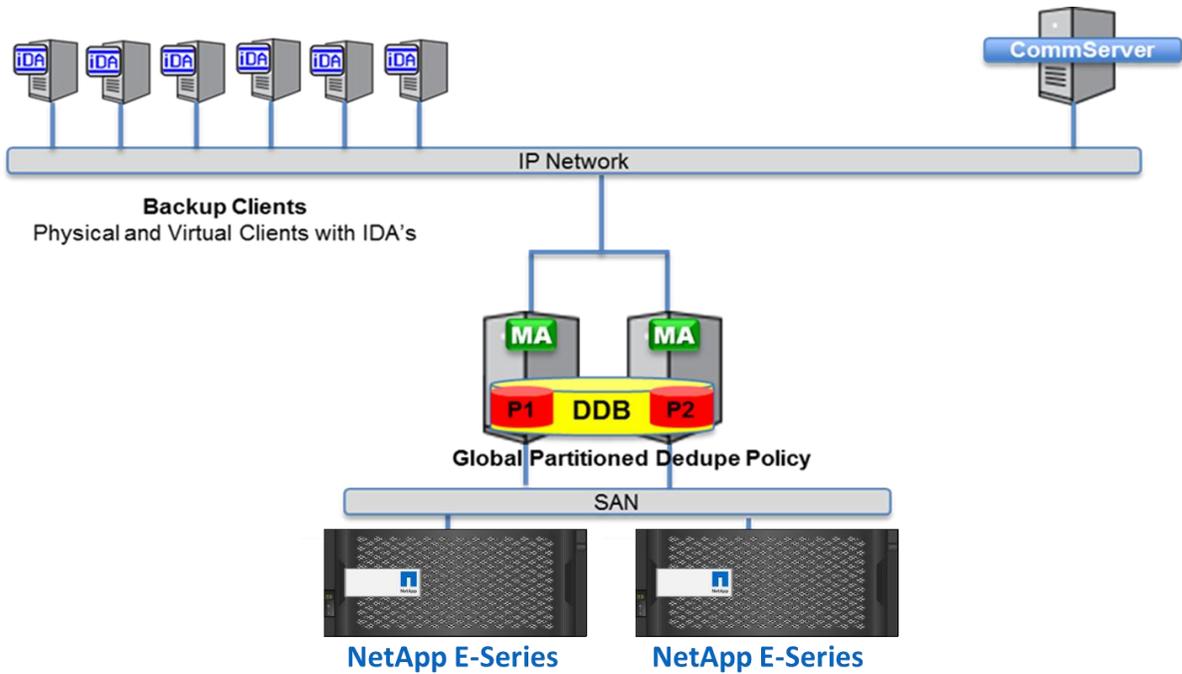


Table 5) Large configuration: Multinode extra-large, 2-node configuration.

Option	Description
Scope	Around 200TB of production data based on data type, up to 400TB of back-end size
Software	OS: 64 bit Windows for CommServe 64-bit Windows/Linux for MediaAgent only
Commvault	V11 CommServe and MediaAgent
Server Configuration (Dedicated MediaAgents)	
Software	OS: 64-bit Windows/Linux for MediaAgent
Form factor	2U rack mount with minimum 12 SFF (2.5") drive bays
CPU/RAM	16 Cores 128GB RAM 2 x 650W power supply

Internal storage	<ul style="list-style-type: none"> • 2 x 400GB SSD class disk for OS disk in RAID 1 • 2TB usable capacity volume (RAID 1 or RAID 5) with SSD class disks/PCIe I/O cards 2GB controller cache memory for index cache database. For IOPS requirements, refer to the Commvault documentation at http://documentation.commvault.com. • 2TB usable capacity volume (RAID 1 or RAID 5) with SSD class disks/PCIe I/O cards 2GB controller cache memory for deduplication database. For IOPS requirements, refer to the Commvault documentation at http://documentation.commvault.com.
NIC	Dual port, 10 GigE card for data ingest and egress Quad 1 GigE ports for management interface
Host bus adapter cards	Dual port SAS adapter Dual port HBA for tape out (optional)
Server Configuration (CommServe)	
Software	OS: 64-bit Windows
Form factor	2U rack mount with minimum 12 SFF (2.5") drive bays
CPU/RAM	8 Cores 32GB RAM 2 x 650W power supply
Internal storage	2 x 400+ GB value SSDs in RAID 1 for OS and Commvault installation
Back-End Storage Configuration	
Storage	NetApp E2800, E5700,EF570, E600,EF560. For information on these systems and drive shelves, see section 3, NetApp E-Series Hardware and Software Specifications.

Enterprise Extended Mode Configuration: Multiple Copies and Long-Term Retention

In extended mode, each MediaAgent hosts two Deduplication Database Backup (DDB), each pointing to a separate copy. Use cases of this configuration are:

- **Multiple copy support.** One example is cross-site replication, in which each site does local backups and then replicates them over to the other site. The first copy is used for primary backups and the second copy for hosting replicated data coming in from the other site.
- **Long-term retention.** Primary backups are retained for the short term, usually 30 to 90 days, but monthly backups need to be hosted for longer periods, usually for several years. The first copy is used for primary backups, and the DASH copy selective backups from primary copy to second copy are used for long-term retention.

Note that a MediaAgent of any size (small, medium, large, or extra large) can be used in this mode, provided that each DDB is hosted on a dedicated volume.

Figure 6) Cross-site replication.

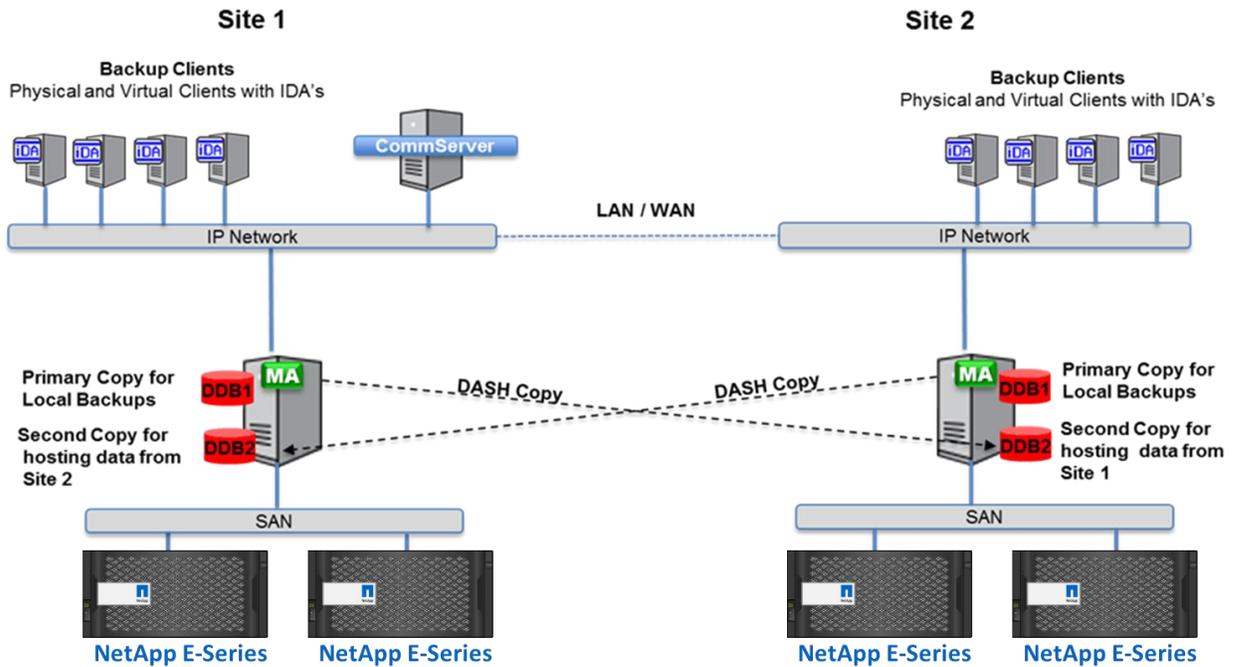
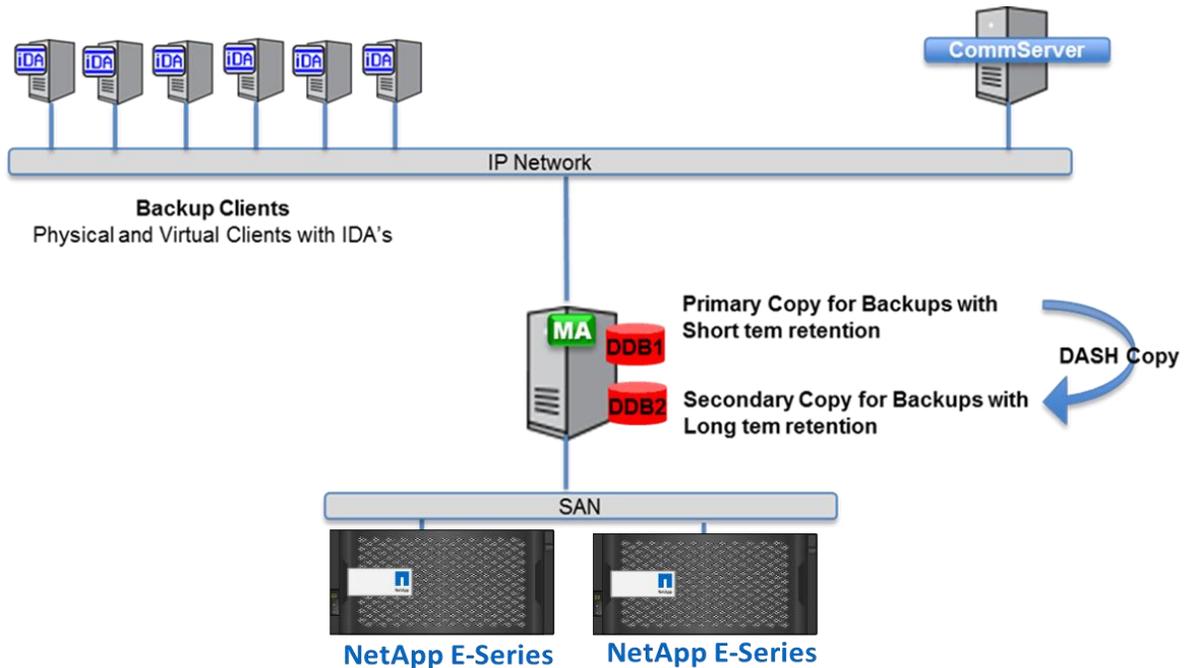


