FlexPod Express Technical Specifications

FlexPod

NetApp
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TR-4293: FlexPod Express Technical Specifications

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FlexPod Express is a predesigned, best practice architecture that is built on the Cisco Unified Computing System (Cisco UCS) and the Cisco Nexus family of switches, and the storage layer is built by using the NetApp FAS or the NetApp E-Series storage. FlexPod Express is a suitable platform for running various virtualization hypervisors and bare metal operating systems (OSs) and enterprise workloads.

FlexPod Express delivers not only a baseline configuration, but also the flexibility to be sized and optimized to accommodate many different use cases and requirements. This document categorizes the FlexPod Express configurations based on the storage system used, FlexPod Express with NetApp FAS and FlexPod Express with E-Series.

FlexPod platforms

There are three FlexPod platforms:

- **FlexPod Datacenter.** This platform is a massively scalable virtual data center infrastructure suited for workload enterprise applications, virtualization, VDI, and public and private cloud. FlexPod Datacenter has its own specifications, which are documented in TR-4036: FlexPod Datacenter Technical Specifications.
- **FlexPod Express.** This platform is a compact converged infrastructure that is targeted for remote office and edge use cases.

This document provides the technical specifications for the FlexPod Express platform.

FlexPod Rules

The FlexPod design allows a flexible infrastructure that encompasses many different components and software versions.

Use the rule sets as a guide for building or assembling a valid FlexPod configuration. The numbers and rules listed in this document are the minimum requirements for FlexPod; they can be expanded in the included product families as required for different environments and use cases.

Supported versus validated FlexPod configurations

The FlexPod architecture is defined by the set of rules described in this document. The hardware components and software configurations must be supported by the Cisco Hardware Compatibility List (HCL) and the NetApp Interoperability Matrix Tool (IMT).

Each Cisco Validated Design (CVD) or NetApp Verified Architecture (NVA) is a possible FlexPod configuration. Cisco and NetApp document these configuration combinations and validate them with extensive end-to-end testing. The FlexPod deployments that deviate from these configurations are fully supported if they follow the guidelines in this document and all the components are listed as compatible in the Cisco HCL and NetApp IMT.

For example, adding additional storage controllers or Cisco UCS servers and upgrading software to newer versions is fully supported if the software, hardware, and configurations meet the guidelines defined in this document.

Storage Software

FlexPod Express supports storage systems that run NetApp ONTAP or SANtricity operating systems.

NetApp ONTAP

The NetApp ONTAP software is the operating system that runs on AFF and FAS storage systems. ONTAP provides a highly scalable storage architecture that enables nondisruptive operations, nondisruptive upgrades, and an agile data infrastructure.

For more information about ONTAP, see the ONTAP product page.

E-Series SANtricity software

E-Series SANtricity software is the operating system that runs on E-Series storage systems. SANtricity provides a highly flexible system that meets varying application needs and offers built-in high availability and a wide variety of data protection features.

For more information, see the SANtricity product page.

Minimum hardware requirements

This section describes the minimum hardware requirements for the different versions of FlexPod Express.

FlexPod Express with NetApp FAS

The hardware requirements for FlexPod Express solutions that use NetApp FAS controllers for underlying storage include the configurations describe in this section.

CIMC-based configuration (standalone rack servers)

The Cisco Integrated Management Controller (CIMC) configuration includes the following hardware components:

- Two 10Gbps standard Ethernet switches in a redundant configuration (Cisco Nexus 31108 is recommended, with Cisco Nexus 3000 and 9000 models supported)
- Cisco UCS C-Series standalone rack servers
- Two AFF C190, AFF A250, FAS2600, or FAS 2700 series controllers in a high-availability (HA) pair configuration deployed as a two-node cluster

Cisco UCS-managed configuration

The Cisco UCS-managed confirmation includes the following hardware components:

- Two 10Gbps standard Ethernet switches in a redundant configuration (Cisco Nexus 3524 is recommended)
- One Cisco UCS 5108 alternating current (AC) blade server chassis
- Two Cisco UCS 6324 fabric interconnects
- Cisco UCS B-Series servers (at least four Cisco UCS B200 M5 blade servers)
- Two AFF C190, AFF A250, FAS2750, or FAS2720 controllers in an HA pair configuration (requires two available unified target adapter 2 [UTA2] ports per controller)

FlexPod Express with E-Series

The hardware requirements for the FlexPod Express with E-Series starter configuration include:

- Two Cisco UCS 6324 fabric interconnects
- One Cisco UCS Mini chassis 5108 AC2 or DC2 (the Cisco UCS 6324 fabric interconnects are only supported in the AC2 and DC2 chassis)
- Cisco UCS B-Series servers (at least two Cisco UCS B200 M4 blade servers)
- One HA pair configuration of an E-Series E2824 storage system loaded with minimum 12 disk drives
- Two 10Gbps standard Ethernet switches in a redundant configuration (existing switches in the data center can be used)

These hardware components are required to build a starter configuration of the solution; additional blade servers and disk drives can be added as needed. The E-Series E2824 storage system can be replaced with a higher platform and can also be run as an all-flash system.

Minimum Software Requirements

This section describes the minimum software requirements for the different versions of FlexPod Express.