Figure 7) Long-term retention.



For hardware configurations with two deduplication databases, add more storage for the second volume based on the capacity of the node (small, medium, large, or extra large).

For more information and additional configurations, refer to the Commvault documentation at <http://documentation.commvault.com>.

Configuration with IntelliSnap

In this configuration, the MediaAgent also acts as a proxy to locally mount snapshots created on E-Series primary storage for creating LAN-free backup copies. The MediaAgent requires either iSCSI or FC access to the array to access snapshots. iSCSI access can be provisioned via the 10 GigE network card. FC access requires a dual port 8 Gbps FC card to be added to the server configuration.

2.2 Backup Storage Capacity Sizing

In any environment, backup capacity sizing for a storage system is calculated based on what Commvault refers to as “terabyte of front-end protection size” (FET), which is the capacity size of the data being protected. Table 6 provides some examples of front-end data and the resulting back-end capacity sizing required for storage. The general rule is to plan backup storage capacity at 1.5 to 2 times FET, depending on the desired retention timeframe.

Table 6) Backup storage capacity sizing.

Backup Storage Capacity Sizing		
Terabyte of Front-End Protection Size (FET)	Backup Storage Capacity Sizing at 1.5X	Backup Storage Capacity Sizing at 2X
15TB	22.5TB	30TB
30TB	45TB	60TB
60TB	90TB	120TB
120TB	180TB	240TB

2.3 Backup Read Performance Goals

Table 7) Backup read performance goals.

Configuration	Backup Read Performance Goal
Small configuration: Single node	500GB/hr restore
Medium configuration: Single node	750GB/hr restore
Large configuration: Single node	1TB/hr restore
Large configuration: Multinode	2TB/hr restore

3 NetApp E-Series Hardware and Software Specifications

3.1 E-Series Hardware

The NetApp E-Series hardware portfolio can be divided into three categories: entry-level, midrange, and all-flash storage systems.

Entry-Level E-Series Storage Systems

NetApp E-Series E2800 Storage System

NetApp E-Series E2800 storage systems address wide-ranging data storage requirements with balanced performance. The E2800 system is equally adept at handling large sequential I/O for video, analytical, and backup applications, as well as small random I/O requirements for small and medium-sized enterprise mixed workloads. The E2800 brings together the following advantages:

- Support for all-flash and hybrid drive configurations
- Modular host interface flexibility (SAS, FC, and iSCSI)
- High reliability (99.999% reliability)
- Intuitive management: simple administration for IT generalists and detailed drill-down for storage specialists

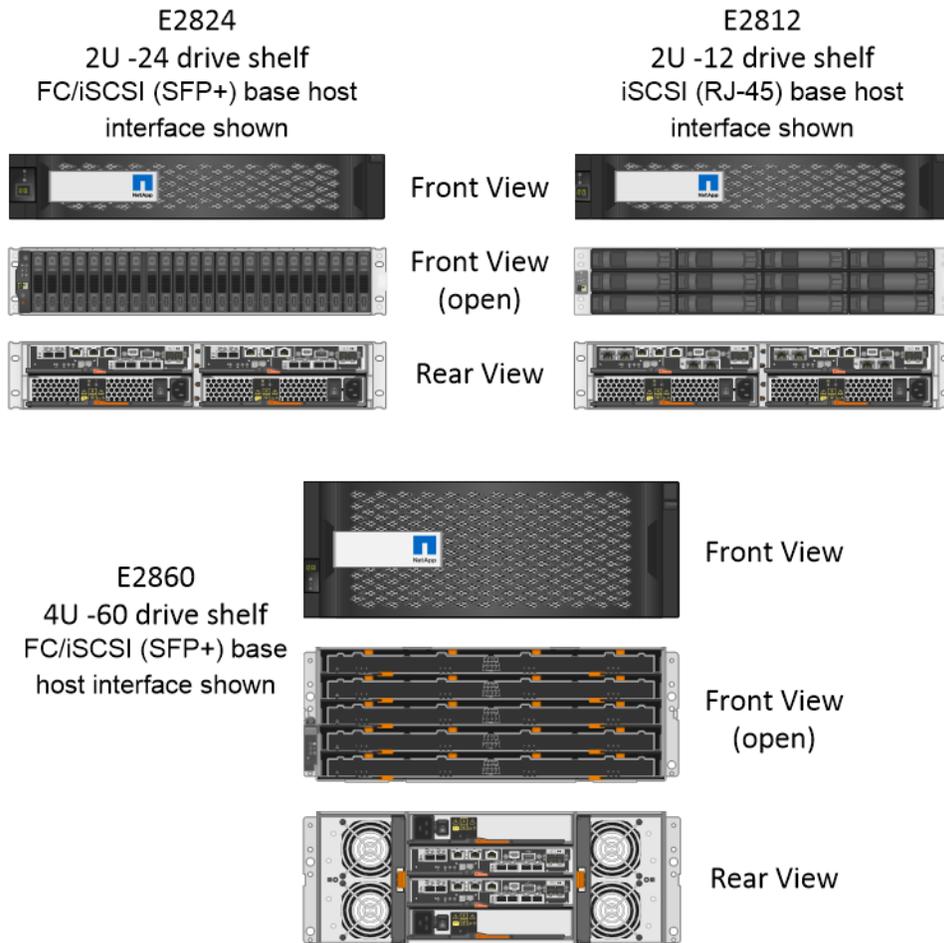
The new entry-level E2800 is a 12Gb SAS 3 system with NetApp SANtricity® 11.30 software. The E2800 introduces new embedded management, including the browser-based SANtricity System Manager 11.30, which features the following new capabilities:

- Embedded web services
- The easy-to-use GUI of SANtricity System Manager
- The ability to store and present up to 30 days of performance data, including I/O latency, IOPS, CPU utilization, and throughput
- The ability to do application and workload tagging
- Easier alert management, including an embedded SNMP agent and MIB
- Embedded NetApp AutoSupport® functionality

Together, these features create an entry-level storage system with the flexibility and performance capabilities to support enterprise workloads without sacrificing simplicity and efficiency. In addition, the E2800 storage system's fully redundant I/O paths, advanced protection features, and extensive diagnostic capabilities deliver a high level of availability, data integrity, and security.

The E2812 and E2824 shelf options support one or two controller canisters, and the E2860 supports only two controller canisters. All shelves support dual power supplies and dual fan units for redundancy (the shelves have an integrated power fan canister). The shelves are sized to hold 12 drives, 24 drives, or 60 drives, as shown in Figure 8.

Figure 8) E2800 hardware overview.



Note: For detailed information about the E2800 system, see [TR-4538: Introduction to NetApp E-Series E2800](#).

Midrange E-Series Storage Systems

The midrange portfolio currently includes the E5700 and E5600 controller pair.

NetApp E-Series E5700 Storage System

NetApp E-Series E5700 hybrid arrays running SANtricity OS 11.40 have a new modern look, leverage the new 12Gbps DE460C and DE224C drive shelves, support a more secure UI, and deliver significantly higher performance than their predecessor E-Series arrays.

For backup and recovery applications and other high-capacity workloads, the E5760 hybrid array dramatically increases the maximum supported capacity per array footprint from 384 drives to 480 drives, or 8 total 4RU (rack unit) shelves. Currently that's up to 4.8PB of ultradense raw capacity in 32RU of rack space, or 150TB/RU, using 10TB NL-SAS drives. This storage density continues to grow every 6 to 12 months as larger capacity drives are qualified for E-Series systems.

As a result, adopting a strategy of purchasing multishelf systems up front with minimum drive counts to start with allows you to continue to increase the footprint density of your E-Series investment over time. This density reduction is achieved by adding sets of higher-capacity drives as you need them to satisfy

future storage growth. You can fully accomplish this goal without changing the footprint or planning new power and, most important, without incurring a service disruption.

In fact, growing by drive packs makes the process of growing over time extremely easy and cost effective. Simply order a new RAID group's or pool's worth of drives as a capacity building block when you need it. Then install the drives without disruption to live systems, map the new capacity to new requirements, or grow existing capacity while maintaining optimal system resiliency and performance over the life of your storage system. This approach drives down your long-term total cost and provides a low-risk and built-in grow-on-demand strategy that can be easily executed in quarter-driven budget cycles.

Note:

Figure 9 shows the E5760 array front and rear views. The front view shows just how easy it is to open a drive drawer to install new drives.

Note: The front bezel should be installed during normal operating conditions.

Figure 9) New E5760 hybrid storage array with the front bezel off.

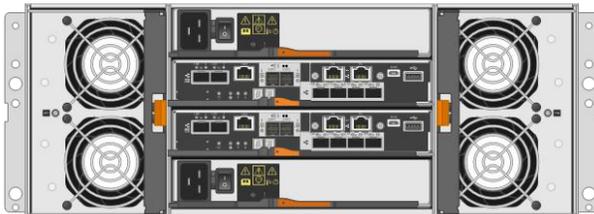
E5760 front bezel



E5760 front view with drawer 5 open



E5760 rear view with controllers installed



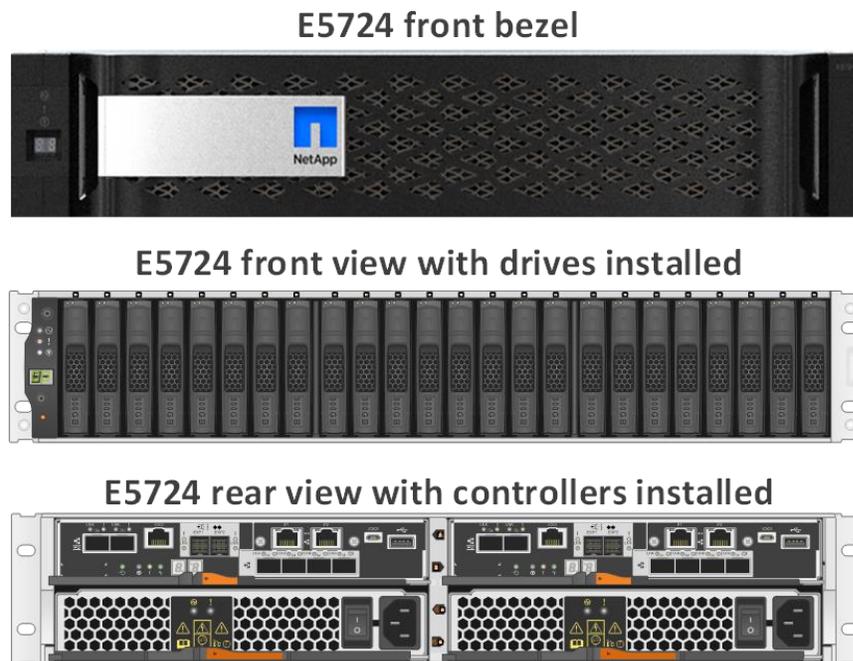
For workloads that require fast storage such as Splunk and other analytics applications, high-performance databases, and specialty applications that require ultralow latency storage, E-Series E5724

hybrid arrays support up to 192 drives, starting with a base set of 10K RPM SAS drives for the HDD tier. You can add more 10K SAS drives or up to 120 solid-state drives (SSDs) to build a fast tier in the same array. The E5724 also supports 15.3TB SSDs to build a large capacity fast tier (~1.8PB fast, raw capacity). For extreme flexibility, you can add a DE460C expansion drive shelf that supports both SSDs and NL-SAS drives.

Note: The DE460C shelf does not support 15.3TB SSDs. The 800GB, 1.6TB, and 3.2TB SSDs are supported in the DE460C shelf.

The system can deliver consistent submillisecond latency response times for small random workloads, or it can deliver up to 21GBps for large sequential read workloads, about 8GBps large sequential write workloads.

Figure 10) E5724 storage array with the front bezel off.



Note: E5700 controllers are not offered in the 12-drive DE212C shelf. Only the E-Series E2800 controllers are offered in the 12-drive configuration (that is, E2812).

Each E5700 controller provides two Ethernet management ports for out-of-band management and has two 12Gbps (x4 lanes) wide-port SAS drive expansion ports for redundant drive expansion paths to the drives.

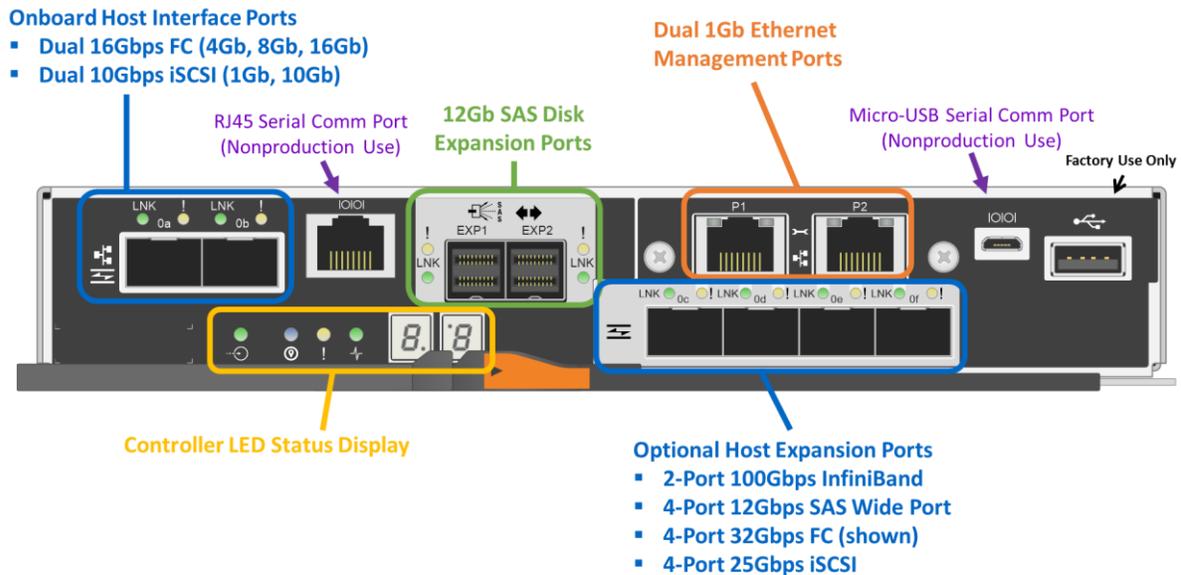
The E5700 controllers also include two built-in host ports, either two 16Gb FC or two 10Gb iSCSI, and your choice of the following optional host interface cards (HICs):

- 4-port 12Gb SAS (mini-SAS 3 connector)
- 4-port 32Gb FC (OM4 fiber required)
- 4-port 25Gb iSCSI (OM4 fiber required)
- 2-port 100Gb InfiniBand ([IB] requires 100Gb-capable cables and HCAs)

Note: A software feature pack can be applied in the field to change the host protocol of the optical baseboard ports from FC to iSCSI or from iSCSI to FC. In addition, the IB protocol can be

changed to one of three choices: iSER, SRP, or NVMe over Fabrics, which is abbreviated NVMe-oF (IB). Only one IB protocol can be active on an E5700 array.