Software requirements for FlexPod Express with NetApp AFF or FAS

The software requirements for the FlexPod Express with NetApp FAS include:

- ONTAP 9.1 or later
- Cisco NX-OS version 7.0(3)I6(1) or later
- In the Cisco UCS- managed configuration, Cisco UCS Manager UCS 4.0(1b)

All software must be listed and supported in the NetApp IMT. Certain software features might require more recent versions of code than the minimums listed in previous architectures.

Software requirements for FlexPod Express with E-Series

The software requirements for the FlexPod Express with E-Series include:

- E-Series SANtricity software 11.30 or higher
- Cisco UCS Manager 4.0(1b).

All software must be listed and supported in the NetApp IMT.

Connectivity requirements

This section describes the connectivity requirements for the different versions of FlexPod Express.

Connectivity requirements for FlexPod Express with NetApp FAS

The connectivity requirements for FlexPod Express with NetApp FAS include:

- NetApp FAS storage controllers must be directly connected to the Cisco Nexus switches, except in the Cisco UCS-managed configuration, where storage controllers are connected to the fabric interconnects.
- No additional equipment can be placed inline between the core FlexPod components.
- Virtual port channels (vPCs) are required to connect the Cisco Nexus 3000/9000 series switches to the NetApp storage controllers.
- Although it is not required, enabling jumbo frame support is recommended throughout the environment.

Connectivity requirements for FlexPod Express with NetApp E-Series

The connectivity requirements for FlexPod Express with E-Series include:

- The E-Series storage controllers must be directly connected to the fabric interconnects.
- No additional equipment should be placed inline between the core FlexPod components.
- vPCs are required between the fabric interconnects and the Ethernet switches.

Connectivity requirements for FlexPod Express with NetApp AFF

The connectivity requirements for FlexPod Express with NetApp AFF include:

- NetApp AFF storage controllers must be directly connected to the Cisco Nexus switches, except in the Cisco UCS–managed configuration, where storage controllers are connected to the fabric. interconnects.
- No additional equipment can be placed inline between the core FlexPod components.
- Virtual port channels (vPCs) are required to connect the Cisco Nexus 3000/9000 series switches to the NetApp storage controllers.
- Although it is not required, enabling jumbo frame support is recommended throughout the environment.

Other requirements

Additional requirements for FlexPod Express include the following:

- Valid support contracts are required for all equipment, including:
  - SMARTnet support for Cisco equipment
  - SupportEdge Advisor or SupportEdge Premium support for NetApp equipment
- All software components must be listed and supported in the NetApp IMT.
- All NetApp hardware components must be listed and supported on NetApp Hardware Universe.
- All Cisco hardware components must be listed and supported on Cisco HCL.

Legacy equipment

The following table lists the NetApp legacy storage controller options.

Storage controller	FAS part number	Technical specifications
FAS2520	Based on individual options chosen	http://www.netapp.com/us/products/storage-systems/fas2500/fas2500-tech-specs.aspx
FAS2552	Based on individual options chosen	http://www.netapp.com/us/products/storage-systems/fas2500/fas2500-tech-specs.aspx
FAS2554	Based on individual options chosen	http://www.netapp.com/us/products/storage-systems/fas2500/fas2500-tech-specs.aspx
FAS8020	Based on individual options chosen	http://www.netapp.com/us/products/storage-systems/fas8000/fas8000-tech-specs.aspx

The following table lists the NetApp legacy disk shelf options for NetApp FAS.

Disk shelf	Part number	Technical specifications
DE1600	E-X5682A-DM-0E-R6-C	Disk Shelves Technical Specifications Supported Drives on NetApp Hardware Universe
DE5600	E-X4041A-12-R6	Disk Shelves Technical Specifications Supported Drives on NetApp Hardware Universe
DE6600	X-48564-00-R6	Disk Shelves Technical Specifications Supported Drives on NetApp Hardware Universe

NetApp legacy FAS controllers

The following table lists the legacy NetApp FAS controller options.

Current component	FAS2554	FAS2552	FAS2520
Configuration	2 controllers in a 4U chassis	2 controllers in a 2U chassis	2 controllers in a 2U chassis
Maximum raw capacity	576TB	509TB	336TB
Internal drives	24	24	12
Maximum number of drives (internal plus external)	144	144	84
Maximum volume size	60TB		

Current component	FAS2554	FAS2552	FAS2520
Maximum aggregate size	120TB		
Maximum number of LUNs	2,048 per controller		
Storage networking supported	iSCSI, FC, FCoE, NFS, and CIFS		iSCSI, NFS, and CIFS
Maximum number of NetApp FlexVol volumes	1,000 per controller		
Maximum number of NetApp Snapshot copies	255,000 per controller		

For more NetApp FAS models, see the FAS models section in the Hardware Universe.

Additional Information

To learn more about the information that is described in this document, see the following documents and websites:

- AFF and FAS System Documentation Center

  https://docs.netapp.com/platstor/index.jsp

- AFF Documentation Resources page

  https://www.netapp.com/us/documentation/all-flash-fas.aspx

- FAS Storage Systems Documentation Resources page

  https://www.netapp.com/us/documentation/fas-storage-systems.aspx

- FlexPod

  https://flexpod.com/

- NetApp documentation

  https://docs.netapp.com

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