Figure 11) E5700 controller with the ports identified.



Note: For more information about the E5700 system, see [TR-4627: Introduction to NetApp E5700 Arrays](#).

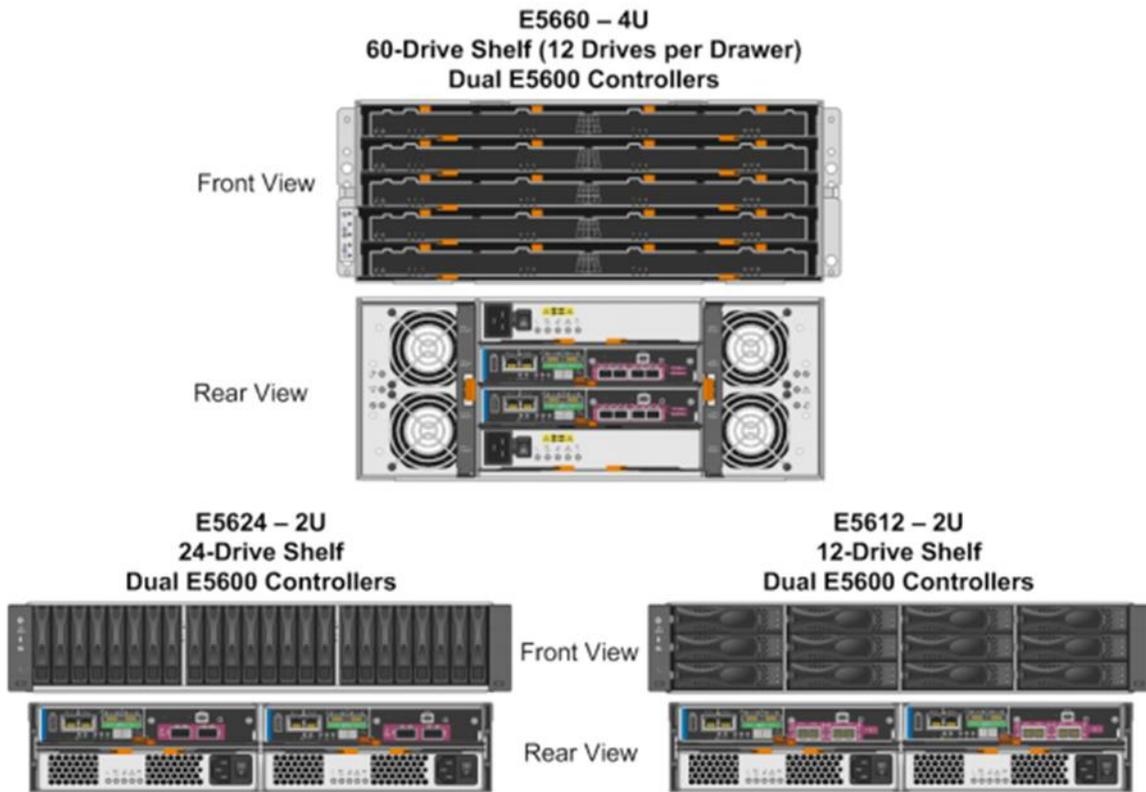
NetApp E-Series E5600 Storage System

The E5600 provides the following benefits:

- Support for wide-ranging workloads and performance requirements
- Fully redundant I/O paths, advanced protection features, and proactive support monitoring and services for high levels of availability, integrity, and security
- Increased IOPS performance by up to 35% compared with the previous high-performance generation of E-Series products
- A winning combination of leading IOPS performance at low latencies and throughput density that makes the E5600 a great choice for high-performance workloads
- A level of price-performance, density, and economics that leads in the industry

The E5600 system is available in three shelf options, which support both HDDs and SSDs. All three shelf options include dual controller modules, dual power supplies, and dual fan units for redundancy (the 12-drive and 24-drive shelves have integrated power and fan modules). The shelves are sized to hold 60 drives, 24 drives, or 12 drives, as shown in Figure 12.

Figure 12) E5600 hardware overview.



Note: For detailed information about the E5600 system, see [TR-4544: Introduction to NetApp E-Series E5600](#).

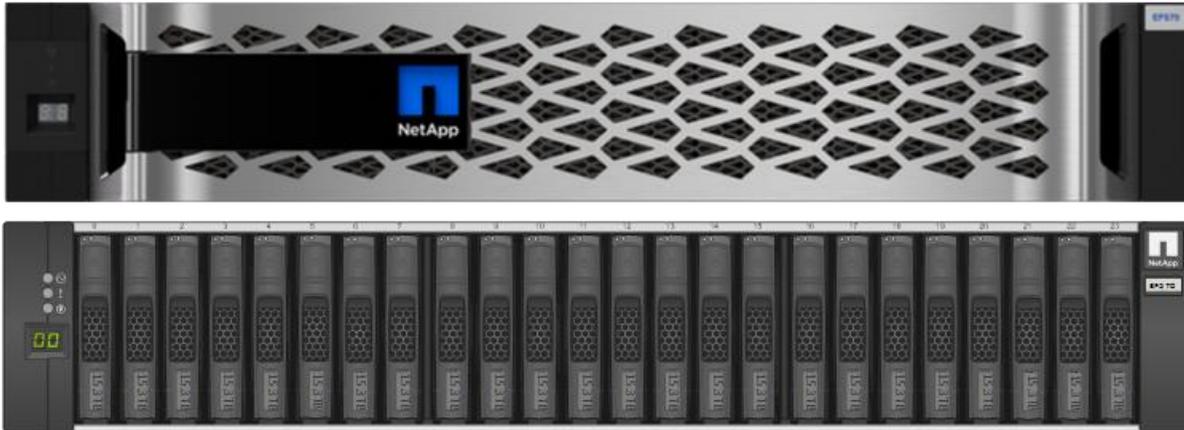
All-Flash EF-Series Storage Systems

The all-flash portfolio currently includes the EF570 and EF560 controller pair.

NetApp E-Series EF570 Storage System

NetApp EF570 arrays have a new modern look, leverage the new 12Gbps DE224C drive shelves, support a more secure user interface, and deliver stunning performance for both mixed random workloads and large sequential workloads in one powerful all-flash array package.

Figure 13) New NetApp EF570 all-flash array with bezel on and off.



The EF570 can deliver consistent submillisecond latency response times for up to 1,000,000 4KB random read IOPS with as few as 24 SSDs; or the same configuration can deliver up to 16GBps large sequential read throughput, about 9GBps cache mirrored large sequential write throughput. If you add an expansion drive shelf and 12 additional SSDs, the EF570 array delivers up to 21GBps throughput for large sequential read workloads and up to 12GBps for full stripe write workloads.

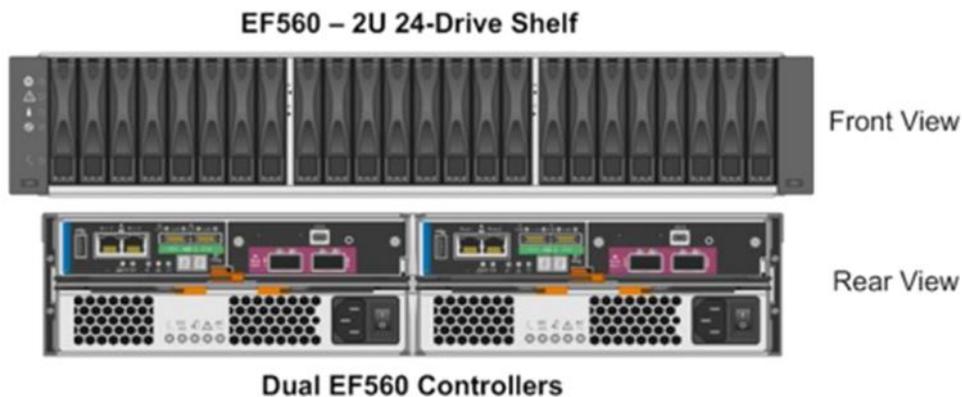
Note: For more information about the EF560 system, see [TR-4637: Introduction to NetApp E-Series EF570 Arrays](#).

NetApp E-Series EF560 Storage System

The NetApp EF560 all-flash array (Figure 14) is a robust system for delivering exceptional performance to mission-critical applications. The EF560 flash array leverages the latest in SSD technologies and a strong heritage of handling diverse workloads and providing superior business value through accelerating latency-sensitive and high-I/O applications.

The EF560 is available in a 2U 24-drive shelf that holds up to 24 2.5-inch SSDs and features dual RAID controllers and dual power supplies with integrated fans. The EF560 flash array supports up to 120 SSDs with the addition of four expansion drive shelves. Each of the two EF560 controllers has a combination of onboard storage-side SAS drive expansion ports and add-on host interface ports.

Figure 14) EF560 hardware overview.



Note: For more information about the EF560 system, see [TR-4546: Introduction to NetApp EF560 Flash Array](#).

3.2 Key NetApp E-Series and EF-Series Features

Here are some important features of NetApp E-Series:

- NetApp E-Series and EF-Series provide highly scalable capacity and performance.
- Maximum density promotes optimal space utilization and reduced power and cooling requirements.
- NetApp Dynamic Disk Pool technology enables dynamic rebalancing of drive count changes to easily expand storage capacity as backup needs grow while providing added data protection with faster rebuild times if a drive fails.
- You can easily integrate E-Series through multiple host interfaces, drive technologies, and disk shelf options for flexible deployment.
- Full disk encryption offers data security. AES 128-bit encryption from SafeStore encryption services and simplified key management protect data throughout the drive's lifecycle without sacrificing performance.
- No-cost application add-ins enable you to easily manage storage from a single display within the native application.
- Tighter economics provide:
 - A better price per gigabyte
 - A lower total cost of ownership (TCO)
 - Supportability and reliability, availability, and serviceability to minimize the cost of support calls

3.3 Enterprise Reliability and Availability

Field-proven technology protects your valuable data.

- E-Series is the right choice for peace of mind because it:
 - Leverages knowledge from 1 million systems
 - Is backed by a worldwide support organization
- E-Series is architected for the highest reliability and availability and includes:
 - A fully redundant I/O path with automated failover
 - Online configuration, expansion, and maintenance
 - Advanced monitoring and diagnostic features that enable fast problem resolution
 - Proactive tracking of SSD wear life and sending of alert messages
- E-Series provides enterprise data protection, including:
 - Robust disaster recovery (sync and async)
 - Local protection with high-efficiency NetApp Snapshot™ copies

3.4 SANtricity OS 11.40: New Features

E5700 and EF570 arrays are new with the NetApp SANtricity OS 11.40 release, but there are also significant software enhancements in the release that apply to all the new-generation E-Series arrays, including the E5700, EF570, and entry-level E2800 arrays. An onboard web-based GUI, SANtricity System Manager, manages these arrays.

New features in SANtricity OS 11.40 include:

- Support for directory services using Lightweight Directory Access Protocol (LDAP)
- Support for role-based access control (RBAC): five standard roles defined with varying permission levels
- Support for certification authority (CA) and Secure Sockets Layer (SSL) certificates
- Secure CLI implementation: secure when the certificates are installed

- Added support for an external encryption key manager in addition to the legacy E-Series drive security onboard encryption key manager
- Security enhancements that extend to the onboard web services API, where user account passwords are now required

Note: If you want to run in the previous security mode with a single administrative password and still use symbols to communicate using API, the new security features can be disabled by the admin user when the storage system is initially set up.

In addition to LDAP and RBAC, some enhancements to our most-used host multipath functionality were released in previous SANtricity OS maintenance releases and are now part of the SANtricity OS 11.40 general availability (GA) release.

Note: For details about SANtricity OS 11.40, see [TR-4627: Introduction to NetApp E5700 Arrays](#).

3.5 SANtricity System Manager Versus Storage Manager

E-Series storage systems are managed by using the SANtricity Storage Manager or System Manager, which offer both GUI management and CLI management interfaces for out-of-band and in-band system management. NetApp generally recommends out-of-band management. However, in-band management is useful if there is no IP network access to remote storage systems but there are in-band traffic connections to the storage system from a local host.

There are two versions of the storage management software:

- SANtricity System Manager is used to manage individual E2800 storage arrays.
- SANtricity Storage Manager, with its Enterprise Management Window (EMW), provides an aggregated view of all E-Series arrays. The Array Management Window (AMW) of SANtricity Storage Manager is used to manage the E2700, E5600, EF560, and all earlier storage arrays.

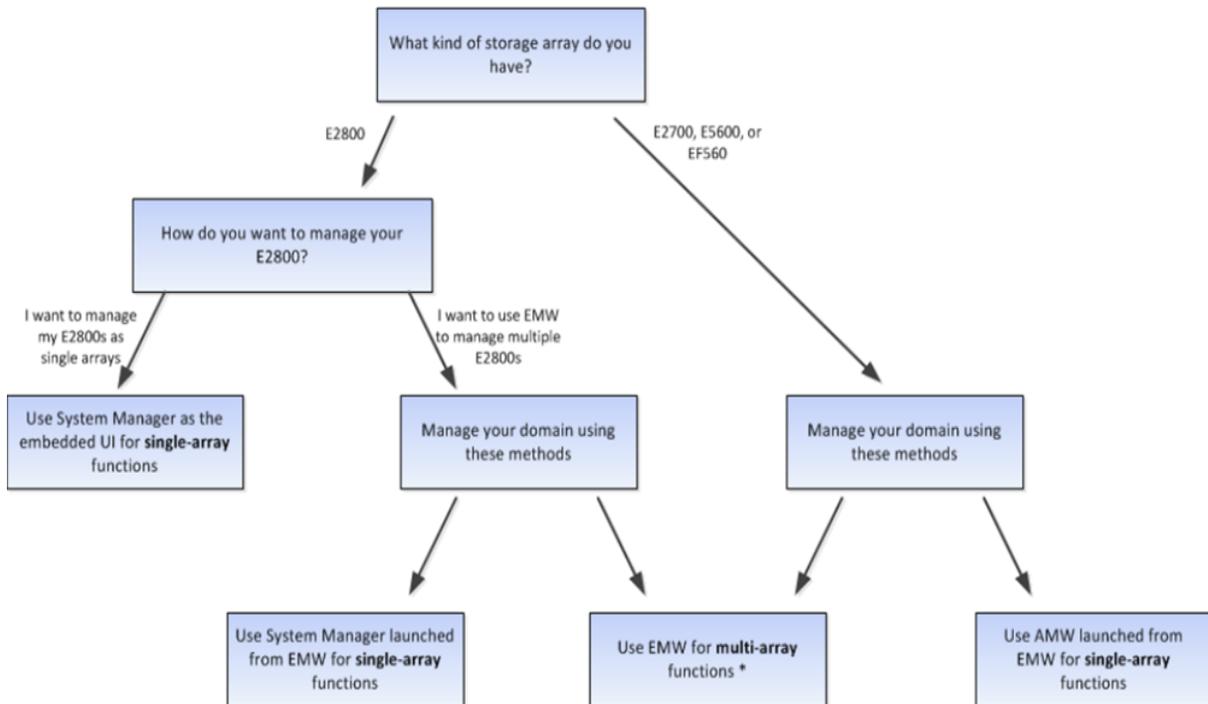
When you choose to manage a storage array from the EMW, the EMW opens the appropriate software (AMW or System Manager), depending on what controller the storage array contains.

The key features of System Manager include:

- Runs on box: You don't have to install any storage management software unless you need an aggregated view or use a mirroring feature.
- Displays in a browser and is mobile ready.
- Has a modern look and feel, with a tile-based GUI and an easy-to-use online help system.
- Uses simplified workflows and simplified terminologies.
- Includes new functionality, such as application and workload tagging, enhanced performance data, an embedded monitor, and a graphical view of thin volume usage.
- Includes an embedded RESTful API that can be used for management.

If you have purchased an E2800-based storage array, your decisions about what components to install depend on how you answer the questions in Figure 15.

Figure 15) Decision tree to determine which management components to install.



For more information about System Manager, see section 3 of the [E2800 technical report](#). For more information about Storage Manager, see in section 2 of the [E5600 technical report](#).

4 Commvault Data Platform V11

4.1 Overview

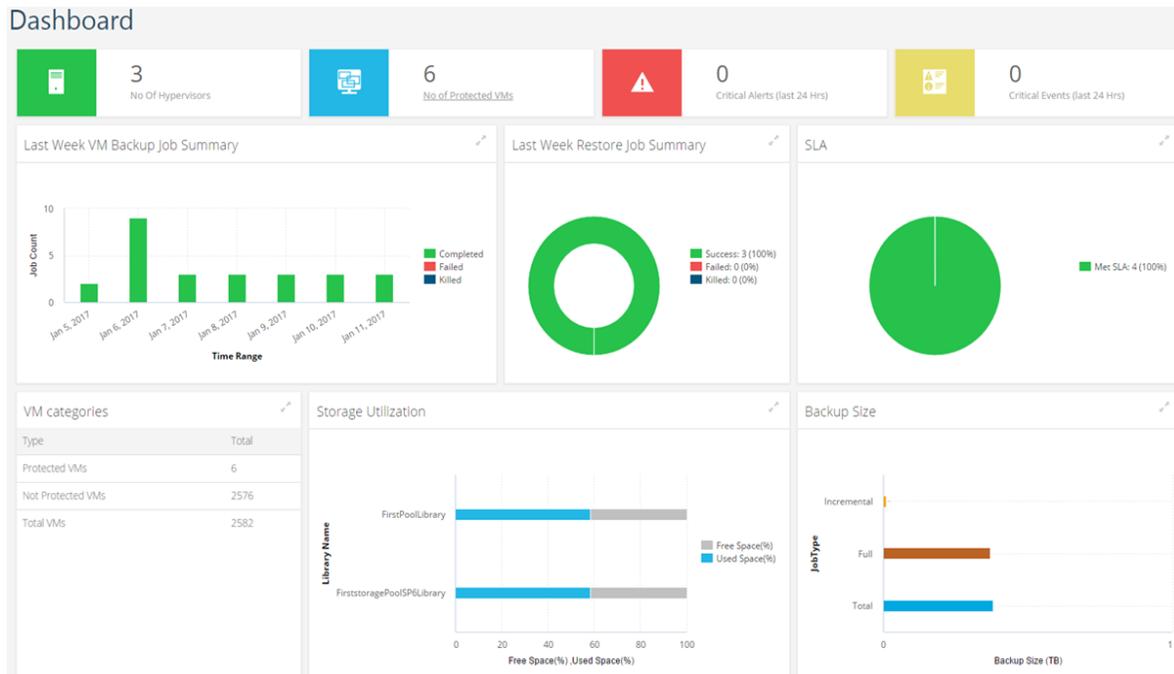
The Commvault Data Platform is a highly scalable, integrated data and information management solution, built from the ground up on a single platform and unified code base. All functions share the same back-end technologies to deliver the unparalleled advantages and benefits of a truly holistic approach to protecting, managing, and accessing data. The software contains modules to protect and archive, analyze, replicate, and search your data. The modules share a common set of back-end services and advanced capabilities, seamlessly interacting with one another. This addresses all aspects of data management in the enterprise, while providing infinite scalability and unprecedented control of data and information.

Production data is protected by installing agent software on the physical or virtual hosts, which use operating system or application native APIs to protect data in a consistent state. Production data is processed by the agent software on client computers and backed up through a data manager, the MediaAgent, to disk, tape, or cloud storage. All data management activity in the environment is tracked by a centralized server, the CommServe, and can be managed by administrators through a central user interface. End users can access protected data by using web browsers or mobile devices.

Key features of the software platform:

- Complete data protection solution supports all major operating systems, applications, and databases on virtual and physical servers, NAS shares, cloud-based infrastructures, and mobile devices.
- Simplified management through a single console; view, manage, and access all functions and all data and information across the enterprise.

Figure 16) Commvault management dashboard.



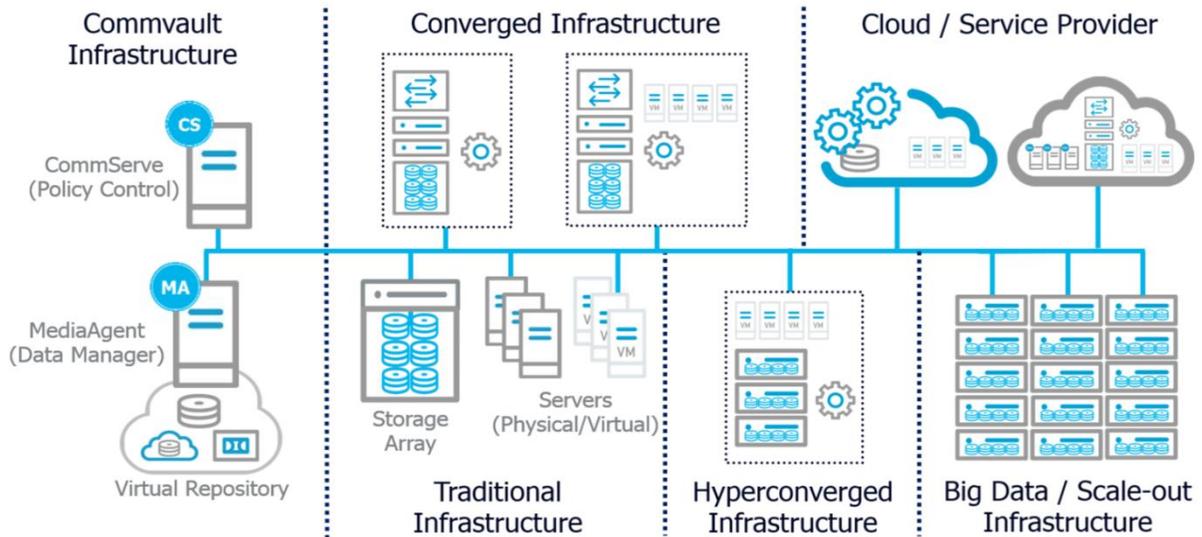
- Multiple protection methods include backup and archive, snapshot management, replication, and content indexing for e-discovery.
- Efficient storage management uses deduplication for disk, tape, and cloud. For a list of cloud targets supported, go to the Commvault Cloud Storage Support [page](#).
- Integration with the industry's top storage arrays automates the creation of indexed, application-aware hardware snapshot copies across multivendor storage environments.
- Complete virtual infrastructure management supports both VMware and Hyper-V.
- Advanced security capabilities limit access to critical data, provide granular management capabilities, and offer single sign-on access for Active Directory users.
- Policy-based data management transcends the limitations of legacy backup products by managing data based on business needs, not physical location.
- Cutting-edge end-user experience empowers users to protect, find, and recover their own data by using common tools such as web browsers, Microsoft Outlook, and File Explorer.
- End users can use third-party screen readers with the Web Console, Admin Console, and command line interface.

Commvault Data Platform V11 Components

Table 8) Commvault Data Platform V11 components and descriptions.

Component	Description
CommCell®	A single instance of the Commvault backup environment.
CommServe	“Command and control center” that handles all requests for activity between MediaAgent and iDataAgent components. Administration: Includes configuration, security, licensing, policies, and scheduling. Disaster recovery: Database includes configuration and media association. Reporting: General health and welfare of environment and detailed reporting on the health of the environment, including the health of the data itself. Event Orchestration: Houses the centralized event and job managers that handle the various operations within a CommCell. Includes an instance of Microsoft SQL 2008 Enterprise for the internal database. Requires installation on Windows 2008 or later.
MediaAgent	Data Mover, home of Deduplication Indexer. MediaAgents have broad operating system support, including Windows, Linux, and UNIX options.
CommCell Console	The Commvault management graphical user interface application.
Intelligent Data Agent (iDA)	Agents that control data consistency during backup operations.
CommServe Database	Handles scheduling, storage policies, activity metadata, media management, reporting, security role-based privileges, and encryption key management.
ContentStore	A hardware-agnostic virtual repository. The back-end repository for all Commvault-managed information. ContentStore consolidates protection and archiving of data to eliminate inefficient data silos that waste resources and infrastructure. An intelligent index provides global awareness for your data so you can quickly find what you need, when you need it. Commvault software has a single, deduplicated index across the ContentStore, making it the only enterprise-class solution like it in the market. Having a reusable, common repository facilitates better control of applications, processes, and data workflow across an enterprise. Ultimately, it delivers information at your fingertips for the better productivity, improved collaboration, and smarter decision making that can transform your business.
Clients	Hosts running iDataAgents for which data is protected.
Backup Set	A layer of management within iDataAgents for grouping subclients.
Subclient	A layer of management within a backup set. A client can have multiple subclients, each of which can be associated with different source data.
Disk Library	A storage resource with an associated mount path that is used in the Commvault backup environment to store index information backups.
Storage Policy	A logical object through which a subclient is protected. The storage policy defines how data is backed up and replicated, as well as retention requirements.

Figure 17) Commvault data management platform.



5 Data Platform V11 Design Considerations and Best Practices

5.1 Infrastructure Design

Design Questions to Ask Your Customer

1. How many sites? That is, the number of sites that exist in the customer's environment. (A site is any location where data exists that needs to be protected or where protected data will reside.) Don't forget that laptops outside the protected network count as additional sites.
2. For each site, where must protection copies reside? You need to know the protection requirements for each site, including whether or not a local copy is made and where any remote copies will be sent.
3. How many clients will be managed? To account for scale, in larger environments it can be helpful to have this information broken down by sites.
4. How much data will be managed in each site? This information helps you address sizing and scale issues.

Infrastructure Design: Step-by-Step Design Process

1. Determine the proper number and specifications of CommServes, based on client limits.
2. Determine the best location for CommServe and DR CommServe.
3. Determine which sites require MediaAgents.
4. Make sure that each site has sufficient MediaAgent quantity and specifications based on client data size or throughput requirements.

Deduplication Solution Design

Table 9) Deduplication terminology.

Deduplication Component	Description
Source-side deduplication	Only unique blocks not present in the deduplication database are transferred from the client to the MediaAgent.
Target-side (MediaAgent) deduplication	All data is sent from the client to the MediaAgent. Only unique blocks are transferred to disk.
DASH full	Deduplication-optimized full backup that allows all backups from the client to be incremental-only after initial full backup.
DASH copy	Deduplication-optimized copy of backup jobs from one storage copy to another.
Deduplication database	Database located on a high-speed disk volume that stores information about all deduplicated blocks.
Global deduplication	Policy that allows all storage copies on one or multiple MediaAgents to be deduplicated together.

Building Block Design Questions to Ask About Sizing

1. How much data in each site?
2. What is the data composition in each site? (What types of data will be protected?)

Breaks down into the following categories:

- a. Uncompressed files or file systems.
 - b. Compressed or uncontrolled data (NDMP data or zipped files fall into this category).
 - c. Any databases protected at the application level as opposed to dumped by the application are categorized together as well
3. What is the data retention for deduplicated disk copies? (You need to know how long the data will be retained on disk — typically in weeks — and whether there are any special retention considerations.)
 4. Will deduplicated secondary copies be made? Where?

Deduplication Step-by-Step Design Process

1. Determine how much data will be protected at each site, what type of data is to be protected, how long it will be retained, and whether you will make secondary copies.
2. Use the deduplication calculator to determine how much disk capacity is required. If the number of back-end TB exceeds the MediaAgents limits, increase the number of MediaAgents accordingly. Also consider throughput and client count when determining the number of MediaAgents.
3. Determine whether you will use standalone building block nodes or partitioned deduplication. Size the proper number of Media-Agents based on front-end data protected.
4. SAN disk provides shared disk libraries that are required in order to use partitioned deduplication.

Deduplication to Disk: Best Practices

Before using deduplication, review the deduplication best practices:

https://documentation.commvault.com/commvault/v11/article?p=features/deduplication/best_practice.htm

For better deduplication performance, use the settings described in the rest of this section.

Virtual Server Agent (VSA) Design Questions

1. Hypervisor VMware or Hyper-V?
2. How much VM data is being protected at each site? (Get a count of how many guests and data sizing.)
3. Are there any physical RDMs or pass-through devices?

Advanced Data Protection Best Practices

Microsoft Active Directory Protection Best Practices

1. Install a File System Agent on each domain controller, with the possible exception of RODCs. Perform full system protection.
2. Install an Active Directory Agent on a single domain controller in each domain of the forest that requires granular recovery.
3. If you do not want to perform an additional Active Directory backup, use the offline mining feature.

Microsoft Exchange Best Practices

1. Determine which mailbox servers should be used for backup or recovery and install the File System Agent and Exchange Database Agent.
2. Configure a DAG pseudoclient and set the backup selection rules.
3. If granular recovery is required, install the Exchange Mailbox Agent. If performance or licensing is a concern, use the offline mining feature.

Microsoft SQL Protection Best Practices

1. For single-server deployments, perform all operations locally.
2. For SQL failover clusters, install the agents on all nodes and then configure Windows cluster clients for each cluster group.
3. For Always On Availability Groups, perform all protection from the primary replica.

Microsoft SharePoint Protection Best Practices

1. Use the File System Agent or Virtual Server Agent to provide full server protection of all SharePoint servers.
2. Use the SharePoint Farm Backup feature to protect all critical SharePoint elements except the content database.
3. Use the SQL Agent to protect the content database.
4. If granular recovery is required, perform document-level and/or site collection backups. If performance is a concern, use Commvault IntelliSnap for NetApp and offline mining.

6 NetApp E-Series Volume Configuration Guidelines

6.1 NetApp E-Series Storage Configuration Guidelines for Data Platform V11 Disk Libraries

NetApp recommends not using thin volumes while setting up NetApp E-Series with Commvault.

Small and Medium Configuration – Single Node

- Use RAID 6 (8+2) volume groups.

- Create LUNs (not thin) from the volume group of 9TB if possible, regardless of the spindle size installed in the system.
- Select segment size in 64KB increments. Default segment size (file system typical) is 128KB.

Large and Extra-Large Configurations – Single and Multinode

- Create either multiple RAID 6 (8+2) volume groups out of the drives in the system, or use Dynamic Disk Pools to maximize ease of use and rebuild times.
- Create LUNs (not thin) from the volume group of 9TB if possible, regardless of the spindle size installed in the system
- For RAID 6 Volume Groups, select segment size in 64KB increments. Default segment size (file system typical) is 128KB.
- For a Dynamic Data Pool, the default segment size (file system typical) is 128KB.

7 Architectural Tools and Sizing

7.1 Assessment Tools

Commvault External Data Connector (EDC) Toolkit

Commvault has made it easy for customers switch from Symantec NetBackup, EMC Networker, and IBM TSM to Commvault software. Just ask any of the more than 16,000 Commvault users who left their costly legacy backup software behind for the singular modern approach of Commvault software to save them time and money while adding value to their business. With the Commvault External Data Connector (EDC) toolkit, customers can switch with confidence and ease. The toolkit is composed of three important components: EDC software, the EDC cloud, and migration services.

- Import settings from Symantec, EMC, IBM

Commvault EDC software connects with Symantec NetBackup, EMC Networker, and IBM TSM master servers to collect legacy client attributes, policies, and job history. That metadata can then be imported to the Commvault software platform for reporting, modeling, and automated conversion into the new Commvault software installation.

- Safely configure and test in the cloud

Commvault's EDC cloud is a web-based platform that allows customers to trial-run Commvault software in a sandbox before they begin implementation in their environment. This capability helps demonstrate the benefits of using Commvault software and ensures that customers' configurations and policies are optimized before they start their implementation.

- Leverage Commvault's team of product experts

The Commvault services team helps customers with each step of their migration to Commvault software. Migration operations services include proactive risk identification and planning, which reduce the time to upgrade while also ensuring that best practices are employed.

External Data Connector

The External Data Connector offers the following functionalities:

- Collect information from non-Commvault backup products
- Stage on a virtual machine
- Size and report the customer environment

The major use case is when an incumbent backup solution is replaced with Commvault. For more information, go to <https://cloud.commvault.com/>.

System Discovery and Archive Analyzer Tool

The System Discovery and Archive Analyzer Tool offers the following functionalities:

- Collect host and file information from a list of servers
- Stage on a virtual machine
- Size and report on the customer environment

Use cases of the tool include:

- Alternative to EDC tool
- Perform detailed file-level archive assessments

The tool can be accessed at <https://cloud.commvault.com/>.

7.2 Design Tool: Software Configurator

The Software Configurator is an online survey-based configuration tool that generates basic solution design and provides license model comparisons.

It can be accessed at <https://partners.commvault.com/>.

The Software Configurator also:

- Estimates the amount of backup disk required when Commvault deduplication will be used.
- Estimates the amount of time it will take to replicate data over the WAN in a DASH copy or Continuous Data Replicator solutions.

8 Summary

NetApp E-Series and EF-Series and Commvault Data Platform V11 combine to provide the necessary capacity, throughput, IOPS, and response times to meet performance requirements for demanding backup windows while ensuring data reliability in backup environments.

E-Series and EF-Series products offer a modular architecture to meet the most demanding performance, scale, and rack density requirements, through their numerous drive choices, while providing flexibility on drive enclosures. Data Platform V11 is more than just an upgrade to the industry-leading software solution for protecting, managing, and accessing corporate information; it is an exponential leap forward. It is a data management solution that can scale to meet all the demands of an enterprise of any size. When paired together, the E-Series and EF-Series storage solution and Data Platform V11 provide an innovative solution to address all data management needs.

9 Appendix

9.1 Commvault Data Platform V11 Terminology and Definitions

Commvault Terminology	Definition
Backup Series	All the archive files on a given backup medium originating from the same subclient.
Backup Set	A group of subclients that includes all the data backed up by the iDataAgent.

Commvault Terminology	Definition
Client Compression	A feature that compresses data on a client computer before sending the data to backup media.
Client Computer	A computer in a CommCell® management group that has agent software installed on it.
Client Computer Group	A logical grouping of client computers in which selected options can apply to all member clients.
CommCell Administration	A user group capability that permits members of the user group to administer a CommCell management group.
CommCell Browser	The window in the CommCell Console that displays all the objects in the CommCell management group in a tree structure.
CommCell Console	The graphical user interface used to access and manage the system
CommCell Management Group	The basic organizational unit of a data management system. A CommCell management group contains one CommServe StorageManager and at least one client.
CommCell Survey	An automatic reporting service that collects information about the CommCell management group, such as overall wellness of the managed components, license usage, and job statistics, and uploads it to the secure cloud site for customer service monitoring. This service is enabled through the Diagnostics and Usage dialog box, found on the Control Panel.
Common Technology Engine	Consists of the CommServe StorageManager and the MediaAgent software modules that provide the necessary tools to manage and administer the Client Agents and manage the storage media associated with the CommCell management group.
CommServe Database Engine	A SQL server database that is used by the CommServe StorageManager that contains all the information related to the CommCell management group.
CommServe StorageManager	The software module that communicates with all clients and MediaAgents, and coordinates operations (data protection, data recovery, and administration operations, job management, event management, and so on) within a CommCell management group. There is only one CommServe StorageManager per CommCell management group.
Compliance Archiving	An operation that moves data from a Journaling Mailbox on the client computer to secondary storage media for the purpose of complying with legal or business regulations.
Content Indexing	A feature used to search archived data of supported file and message types by their content.
Data Replication	The creation of secondary copies of production data by using a combination of host-based replication and snapshot technologies. These real-time data replication copies can be accessed immediately for fast recovery, used to create multiple recovery points, or used to perform traditional backups without having an impact on server performance.

Commvault Terminology	Definition
Data Stream	A data channel through which client data flows to backup media.
Differential Backup	A backup of all the data on a subclient that has changed since the subclient's last full backup.
Disaster Recovery	The planning for and/or the implementation of a strategy to respond to such failures as a total infrastructure loss, or the failure of computers (CommServe StorageManager, MediaAgent, client, or application), networks, storage hardware, or media. A disaster recovery strategy typically involves the creation and maintenance of a secure disaster recovery site, as well as the day-to-day tasks of running regular disaster recovery backups.
Disaster Recovery Backup	Backs up metadata and Windows registry data in two phases. In the first phase, the data to a local or network path is backed up. In the second phase, the data is backed up to media by using a disaster recovery backup storage policy. This data can then be restored by using the CommServe Recovery Tool.
Disaster Recovery Backup Storage Policy	A storage policy that is used to store metadata to media. This metadata contains information about the CommCell database and the backed-up data. In case of a system failure, disaster recovery backup data can be retrieved by using this storage policy.
Disk Library	SAN (storage area network) disk is configured as a library to back up data to disk.
Drive Pool	Logical entities used to facilitate the sharing of a library's drives between multiple MediaAgents. See also master drive pool.
Full Backup	A backup of all the data on a subclient. A full backup provides the baseline for subsequent incremental and differential backups. (Known as a level 0 backup in Oracle.)
Incremental Backup	A backup of all the data from a subclient that has changed since the subclient's last full, incremental, or differential backup.
Index Cache	A storage location maintained by a MediaAgent that contains the index data generated by the system when backups are conducted.
Instance	The level in the CommCell Browser tree that represents the database that needs to be backed up. All subclients for the database are defined under an instance.
Instance (File Archiver For Windows)	A File Archiver for Windows instance exists as a level in the CommCell Browser under the client and agent levels and represents the type of file system that needs to be backed up. The four types of instance are Local File System, Celerra, Network File Share, and NetApp FPolicy®. An instance is user defined, rather than created by default after installing the agent.
Intelligent DataAgent (iDataAgent)	A software module that backs up and restores data of a particular application type on a host computer system.
IntelliSnap Backup	Commvault IntelliSnap® for NetApp is a feature that enables the creation of a point-in-time snapshot of the application data to be used for various data protection operations.

Commvault Terminology	Definition
Job Controller	The window in the CommCell Console that can be used to monitor and manage the active jobs in the CommCell management group.
Master Drive Pool	A logical entity that is used to facilitate the sharing of a library's drives between multiple MediaAgents. See also drive pool.
MediaAgent	The software module that transmits data between clients and backup media. The MediaAgent manages the data that is stored on the media.
Network Agent	A feature that can be used to increase the data transfer throughput from a client during data protection operations.
Network Bandwidth Throttling	A feature that can be used to control the amount of data transferred in a network during a data protection operation.
Primary Storage	Data in active use from computer hard disks and/or volumes. See also secondary storage.
Replication Policy	A centralized template to configure replication sets or replication pairs within a CommCell management group. A replication policy consists of a common configuration for replication set and replication pairs that can be applied to target replication set or replication pairs within the CommCell management group.
Replication Set	A group of replication pairs.
Schedule Policy	A feature used to associate a schedule or groups of schedules and attach it to any number of clients, backup sets, subclients, or storage policies within the CommCell management group.
Secondary Storage	Backup or archival data moved to storage media, such as tape media, disk volumes, and so on. See also primary storage.
SLA (Service-Level Agreement)	Measures the data protection coverage aspects in short-term and various long-term intervals to determine whether or not the data protection coverage for CommCell client, application, or subclient content is within an acceptable level.
Snapshot Copy	A snapshot copy of the storage policy is an additional copy of the protected data that is used in IntelliSnap operations. The snapshot backup copy stores the metadata information related to the IntelliSnap feature.
Storage Policy	A logical entity through which data from a subclient is backed up. A storage policy consists of one or more copies that associate data with physical media.
Stubs	Files that point to backed-up and archived data; functionally similar to a Windows shortcut, Macintosh alias, or Unix symbolic link.
Subclient	A logical entity that uniquely defines a unit of data on a client computer.

Commvault Terminology	Definition
Subclient Policy	A logical entity through which configuration of multiple file system subclients within a CommCell management group can be accomplished from a centralized template. A subclient policy consists of one or more subclient templates that contain a common configuration that is applied to target subclients within a CommCell management group.
Synthetic Full Backup	An operation that combines the most recent full backup of the selected data with all subsequent incremental or differential backups and stores the result in a single archive file.
Virtualization	Virtual Server iDataAgent, Microsoft Hyper-V backup software, and VMware backup software is a single product for controlling all aspects of data management from a single console in virtualized environments for both Microsoft Hyper-V and VMware. This includes data protection, archiving, replication, and reporting.

9.2 NetApp E-Series SANtricity Software Documentation

For NetApp E-Series SANtricity software documentation:

<http://support.netapp.com/documentation/productlibrary/index.html?productID=61197>

9.3 Commvault Data Platform V11 Software Documentation

For Commvault Data Platform V11 software documentation:

<http://documentation.commvault.com>

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